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METACOGNITIVE STRATEGY USE IN CHINESE (L1) AND ENGLISH (L2) WRITING: A WITHIN-SUBJECT COMPARISON

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Abstract

Writing is characterized by a dynamic and multifaceted nature, making it a highly sophisticated and demanding language skill. As such, learners must exert significant effort and time to develop writing proficiency no matter in which language context. Successful completion of writing tasks requires not only writers' processing and orchestration of different types of knowledge under individual and contextual constraints but also their active and purposeful management of these endeavours. Metacognitive strategies are a set of mental operations that enable learners to direct, oversee, and regulate their cognitive processes and behaviours. The existing literature has consistently recognized the significant role that metacognition plays in the learning process. However, there is a lack of studies that focus on students' metacognitive strategic use in test-situated writing and its role in final writing performance. Furthermore, Chinese university students might not be metacognitively competent enough to exert effective control over their thinking and behaviours related to writing particularly in the context of an L2 after years of exam-oriented and teacher-centered classroom instruction. Given that writing abilities have always been seen as essential for university students to succeed academically and professionally, this thesis aims to probe into writing metacognitive strategies with an expanded participant pool, including participants from different disciplinary majors and with diverse levels of L2 proficiency. It is also important to note that a large learner population of native Chinese speakers is also learning English as their L2 in mainland China. Previous studies on learners' strategic processes have been conducted in either an L1 context or an L2 context. However, researchers in this vein have rarely based their empirical investigations on a cross-linguistic approach via the within-subject comparison. Therefore, in addition to investigating what kinds of metacognitive strategies Chinese university students employ to undertake the assigned writing tasks, this thesis also compared such strategy use across L1 and L2 settings. Taking the participants' academic major and L2

proficiency level into analysis, it attempts to advance our understanding of the complex L1-L2 transfer mechanism underlying writing, thus further testing Cummins' linguistic interdependence hypothesis (LIH) and the common underlying proficiency (CUP) from a new arena of metacognitive strategies. More specifically, this thesis seeks to examine the main categories of metacognitive strategies, the factorial structure among these categories of metacognitive strategies, the effects of using such strategies on final writing scores, as well as the transfer possibility of metacognitive strategies across L1 and L2 writing contexts.

The former two research questions were addressed in the development and validation procedure of writing metacognitive strategy questionnaires in L1 and L2 contexts respectively. Multiple data collection methods, including focus-group interviews, literature reference, researcher judgment, teacher comment, and student feedback, were reliably applied to conceptualise and build the initial scale of metacognitive strategies in L1 and L2 writing contexts. What followed were statistical factor analyses on questionnaire datasets to reveal the extracted common factors of metacognitive strategies and confirm the factorial structure among them. Exploratory and confirmatory factor analysis (hereafter EFA and CFA) results showed that the participants utilized five main types of metacognitive strategies when accomplishing the assigned writing tasks (i.e., task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating), and these strategies were interacted but distinct from each other to support the hierarchical construct of metacognitive regulation in real time, which works across L1 and L2 writing contexts. Deep insights into the two research questions were also derived from post-task interview responses. These results collectively contributed to refining the theoretical conceptualisation and operationalisation of metacognitive strategies in writing by addressing some of the blurriness and confusion inherent in the definition and categorisation of this construct to a certain extent.

Followed is the mixed-methods investigation into the contribution of metacognitive

strategy use on writing performance and the availability of L1-L2 transfer of such metacognitive skills, combining quantitative analyses of questionnaire responses and writing scores and qualitative analyses of interview data. The results of structural equation modelling (hereafter SEM) confirmed that metacognitive strategy use was a determinant factor of writing performance in both L1 and L2 contexts. In particular, the predictive effects of metacognitive strategies were relatively more robust on L2 writing performance than L1 writing performance. However, a careful inspection of correlation and regression results revealed a mixed picture in which not all the extracted factors of metacognitive strategies were significant contributors to final writing performance. Besides, SEM results supported the L1-L2 transfer of metacognitive strategies in the writing domain. There was also a cross-language facilitation effect of L1 writing metacognitive strategies on L2 writing performance, which was mediated by L2 writing metacognitive strategies. Finally, SEM multigroup analysis failed to identify the statistically significant moderation effect of L2 proficiency and academic major on the observed L1-L2 transfer of writing metacognitive strategies, but the path coefficients were found to be different between higher- and lower-L2 proficiency groups as well as between English major and non-English major groups.

Results obtained in this thesis are extensively discussed to offer theoretical and pedagogical implications in the writing domain. Limitations are also acknowledged critically to suggest directions for researchers to conduct further research to move this field forward.

Keywords: Metacognitive strategies, Chinese (L1) writing, English (L2) writing, transfer, moderation

Publications

Peer-reviewed Journals

Xu, W., Zhao, P., Yao, Y., Pang, W., & Zhu, X. (2023). Effects of self-efficacy on integrated writing performance: A cross-linguistic perspective. *System*, 103065. https://doi.org/10.1016/j.system.2023.103065

Cheong, C., Zhu, X., & **Xu, W***. (2021). Source-based argumentation as a form of sustainable academic skill: An Exploratory study comparing secondary school students' L1 and L2 writing. *Sustainability*, *13(22)*, 12869. https://doi.org/10.3390/su132212869

Xu, W., & Gu, X. (2020). Cognitive validity: A review of its rationale, definition, models and empirical studies. *Contemporary Foreign Language Studies*. *6*, 68-78. (CSSCI indexed, In Chinese)

Liao, X., Cheong, C., **Xu., W**., Pang, W., & Zhu, S**.** (under review). The construct of integrated group discussion (IGD) among undergraduate students: To what extent does group discussion reflect the performance on IGD task?.

Xu, W., Yao, Y., & Zhu, X. (under review). A simultaneous analysis of the relationship among growth mindset, future selves, metacognitive strategy use and L2 writing performance.

Xu, W., & Zhu, X. (under review). Trait and state aspects of metacognitive competence in writing among Chinese EFL learners: Multigroup confirmatory factor analysis and latent mean difference test.

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Conference Abstracts

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List of Abbreviations

L1	First language
L2	Second language
MS	Metacognitive strategies
LIH	Linguistic interdependence hypothesis
CUP	Common underlying proficiency
EFA	Exploratory factor analysis
CFA	Confirmatory factor analysis
SEM	Structural equation modelling
LTH	Linguistic threshold hypothesis
CALP	Cognitive academic language proficiency
BICS	Basic interpersonal communicative skills
KMO	Kaiser-Meyer-Olkin
ML	Maximum likelihood
χ^2	Chi-square statistics
χ^2/df	The ratio of chi-square divided by the degree of freedom
CFI	The comparative goodness-of-fit index
RMR	Root mean residual
RMSEA	Root mean square error of approximation
IFI	The incremental fit index
TLI	The Tucker-Lewis index
T value	The target coefficient index
PCA	Principal component analysis
NMET	National Matriculation English Test

UEEHE	The University Entrance Examination to Higher Education
NEEA	The National Education Examinations Authority
CV	The coefficient of variation

Chapter 1 Introduction

Introduction contains four subsections: research background, research questions, research significance and organisation of the thesis. Research background is written to situate this thesis into research and practical contexts regarding the relationship among metacognition, metacognitive strategies and writing across L1 and L2 settings. The following research questions concisely demonstrate the focused aspects this thesis aims to address. Implications for researchers, teachers, students and other practitioners are presented in research significance. The organisation of the thesis at the end of Introduction offers a summary of all chapters and how these chapters are structured systematically in this thesis.

1.1 Research background

Language learning, including Chinese (L1) and English (L2) learning, plays a vital role in different levels of educational programs for students in China. These students must take Chinese and English as two core subjects from primary school and as two compulsory subjects in universities and colleges. In addition to being part of academic requirements, Chinese and English modalities including listening, speaking, reading, and writing are often tested for educational and/or professional purposes (Cheng, 2008; Qi & Zhang, 2014). Being successful in these authoritative language tests like Gaokao, College English Test (CET) Band 4 and 6, and Putonghua Shuiping Ceshi (PSC) has become a gatekeeper to higher education and work positions (Hu & Mckay, 2012). Specifically, writing is often considered as one of the most sophisticated components in language systems (Harris et al., 2019; Panahandeh & Esfandiari Asl, 2014). Writing instruction has been integral to language education programs from adolescence to adulthood, and students are expected to grasp this literacy skill to meet academic and vocational demands (Harris et al., 2019). However, these writing expectations seem to form a sharp contrast with students' actual writing performance. Despite its commonly recognised importance, inadequate writing skills appear to be a prevalent issue for students worldwide. It

is the same for Chinese students, particularly when they write in a second or foreign language. No matter whether in L1 or L2 context, students in China appear to have limited instructions aiming at teaching students how to write and how to write for learning as well as few opportunities to practice their writing (Graham et al., 2013; Teng et al., 2022). Even worse, the limited writing instruction has long been exam-oriented and teacher-centred, which centres on language-related knowledge such as vocabulary, sentence structure, and discourse organisation. In this way, students are more likely to find themselves exerting many efforts to memorise and recall different levels of linguistic knowledge passively rather than actively engaging in the act of writing to build self-control over their writing behavior and processes (Graham & Harris, 2000). Consequently, it is of paramount importance to identify and address the obstacles that students face in writing with an approach that goes beyond their linguistic knowledge. In this regard, framing the development of writing skills within the scope of metacognition is an essential alternative to strengthening learners' self-regulatory capacity and agency for personal writing (Tseng et al., 2006).

Researchers have directed increasing attention to the link between metacognition and writing over the past decades. The vital role of metacognition in acquiring writing skills has received wide acknowledgement. Metacognition is one unique human ability to observe, reflect on, and manage one's cognitions and behaviors (Negretti, 2012). Flavell (1979) discussed metacognition in a broad range of learning activities. He (1979) argued that metacognition deserves an essential position in "oral communication of information, oral persuasion, oral comprehension, reading comprehension, writing, language acquisition, attention, memory, problem solving, social cognition, and various types of self-control and self-instruction" (p.906). Drawing on Flavell's conceptualisation, Wenden (1998) raised an innovative attempt of applying metacognition into the arena of language learning with a simplified model of metacognitive knowledge, which has become an ongoing source of inspiration for language

researchers and practitioners to identify, describe, and classify the metacognitive aspects embodied in the acquisition of general language proficiency as well as in the learning of specific language skills (Goh, 1997; Negretti, 2012; Zhang, 2001). Moreover, metacognition has been found to be associated with self-regulation and self-regulated learning, which can be framed under the concept of agency (Bandura, 2001) to a greater or lesser degree. Empowering students' agency in their learning process is a fundamental goal of education, especially in the 21st century when facing a rapidly changing and complex world. Autonomous learning cannot be divorced from the development of metacognitive competence that allows for positive self-awareness and self-regulation of cognitive endeavors, thus leading to higher learning motivation and engagement. Depending on their metacognitive competence, learners are hoped to self-initiate, self-monitor, and self-regulate any thoughts and behaviors involved in the writing process, which in turn constitutes a step to assume responsibility for their own learning of writing and grow into independent and autonomous writers. However, after years of product-oriented writing instruction emphasising the accumulation of linguistic knowledge, Chinese students, in most cases, are passive recipients and tend to fail in self-regulating their writing processes successfully (Ruan, 2014; Teng et al., 2022). Therefore, it is indeed essential to consider metacognition in writing to provide illuminative insights into writer agency and autonomy.

Writing is a problem-solving activity involving processing different types of knowledge and coordinating multiple cognitive operations (Abdel Latif, 2021). It is more likely to be a meaning-making process instead of a pure demonstration of accumulated knowledge (Seow, 2002). As a result of the shift from behaviorism to cognitive sciences in the 1970s, research in the field of writing has seen the foci switching from a product-oriented approach to a process-oriented approach for the past four decades, and there is a growing interest in examining language learners' cognitive processes or strategies when engaged in writing (Bai, 2015; Bai

et al., 2014; Cumming, 1989; Manchón et al., 2007; Wong, 2005). This valuable scholarship moves this field forward and provides systematic taxonomies to identify and characterise strategic behavior specific to writers (Guo & Huang, 2020). A careful review of these strategy taxonomies reveals that the classification of writing strategies primarily draws on four common subcategories, i.e., metacognitive, cognitive, social, and affective strategies (Ardnt, 1987; Sasaki, 2000; Victori, 1995; Wenden, 1991). Some researchers hold that there is a hierarchy for writing strategies in which metacognitive strategies play a more critical role in supervising other types of strategic operations (Anderson, 2005; McDonough, 1999; Vandergrift, 2002). Writers without metacognitive control are more likely to write without direction and opportunity to prepare before the task, monitor during the task, and evaluate following the task. Around the same time, there is a pressing need to give greater weight to metacognition in language learning strategies to hold the premise of tapping into learners' self-awareness and self-direction traits (Anderson, 2008; Dörnyei & Ryan, 2015; Victori & Lockhart, 1995). In response to this need, the present thesis thus focused closely on the dynamic aspect of metacognition in writing, that is, writing metacognitive strategy use, to better understand its intricate relationship with academic achievements and the vital role in keeping and transferring strategy use across a range of writing stages and contexts (Cohen, 2014; Griffiths, 2013; O'Malley & Chamot, 1990).

Due to the problem-solving nature, the production of written texts requires processing different levels of linguistic knowledge as well as higher-level metacognitive competence over these processing in both first language (L1) (Hayes, 2012) and second language (L2) (Hyland, 2019) contexts. Researchers have consistently pointed out the importance of metacognitive strategies in developing students' written composition skills (Lee & Mak, 2018; Teng & Huang, 2019; Zhang, 2016). Specifically, student writers in L1 writing need strategies related to interpreting the task requirements, constructing and executing the plan, engaging in real-time

monitoring, and evaluating the participation in the writing process and the quality of final writing texts so as to achieve successful writing performance (Schoonen et al., 2010; Teng et al., 2022). These metacognitive strategies take a more prominent role in the L2 writing context, during which they are faced with more challenges rooted in cognitive, linguistic, and affective arenas (Hirvela et al., 2016). In this respect, L2 learners are compelled to rely more heavily on metacognitive strategies due to their restricted linguistic knowledge and the constraints imposed by cognitive resources when processing automatisation is insufficient (Skehan, 1998). With valuable insights from multiple methods, this thesis is expected to provide meaningful information about Chinese EFL learners' metacognitive strategic behaviors in completing L1 and L2 writing tasks.

Research on the relationship between metacognitive competence and listening (Bourdeaud'hui et al., 2021; Goh, 2008; Goh & Hu, 2014; Zhang & Goh, 2006), speaking (Forbes & Fisher, 2018; Lam, 2010; Zhang et al., 2021), and reading (Zhang, 2010; Zhang & Goh, 2006) has proliferated, the role of metacognition in writing performance is relatively not well understood (Lee & Mak, 2018). In this vein of studies, researchers have attempted to utilise different methods, qualitative or quantitative, including questionnaires, think-aloud, retrospective interviews, and keystroke logging to capture writers' strategic processes (Chan, 2017; Teng et al., 2022; Zhao & Liao, 2021). However, there is no single perfect method for the possible limitations such as veridicality and reactivity risks. Writers' self-reports of their metacognitive strategies are possibly influenced variably or in an intended way by the data collection methods that researchers adopt in their study. It can be seen that the triangulated data sources would help to obtain a fuller and more accurate understanding of thoughts and behaviors involved in the writing process. In addition, the limited number of studies on writing metacognitive strategies tend to focus on the L2 context while less attention has been paid to the L1 one. Therefore, the present thesis is hoped to extend the existing literature by

investigating and comparing undergraduate students' metacognitive strategy use and its effects on L1 and L2 writing performance with triangulated insights from both quantitative and qualitative methods.

Noticeably, a large number of students who speak Chinese as their L1 are learning English as an L2 in China. Research on biliteracy acquisition affords benefits to understanding the interactions between the two languages among the large bilingual population. Writing in L1 is a cognitively demanding task for Chinese students. Writing in L2 remains an even more challenging task for these students since the underlying abilities are less developed than in L1, and the retrieval and execution of linguistic knowledge is an even more effortful process (Schoonen et al., 2003). Although a substantial body of studies on writing strategies have achieved fruitful results, few attempts have focused on metacognitive strategies and comparatively examine students' strategic behaviour in L1 and L2 contexts, thus largely ignoring the potential transferability of such strategy use underlying writing and the way by which L1 and L2 writing interact within the Chinese-English bilinguals. As Cumming et al. (2000) argued, both L1 and L2 resources were available for L2 writers to utilise strategically during the writing process. The extant studies on cross-linguistic transfer in writing have focused on the surface linguistic level of writing products while less attention was paid to the hidden composing process. As part of the writing process, the transferability of metacognitive strategies tends to be an even more under-researched area. As a large number of students who speak Chinese as their L1 are learning English as an L2 in China, research on biliteracy acquisition affords benefits to understanding the interactions between the two languages among the sizeable bilingual population in the domain of writing.

To sum up, this thesis examines Chinese EFL learners' metacognitive strategic profiles in writing, strategy effectiveness, and the transferability across L1 and L2 contexts by triangulating multiple data sources. To be specific, the objectives of this thesis are thus fourfold:

1) to investigate the main categories of metacognitive strategies that students deployed to complete the Chinese (L1) and the English (L2) writing tasks; 2) to validate the internal structure of the extracted factors for metacognitive strategies in both writing contexts; 3) to examine the predictive effects of metacognitive strategy use on L1 and L2 writing performance respectively; and 4) to explore the extent to which the reported L1 metacognitive strategies are similar to the L2 ones as to inform the cross-linguistic transfer underlying writing skills and whether such cross-linguistic transfer is moderated by the participants' academic major and L2 proficiency. By adopting a narrower lens to focus on metacognitive strategies in L1 and L2 writing, this thesis provides comparative insights into the strategic behaviour featuring self-control in this field, which in turn affords better explanations for the courses and outcomes from both writing tasks. The results of this thesis are expected to inform this field empirically, theoretically, and practically. They offer empirically meaningful information for researchers who are interested in metacognitive writing strategies in both L1 and L2 contexts. Theoretically, this thesis represents a rare empirical attempt to test the cross-linguistic hypotheses from the perspective of strategic competence underlying writing and the possible moderation effects of academic major and L2 proficiency. Given the teachability and malleability of metacognitive strategies, the findings of the thesis also highlight the potential for educators and practitioners to incorporate metacognitive strategy instruction effectively in the L1 and L2 writing classrooms.

1.2 Research questions

As a whole, the current thesis is conducted to address the following four research questions:

(1) What are the main types of metacognitive strategies do students use when completing L1 and L2 writing tasks?

(2) What structural models can better represent the dimensions of L1 and L2 writing

metacognitive strategies?

(3) To what extent do students' metacognitive strategies predict their L1 and L2 writing performance respectively?

(4) Is there a cross-linguistic transfer of metacognitive strategies underlying L1 and L2 writing? If so, do L2 proficiency and academic major moderate such transfer?

1.3 Research significance

This thesis focuses on metacognitive strategy use and its association with L1 and L2 writing performance via a triangulation of multiple quantitative and qualitative datasets. It examines and compares what metacognitive strategies Chinese undergraduate students employ to complete the assigned writing tasks and the predictive effects of such strategies on their writing performance across L1 and L2 contexts. The findings are expected to provide insights into the relationship between metacognition and writing performance from a cross-linguistic perspective. Research significance can be shown in the following theoretical and practical aspects. Firstly, it provides a fuller picture of writers' metacognitive regulation when performing L1 and L2 task-situated writing. With multiple data sources, it further fine-tuned the concept of metacognitive regulation and its stability across L1 and L2 contexts, thus extending the existing literature. To be a self-regulated writer, students should think critically and manipulate their cognitive endeavors and actions analytically when producing a text. Therefore, knowledge about metacognitive strategic operations will be desirable to enhance students' self-regulation in writing and their learning autonomy. The developed questionnaire of metacognitive strategies can be a valid diagnostic tool for learners to assess their control of mental activities and behaviors during the writing process and for teachers to support writing development by cultivating students' metacognitive regulation competence. Secondly, gaining knowledge of the associations between metacognitive strategies and writing performance could

contribute to a better understanding of individual differences in the process of writing and the difficulties that prevent students from achieving further writing development. In this way, it prompts a new arena for future writing pedagogy with more attention paid to writers' agency and empowerment in their writing development. Accordingly, suggestions will be offered to facilitate metacognitive instruction in writing classrooms in line with the pedagogical implications proposed in this thesis. To facilitate teachers' preparation for metacognitive strategy instruction, it is necessary to discern how students employ metacognitive strategies and the predictive effects of such strategies on writing performance. Besides, adding the learning to metacognitively regulate orientation into the pedagogical agenda can empower teachers to think of writing beyond a purely linguistic level and thus help students to seek deeper awareness and conscious control of their writing process. It can also sharpen their understanding and skills of learning since the regulating-metacognitively-to-learn approach lends itself to achieving learning efficiency and constructive development of higher-level thinking. Thirdly, the within-writer comparison provides insights into the theoretical understanding of the transfer phenomenon underlying L1 and L2 writing from a perspective of metacognitive strategies. The vast majority of research on writing strategies has been conducted within a single context of either L1 or L2, while we know relatively little about the possible interactions between the two. Thus, this thesis is hoped to provide implications for interpreting how L1 and L2 writing processes interact intricately and afford valuable knowledge about bilingual development. It tests Cummins' LIH assumption and CUP notion in writing from the perspective of metacognitive strategies with particular attention to individual characteristics of academic major and L2 proficiency. L2 writers are not blank slates when they move into L2 writing. Examining cross-linguistic transfer is crucial for developing effective pedagogical interventions to promote the successful acquisition of literacy skills in both languages. Specifically, the findings can move forward with the cross-linguistic

perspective by helping learners accelerate their L2 acquisition by capitalising on the literacy skills they have already acquired in L1.

1.4 Organisation of the thesis

The whole thesis comprises six chapters, which work together to form a fine-detailed portrayal of students' metacognitive strategies in L1 and L2 writing with a valid theoretical foundation and triangulated data sources.

Chapter 1 is the Introduction, briefly introducing the research background, questions, significance, and organisation of the whole thesis. Research background helps situate this thesis within the broad literature of metacognition and writing to demonstrate the practical, theoretical, and empirical need for conducting the cross-linguistic examination of metacognitive strategies in the writing domain. Then, it comes to research questions. The four research questions collectively delineate specific inquiries that the thesis aims to address and guide the whole research design. By proposing the four focused questions, I can gather and analyse relevant data and explore metacognitive strategies in a progressive and systematic manner. Research significance elaborates on the implications that this thesis is expected to offer based on the obtained results. It provides valuable information for researchers interested in metacognitive strategies that university students employ in task-situated writing and their predictive effects and L1-L2 transferability with a mixed-method design as well as pedagogical implications for educators and practitioners to nurture metacognitively competent writers.

Chapter 2 is an extensive review documenting existing literature on metacognitive strategies and cross-linguistic transfer, especially regarding the writing domain. Beginning with a profound conceptualisation of writing abilities, it points out the need to explore metacognitive aspects in this domain. What follows is an overview of the historical development of metacognition, the writing process, and the intricate connections between them. Then, it

narrows down to theoretical and empirical studies of metacognitive strategies in writing. Critical review and discussions on these studies reveal the possible gaps in the existing literature. At the end of this section is the overview of the L1-L2 transfer theoretical assumptions and empirical investigations in the domain of writing to demonstrate the importance of the cross-linguistic perspective. Considering the limited number of within-subject comparison studies, this thesis is conducted to examine writers' actual use of metacognitive strategies in both L1 and L2 writing contexts, how such strategy use influences final writing performance, and whether metacognitive skills can be included in the common underlying proficiency shared by L1 and L2 writing.

Chapter 3 focuses on what metacognitive strategies were employed by university students to accomplish L1 and L2 writing tasks and the factorial model among different types of writing metacognitive strategies in this study. Multiple methods helped to generate and develop the initial scale of metacognitive strategies in writing. Then, it was administered to a large sample of sophomore students and validated with EFA and CFA. EFA results revealed five strategy factors in both L1 and L2 questionnaire datasets. Thus, five main types of metacognitive strategies that the participants used during the L1 and L2 writing processes were found: task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating. CFA results confirmed the fitness of first- and second-order models to questionnaire datasets. In this way, it was further revealed that the extracted factors of metacognitive strategies were correlated with each other and coordinated to form the hierarchical construct of metacognitive regulation, which was consistent across L1 and L2 contexts.

Chapter 4 is written to demonstrate the effects of metacognitive strategies on students' final writing performance and the possible L1-L2 transfer of metacognitive regulation. It investigates to what extent metacognitive strategies predict L1 and L2 writing performance at the global, factor, and item levels. Metacognitive strategies had predictive effects on writing

performance that were not constrained by L1/L2 context. However, the specific coefficients varied across the two language contexts. By gauging the structural relationships among L1 writing metacognitive strategies, L2 writing metacognitive strategies, L1 writing performance, and L2 writing performance simultaneously, it tests the L1-L2 transferability of metacognitive strategies underlying writing. Metacognitive strategies were transferrable between L1 and L2 writing contexts. L1 writing metacognitive strategies were found to contribute to L2 final writing performance in an indirect way. Furthermore, whether the participants' L2 proficiency and academic major inhibit or facilitate the L1-L2 relationships is also explored to provide further information about the complex L1-L2 transfer mechanism in the writing domain.

Chapter 5 elaborates on discussions in terms of the four proposed research questions. In comparison to the results in previous studies, it provides in-depth and profound interpretations of the different taxonomies of metacognitive strategies, the inconsistent effects of the identified metacognitive strategies on writing performance, the relationship between L1 and L2 metacognitive strategy use, the cross-linguistic facilitation of metacognitive strategy use, and the lack of significant moderation of L2 proficiency and academic major on L1-L2 transfer.

Chapter 6 is the final concluding part of the present thesis. It first summarises the main findings in relation to the proposed research questions. Based on these findings, several implications are offered for researchers, educators, and other practitioners in this field. Finally, the limitations should be acknowledged at the end to provide suggestions for future considerations as well as inquiries of cross-linguistic comparison of metacognitive skills especially in writing acquisition and generally in language learning.

1.5 Summary

The introduction chapter opens this thesis by providing necessary background information concerning the research, theoretical, and practical needs of examining Chinese EFL learners'

metacognitive strategies in writing with a cross-language perspective. Then, it moves towards presenting the specific research questions this thesis intends to address. The following section showcases the significance of findings for the research community, practitioners, and learners under investigation. It ends with the organisation, which aids readers' transition into the detailed content of subsequent chapters.

Chapter 2 Literature Review

In the Literature Review, the extant literature concerning the ability to write, the conceptualization of metacognition, the role of metacognition in established writing process models, the relationship between metacognitive strategies and writing performance, and L1-L2 transfer potential and moderation of individual features on such transfer are critically reviewed and discussed.

2.1 The ability to write

Writing is a productive skill that urges the writer to generate and convert abstract ideas into a concrete written form. It is a broad, multi-dimensional, situated, and contextual construct (Slomp, 2012). When writers compose a text, they must simultaneously work on a range of linguistic and content knowledge under the joint influence of internal and external factors. At the most basic level, it is a physical act that carries out words and thoughts in a written modality, such as writing a letter and typing an e-mail. More importantly, writing is a complex mental act of creating ideas, thinking about how to express these ideas with strings of languages, and organising them into a structured discourse adapted to the reader's needs and the writer's goals (Nunan, 2003). Although writing is one of the most sophisticated and challenging components of a language system (Panahandeh & Esfandiari Asl, 2014), it is highly valued in educational and professional settings. The manifest importance of writing ability is not only shown in personal and social advancement but also reflected in the success of other aspects of society regardless of language contexts (Eckes et al., 2016). It is a communication tool for us to maintain personal connections even when we are unable to come face-to-face (Graham et al., 2013). It is also a tool for learning reflected by constructing and reconstructing knowledge as well as developing our thinking and reasoning (Graham et al., 2020). Writing has become an integral part of contemporary human life as we use writing to communicate, record and transmit information, influence others, describe events, express emotions, entertain and build aesthetics,

and accomplish various tasks in academic studies and professional work.

A final product of writing alone offers little information about the complexities embedded in writers' minds, while writing process research has very important implications for developing a more robust construct of writing in theory, assessing it from a developmental perspective, and teaching it in an effective way. In its very nature, writing is a problem-solving activity involving the processing of different types of knowledge and the coordination of multiple cognitive operations (Abdel Latif, 2021). As a result of the shift from behaviorism to cognitive sciences in the 1970s, a growing number of writing studies have been conducted to unveil the process that gives rise to written essays (Bai, 2015; Bai et al., 2014; Wong, 2005). This valuable scholarship moves this field forward and provides systematic models to depict both global and local composing processes (Guo & Huang, 2020). These models outline the process of writing by addressing what cognitive processes are involved in writing, what knowledge is needed for writers to compose a text, and what other factors may play a role in the writing process. Despite labelling differences in these notable models (Scardamalia & Bereiter, 1987; Flower & Hayes, 1980; Hayes, 1996; Kellogg, 1996; Zimmerman & Reisemberg, 1997), writing is commonly characterised as a recursive process following a cognitive plan in which the writer activates linguistic and content knowledge to generate ideas, formulates a text with appropriate languages, reviews and revises the produced text.

Moreover, the process of writing is characterised by self-initiation, self-direction, and self-sustainability, necessitating the effective management of the knowledge, skills, and processes involved in composing as to achieve the writers' goals within the constraints imposed by the writing task and the writing environment (Zimmerman & Reisemberg, 1997). The written text production calls upon the retrieval and application of different levels of linguistic knowledge as well as the metacognitive control during the writing process in both L1(Hayes, 2012) and L2 (Hyland & Hyland, 2019) contexts. Suffice it to say, writing development belongs to

learners who can self-initiate, self-direct, and self-regulate their writing process and products successfully (Sasaki et al., 2018). In other words, the possession of metacognitive competence, which enables individuals to monitor and control cognitive endeavours and behaviours, is crucial for making progress in writing. It is an essential factor determining the success of language learning for its influence on learning effectiveness and cognitive engagement (Wenden, 1998). As research suggests, metacognitive competence has both predictive and mediation effects on L1 writing performance (Schoonen et al., 2010), and these effects are more prominent when students write in an L2, during which they are faced with more challenges that are rooted in cognitive, linguistic, and affective arenas (Hirvela et al., 2016). There is a proliferation of research on the relationship between metacognitive competence and listening (Bourdeaud'hui et al., 2021; Goh, 2008; Goh & Hu, 2014; Zhang & Goh, 2006), speaking (Forbes & Fisher, 2018; Lam, 2010; Zhang et al., 2021), and reading (Zhang, 2010; Zhang & Goh, 2006), while less attention has been paid to the role of metacognition in writing task performance in both L1 and L2 contexts (Lee & Mak, 2018).

As a vital component of language learning and assessment, educators have been concerned with the ways by which language learners are cultivated with adequate written literacy. It entails equipping students with the ability to produce essays across multiple genres and utilise writing to convey, organise, analyse, construct, and create content knowledge. However, these writing expectations seem to be in a sharp contrast to learners' current writing situation. In China, as well as in many other countries, research has shown that there is a paucity of opportunities for students to hone their writing skills, and the amount of instruction devoted to teaching students how to write and how to write for learning is often insufficient (Graham et al., 2013; Teng et al., 2022). Furthermore, limited writing instruction that occurs in China has been focused solely on language-related knowledge, such as vocabulary, sentence structure, and discourse organisation, neglecting the active aspect of writers. Even worse, many writing

instructors continue to view the teaching of writing as assigning writing tasks, giving feedback, and dedicating excessive time to correcting errors in students' composition texts. As a result, students are more likely to find themselves exerting many efforts in passive memorisation and recall of different levels of linguistic knowledge rather than actively engaging in writing processes and building self-control skills (Graham & Harris, 2000). This deficiency in writing instruction possibly has significant consequences for students' academic performance, as writing is a crucial component of academic success across disciplines. As such, it is imperative for educators to prioritise writing development by providing students with ample opportunities to have active engagement and develop metacognitive control skills. Accordingly, empirical research is warranted to enhance our knowledge of students' de facto state of metacognitive competence in the writing domain.

Writing in L1 is a cognitively demanding task since it draws upon the involvement of various linguistic domains as well as cognitive and higher-order metacognitive abilities. Writing in L2 can prove an even more challenging task for students in China since these underlying abilities are less developed than in L1 (Schoonen et al., 2003). Due to its heightened presence and predictive effects in writing across a wide range of schooling settings, metacognition represents an important angle in explaining variations among individual writing proficiency and writing-related problems. When students are involved in self-directed planning, monitoring, and evaluating during the course of writing to fulfil problem-solving and decision-making aims, those metacognitive regulations materialise the prosperity of time and energy in approaching the writing task at hand, overcoming difficulties that may arise, and implementing strategies to progress smoothly. This is particularly salient in higher education, where students are often prompted to draft argumentative essays as part of their academic coursework and assessment programs. When producing an argumentative text, students are required to articulate and support their perspectives by grappling with conflicting information embedded

in a controversial topic. The need for regulating mental cognitive processes and actions is more pronounced when completing such writing tasks. Therefore, it is essential to explore students' writing dilemmas from a perspective beyond mere linguistic domain and consider the role of metacognitive capacity in regulating and controlling any endeavours in the writing process.

The review in this section provides a succinct introduction to writing ability, encompassing its nature, significance, processes, and the necessity of metacognitive regulation and control. No matter the language context, writing is intricately connected to creativity and critical thinking, particularly in the argumentative genre, in which students are required to engage in analytical thinking and present their perspectives cogently. The exploration of metacognition in writing adds a positive means of promoting writing ability and transforming conventional writing instruction and practices into self-directed and self-managed experiences.

2.2 Metacognition and writing

2.2.1 Metacognition

Metacognition is broadly defined as cognition about cognition or thinking about thinking (Anderson, 2008; Flavell, 1979), which allows students to be aware of and assert control over their cognitive endeavours to enhance learning. Flavell was among the first to propose the concept of metacognition in his article published as one chapter of the book *The Nature of Intelligence* (1976). Based on the research examining children's self-reflection on thoughts, Flavell defined metacognition as "one's knowledge concerning one's cognitive processes or anything related to them, e.g., the learning-relevant properties of information or data. For example, I am engaging in metacognition if I notice that I am having more trouble learning A than B; if it strikes me that I should double check C before accepting it as fact" (1976, p.232). It involves "the active monitoring and consequent regulation and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service

of some concrete goals or objectives" (p.232). Flavell (1979) later condensed the metacognition concept as "knowledge and cognition about cognitive phenomena" (p.906). Metacognitively competent learners are assumed to exhibit critical thinking of the learning process, employ a diverse array of strategies, and demonstrate adaptability to changes and challenges efficiently, thereby improving learning outcomes and effectiveness and leading to greater learning self-regulation and autonomy (Gourgey, 2001; Hartmann, 2001; Wenden, 2002)

Research on metacognition has its root in the field of cognitive and developmental psychology before the 1980s. It thrived for the publications of a respectable body of theoretical and empirical inquiries conducted by a cohort of cognitive psychologists. As they proposed, metacognition is closely associated with the "executive control" system of our mind, which entails higher-order cognitive processes supervising our knowledge, thoughts, and behaviours consciously (Miller, 2000). Such conceptualisation implies intentions and goal orientation in the metacognition construct (Roebers, 2017). It enables learners to "apply, monitor, and regulate strategy use; develop insight into their strengths and weaknesses; and use such insights to improve their learning" (Lee & Mak, 2018, p.1805). Nevertheless, there is still blurriness about the conceptualisation of metacognition in terms of its nature, function, and developmental route despite the proliferation of definitions and classifications proposed in recent decades (Flavell, 1982; Schraw & Moshman, 1995). Some scholars even asserted that metacognition was not a worthwhile topic to be investigated due to considerable unsettled debates among metacognition theories. However, it is not an ideal objective to propose a universally applicable and inclusive conceptualisation of metacognition, nor is it necessary to debate the level of precision among different definitions and classifications as researchers may operationalise and categorise metacognition differently based on their theoretical background and research situations (Haukås, 2018; McCormick et al., 2013). The conceptual blurriness does not mean that metacognition is a vague concept not worthy of empirical inquiry. There

are numerous questions and issues of metacognition warranting exploration and discussion for its manifest value in learning success.

Interest in metacognition continues to revive after the publication of a series of works by Nelson and his colleagues (Nelson, 1996; Nelson & Narens, 1990; Nelson et al., 1994). They proposed an influential monitoring-and-control model of metacognition, which contained two interrelated levels of our cognitive system: the meta-level and the object-level (Shimamura, 2008; Son & Schwartz, 2004). The lower level, namely the object level, involves separate components of cognitive function, such as phonological encoding and semantic processing, to receive and process information flow. The meta-level is responsible for mobilising and managing cognitive processing at the object level through the monitoring and controlling function. Thus, metacognition plays a dual role in learning: forming a representation of our cognition and exerting control over our cognition according to the built representation (Efklides, 2006). As the above formulations show, metacognition is more concerned with cognition in its very nature. Worth noting is that metacognition is not a constant system arising from the vacuum mind despite the reinforcing cognitive nature in previous conceptualisations. In addition to being a cognitive enterprise arising from the individual mind, researchers, in recent years, have also been cognizant of the fact that metacognition is susceptible to social, contextual, and cultural differences after decades of the prevalence of sociocultural perspectives (Gao & Zhang, 2011).

Wenden (1998) raised the innovative application of metacognition in the field of language learning and teaching as an effort to highlight the need to guide learners to reflect upon and refine their beliefs and knowledge about acquiring a language. As commented by Wenden, how well learners perceive and understand learning, namely metacognitive knowledge, has a significant impact on how they approach learning activities and what they expect to achieve from their efforts. Although researchers have a general consensus about the importance of

metacognition, there has been a lack of explicit discourses on this concept within the realm of language studies. Explicit discussions of such knowledge in this realm have the potential to advance our understanding of language acquisition by acknowledging the active role of learners themselves as well as providing informed support to language pedagogy practices. Nevertheless, she transferred metacognition theory mainly with a simplified knowledge component model. More recently, researchers have expanded further the notion of metacognition in the field of L1 and L2 writing with a tripartite conceptualisation, including metacognitive knowledge, experiences, and regulation (Teng & Zhang, 2022; Zhao & Liao, 2021; Zhang & Qin, 2018). The subsequent text seeks to elucidate the influential framework of metacognition to acknowledge what constitutes this construct with particular emphasis on its dynamic facet, which is indeed the central issue of this thesis.

Flavell (1979) proposed and outlined a cognitive monitoring model to delineate the constituent structure of metacognition. In this model, metacognition plays a role mainly through the interactions among four interrelated components: metacognitive knowledge, metacognitive experience, goals (or tasks), and actions (strategies) (see Figure 2.1). Metacognitive knowledge is defined as knowledge or beliefs about the factors that may have an impact on the process and product of cognitive activities. Beneath metacognitive knowledge are three types of knowledge in line with person, task, and strategy respectively. Person knowledge involves the knowledge about the individuals as cognitive processors (Wenden, 1998). Task knowledge refers to information available for the learner to understand the nature, purposes, and requirements of any learning task. Another subcategory of metacognitive knowledge is strategy knowledge concerning what strategies can be used to complete the cognitive task at hand and their relative effectiveness. Metacognitive experiences, along with a cognitive enterprise, can be characterised as being cognitive and affective in nature. These experiences may be simple or complex in content and momentary or somewhat lengthy in time

duration. For example, learners may experience a brief sense of puzzlement that can be easily ignored, and they may also find themselves reflecting and making a judgment on the comprehension of a passage they just read for a relatively long time. Goals (or tasks) include "the objectives of a cognitive enterprise", and actions (or strategies) refer to the cognitive operations or behaviours needed to fulfil these goals. Metacognitive knowledge and metacognitive experiences act upon each other and even form some partially overlapping sets in any cognitive tasks. On the one hand, metacognitive experiences lead to the addition, deletion, and revision of metacognitive knowledge. To illustrate, the relationship among goals, strategies, metacognitive experiences, and task outcomes that a learner observes can be assimilated into the existing metacognitive knowledge. On the other hand, metacognitive knowledge empowers the learner's understanding of metacognitive experiences and the signal imposed on any cognitive actions. However, Flavell's model of cognitive monitoring mainly focuses on the static knowledge structure of metacognition, while its dynamic facet is underestimated to some extent. As Zhang and Zhang (2013) argued, "metacognition should be treated as dynamic systems, and it should be construed as something embedded in language learners, which is intertwined with many modifiable variables, both cognitive and sociocultural (p.114)".
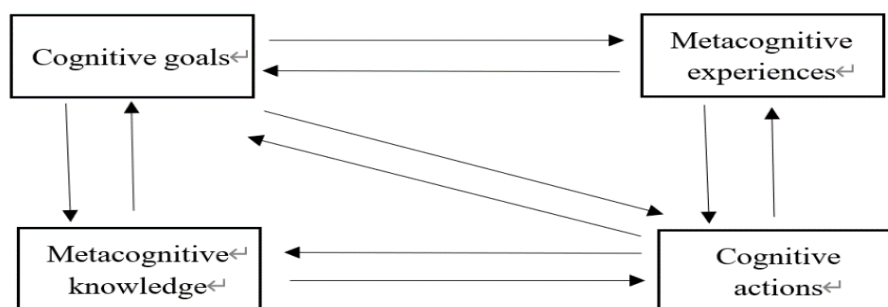
Figure 2.1 The cognitive monitoring model proposed by Flavell (1981)

Brown (1987) underscored the dynamic facet of metacognition and raised another attempt at modelling metacognition in which knowledge of cognition is distinguished from regulation of cognition. As he defined, knowledge of cognition consists of what the learner knows about

their cognition as well as the learning environment, which remains relatively stable within individuals. Three different types of awareness are identified after knowledge of cognition: declarative, procedural, and conditional knowledge (Brown, 1987; Schraw & Moshman, 1995). Declarative knowledge, on what aspect of our cognition, contains accumulated information about a learner's general cognitive abilities and other influential factors involved in the learning process. Resonating earlier proposals, declarative knowledge provides the factual accounts of self, tasks, and strategies involved in any learning activities. Research has suggested that skilled learners who possess more declarative knowledge are better able to use what they know to accomplish a learning task efficiently (Gourgey, 2001). Procedural knowledge concerns how something occurs in a particular way, which is used throughout the execution stage of any learning task. Individuals who possess extensive procedural knowledge are inclined to employ strategies and skills effortlessly and efficiently, thus improving problem-solving performance. Finally, "when" and "why" to perform these cognitive actions fall under conditional knowledge. Increasing students' conditional knowledge helps them make informed decisions when they are doing the cognitive task, for example, making plans and allocating cognitive resources selectively and employing strategies appropriately in line with task conditions. Regulation of cognition comprises metacognitive skills that afford learners' conscious regulation of their learning process via the interplay between multiple metacognitive strategies and posed cognitive loads (Harris et al., 2009). A few metacognitive skills have been identified in the existing literature as the regulation components, among which three core ones are planning, monitoring, and evaluating. With the ability to plan, learners select appropriate strategies and allocate cognitive resources before they perform a given task, which can be instantiated in making predictions, setting goals and making plans to achieve the goals, sequencing the learning procedure, and allocating time and attention. Monitoring allows for online awareness and checking of comprehension and production performance as to ensure the learning is on

track. Evaluating involves the self-appraisal of both the learning experience and outcome. Typical examples of evaluation consist of assessing whether the pre-determined goals are met or not and diagnosing possible problems. Knowledge of cognition and regulation of cognition coexist interdependently (Aydın & Ubuz, 2010; Schraw, 1994; Teng, 2020). They intimately interact with each other and jointly lead to individual differences in learning attainments.

In a recent categorisation, Dunlosky and Metcalfe (2009) further divided metacognition into three distinct aspects: metacognitive knowledge, monitoring, and control. Regardless of differences in metacognition conceptualisation reviewed above, researchers have mostly agreed on some common parts of metacognition theory (see Figure 2.2): metacognitive knowledge serves as a fundamental constituent component; metacognitive strategies or skills play a role in the execution procedure to facilitate learners to have control over their cognitive actions which in turn form and reshape their metacognitive experiences; and the accumulation of metacognitive experiences play a role in informing and updating existing metacognitive knowledge and strategies (Lee & Mak, 2018). Although there is some disagreement with respect to conceptual meaning and constituent labelling in metacognition theories, the consensus is that metacognition plays a pivotal role in learning and attainment (Anderson, 2005; Higgins et al., 2005). Yet a plethora of empirical studies on learning strategies have been conducted in a range of learning areas, and relatively little is known about how metacognitive knowledge and strategies come into play in the success of language learning (Li & Larkin, 2017). As Sinclair (2000) argued, without conscious awareness and regulation of the language learning process, learners would struggle to make informed decisions about learning and to initiate and direct their thoughts and behaviors effectively. Thus, this thesis aims to fill this gap with an empirical investigation tapping into what kinds of metacognitive strategies Chinese EFL learners employ to complete their L1 and L2 writing and how these strategies may affect their writing performance.
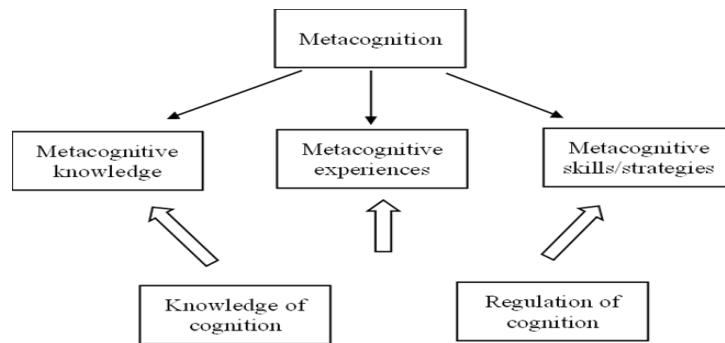
Figure 2.2 Components of metacognition (Lee & Mak, 2018, p.1087)

2.2.2 Metacognition in writing process models

Writing is an important tool for expressing and exchanging thoughts, introducing and describing events, and presenting and transmitting information (Flower & Hayes, 1981). Students who cannot write nicely are possibly at a terrible disadvantage in extending learning development and gaining future employment (Harris et al., 2009). Adequate writing skills are not simply attributed to linguistic processing but also to metacognitive knowledge and regulation (McCormick, 2003) since writing is a constructive process that requires deliberate and analytical regulation to produce an intended written product. The value of metacognition in writing development and attainments has already been acknowledged in theoretical attempts to model the composing process (Dimmit & McCormick, 2012; Harris et al., 2009). As these writing models depict, metacognition seems to be ubiquitous throughout the entire composition process, during which students plan, monitor, and evaluate their composing thoughts and behaviour (Scardamalia & Bereiter, 1987; Flower & Hayes, 1981; Hayes, 1996; Kellogg, 1996; Zimmerman & Reisemberg, 1997). To better understand how metacognition influences the development of writing expertise, it is necessary to review and delineate these influential writing models that have evolved during the past few decades with a focus on metacognitive control. In this section, metacognitive involvement is identified and addressed in these influential writing models.

Flower and Hayes' model of writing (1981) has garnered substantial recognition as one of

the most influential models in the realm of language education and applied linguistics. As is shown in Figure 2.3, their model conceptualises writing as a goal-oriented and problem-solving process that entails a complex interplay among three key elements, i.e., task environment, the writer's long-term memory, and writing processes. The task environment contains all factors external to the writer, beginning with the initial rhetorical problem and extending to the evolving text as composing proceeds. A writing assignment is a simplified version of the rhetorical problem to be solved, which specifies the writing topic, the target audience, and the rhetorical situation at the outset of writing. As the composing proceeds, the text that has been generated so far is integrated into the writing process as another essential component of the task environment, which guides and constrains the writing flow in competition with the knowledge contained in the long-term memory and the plan devised for addressing the initial rhetorical problem. The long-term memory is a stable storehouse holding all the knowledge that the writer possesses related to the topic, the audience, the plans for completing various writing tasks, and the problem representation. As the core of their model, text production processes can be subdivided into planning, translating, and reviewing. These three subprocesses occur and interact in the whole composing process under the control of the writer's monitor. Planning allows the writer to set goals and generate and organise ideas to build the internal representation of knowledge to be used in his or her writing. Worth noting is that planning is not confined to the pre-writing stage but occurs continuously throughout the real-time writing process. Translating happens when the writer turns abstract ideas into visible written language. The information generated and organised during the planning subprocess is transformed into a diverse array of written language symbols, which affords the overt text for communication. Reviewing is a conscious subprocess that can be further divided into evaluating and revising the already written text and the unwritten thoughts in mind. The three components delineated in this model underscore the necessity of managing and orchestrating

mental endeavour in a hierarchical manner to capture the recursive essence of writing. As Flower and Hayes (1981) argued, these cognitive processes are coordinated by the monitor. It is distinctive for its nature of being able to regulate other processes and guarantee the act of writing continues as expected. As a strategist, the monitor helps the writer make informed decisions about the time when he or she switches from one process to another. Difficulties and the possible lack of fluency in writing can be primarily attributed to student writers' limited "executive routine," which impedes their abilities to effectively switch between writing subprocesses or generate sustained and coherent ideas. Flower and Hayes' model (1981) makes a unique contribution to our understanding of writing as a dynamic, interactive, and recursive process, which has inspired a large volume of studies in this field. It explicitly shows metacognition's role in writing through the monitor, which takes charge of sequencing and iteration of all subprocesses in the act of writing. Writers' metacognitive understanding of individual and contextual factors, which in turn allows for the direction and management of thoughts and operations, is also implicitly embedded in the task environment and the writer's long-term memory. In addition, the writing process that incorporates metacognition is represented by goal setting within the planning subprocess and evaluation and revising within the reviewing subprocess.
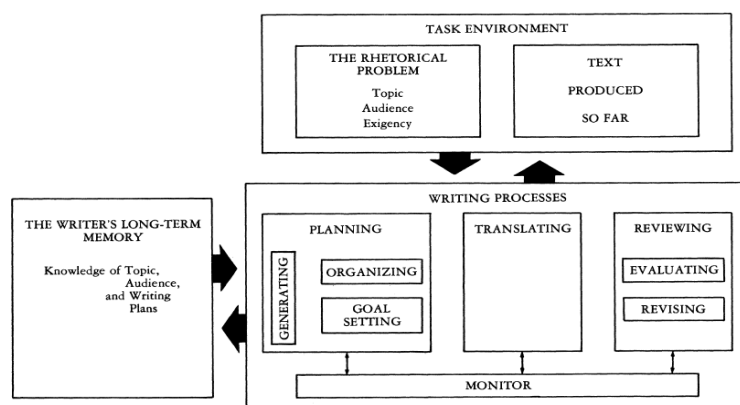
Figure 2.3 Flower and Hayes' model of writing (1981, p. 370)

As depicted in Figure 2.4, Hayes (1996) later made some revisions to the prior writing

model and defined the writing process by articulating two main components: the task environment and the individual. Given that writing is also a social activity, the task environment in Hayes' new model includes not only the immediate physical environment, namely the produced text and the writing medium, but also the social environment including the audience and collaborators. It specifies what, how, and who we write. Motivation/affect, cognitive processes, working memory, and long-term memory are grouped in the new model as constituents of the individual. Writing is also a communicative act embedded in a particular social context, a generative process involving motivation and an intellectual activity supported by individual cognition and memory system. The multi-faceted writing process is determined by the complex interplay of cognitive, affective, physical, and social factors. Note that initiating and sequencing these cognitive processes depend on the control structure for revision and a task schema acquired in practice to improve the writing performance effectively. Hayes considered revision as a type of text interpretation, reflection, and production, and the control structure contains a set of activities, quality criteria, selective attention, and fixing strategies to be performed for the goal of improving the quality of written texts. Once the writer encounters difficulties in fundamental cognitive processes, he or she should purposively access knowledge resources stored in long-term memory and then process them in working memory. Accordingly, metacognitive control is needed in such problem-solving and decision-making procedures. Furthermore, Hayes' model also highlights the crucial role of reading in writing performance since reading is not merely a means to comprehend the text but also helps to shape the interpretation and representation of the writing task at hand, identify possible errors and ambiguities, and fix problems, thus informing the writer's active control.

Although there is no explicit representation of metacognition in Hayes's model of writing, we can still detect its involvement within the cost/benefit estimates, reflection, and task schemas. As Hayes delineated, writers' motivation to control the writing process is determined

by the cost/benefit estimates. To illustrate, if the writer holds that the costs of engaging in purposive control outweigh its benefits, they will be reluctant to observe and adapt the writing process. Otherwise, the writer tends to have such control willingly for the benefits they expect to achieve. Reflection within cognitive processes mainly materialises by reviewing the produced text and examining the untranslated ideas, which implies the writer's active role in the writing process. Task schemas, entailing packages of procedural information in accomplishing a particular task, are proposed as an alternative to the monitor in the prior model.
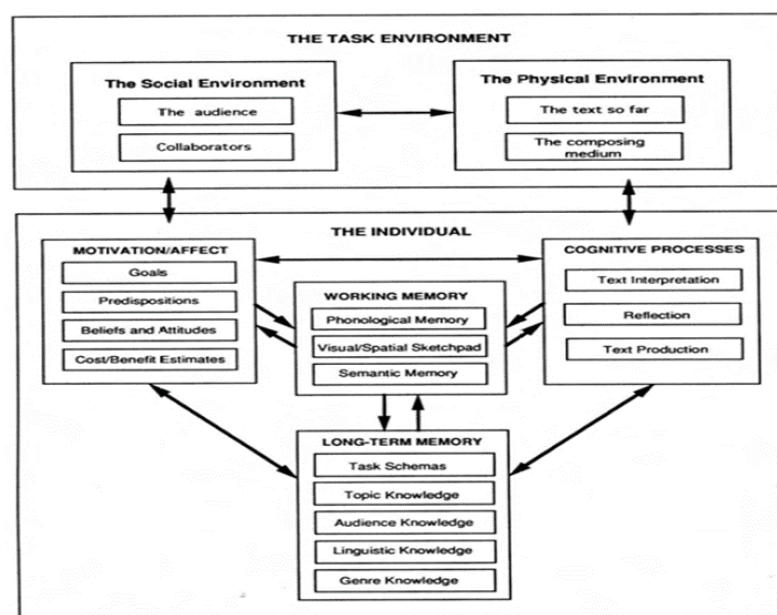
Figure 2.4 Hayes' framework for understanding cognition and affect in writing (1996, p.4)

Integrating Baddeley's (1986) model of working memory with Flower and Hayes' seminal works on writing models, Kellogg (1996) later proposed a new model of written composition which underscored the role of working memory in support of cognition in the writing process (see Figure 2.5). The process of writing not only depends on linguistic competence but also involves significant cognitive effort regardless of the length or complexity of the written text (Kellogg et al., 2013). Working memory, as a brain system, provides an important means of facilitating the temporary storage of information in such an accessible form that it can be effectively utilized as well as the manipulation of information in writing and other complex

tasks. As an illustration, both conceptual and linguistic knowledge must not simply be stored in long-term memory but also be retrieved and accessed for use to address content and rhetorical challenges when composing. As predicted by Kellogg's model, the different components of the working memory model, i.e., the central executive, the phonological loop, and the visuospatial sketchpad, support the writing process of planning ideas, transforming ideas into written form, reviewing ideas, and generating the text. In particular, Kellogg (1996) emphasized the importance of deliberate and conscious control over thoughts and behaviors using metacognitive elements, and the central executive, as a part of the tripartite model of working memory, serves as the monitor responsible for determining and regulating the activation and execution of all writing sub-processes. Not only is metacognition valued in the central executive that coordinates all writing subprocesses, but also in planning and reading subprocesses, which is suggestive of processing at a metacognitive level.
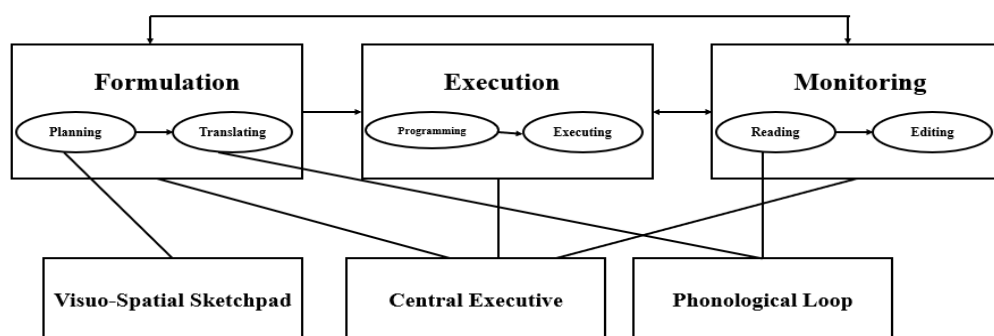
Figure 2.5 Kellogg's model of working memory in writing (1996)

Focusing on significant differences between expert and novice writers, Scardamalia and Bereiter (1987) developed another set of writing models that profoundly influence today's writing research and instruction. They set forth two contrasting models to capture essential features specific to immature and mature writing processes, i.e., the knowledge-telling process model and the knowledge-transforming process model. As the two labels show, the principal difference between the two groups of writers lies in how knowledge is brought into and

processed when producing a written text. Knowledge telling among novice writers, as a way of content generation, only involves a simple process of putting all they know into a written text without considering writing goals and intended audience. It is done by a heavy reliance on retrieving information from the memory system. On the contrary, knowledge transforming is characteristic of the writing process of expert writers. When writing, they build a mental representation of the task and engage in problem analysis and goal setting to decide on what to write (content problem space), how to write, and who it is written for (rhetorical problem space) in terms of rhetorical, communicative, and pragmatic constraints. Besides, rhetorical and self-regulated strategies in the two models were defined as two mental operations that largely influence the ability to write. The knowledge-telling model has been proven to accurately describe less skilled writers' composing processes (Graham, 2006; MacArthur et al., 2006; McCutchen, 2006). When learning to write, these students lack the necessary metacognitive awareness of their writing process and have difficulties in utilizing effective strategies to establish and develop writing plans, organize and regulate mental activities, and evaluate and modify written drafts. Novice writers' metacognitive processing is confined to their evaluation of the extent to which the retrieved information from the memory system is appropriate. In contrast, expert writers engage in a broader range of metacognitive processing including goal setting, problem identifying, and knowledge transforming. The transition from writing as knowledge telling to writing as knowledge transforming poses a demand for developing students' higher-level reflective thinking in their writing process, that is metacognitive abilities.

Although the writing models mentioned above have acknowledged the critical involvement of metacognition, these models are proposed with a primary goal of specifying cognitive processes underlying writing skills. Therefore, they fail to explain metacognitive control in the writing process explicitly. Drawing upon social-cognitive theory and self-regulation theory, Zimmerman and Reisemberg (1997) put forward a writing model with

explicit metacognitive functions. It includes a basically triadic system of self-regulation in writing: environmental, behavioural, and covert or personal regulations. Environmental regulation pertains to writers' self-regulation of the physical environment in which they write. On the other hand, behavioural regulation refers to a writer's capacity to self-regulate visible motoric behaviours relevant to the writing process. Finally, personal regulation is the covert regulation of cognitive and affective states, constituting an integral component of effective writing performance. This model dramatically contributes to our understanding of metacognition and the writing process in virtue of elucidating the ways by which writers initiate, guide, and control the writing process with the use of these self-regulated techniques, the interplay of writing self-efficacy and self-regulated processes, and the changing mechanism of thoughts, ideas, and actions. As an inspiration from Nelson and Narens' (1990) metacognitive model, Hacker and his colleagues (2009) reconceptualized writing as applied metacognition in a direct way, which indicates the existence of metacognition at every stage of writing experience. They reconceptualized writing as "the production of thought for oneself or others under the direction of one' goal-directed metacognitive monitoring and control, and the translation of that thought into an external symbolic representation" (2009, p.160). As they pointed out, "reading, re-reading, reflecting, and reviewing" are monitoring strategies in relation to our writing processes as to ensure the meaning making conforms to the writer's intention, and "editing, drafting, idea generation, word production, translation, and revision" are used as control strategies to observe the actual instantiation of generated meaning (Hacker et al., 2009, p.157). As depicted in Figure 2.6, monitoring and controlling thoughts between meta and object levels occur in cycles to enable the writer to initiate, observe, and manage the writing process. The implicitness level of monitoring and control is argued as a criterion that differentiates experienced writers from their less experienced peers.
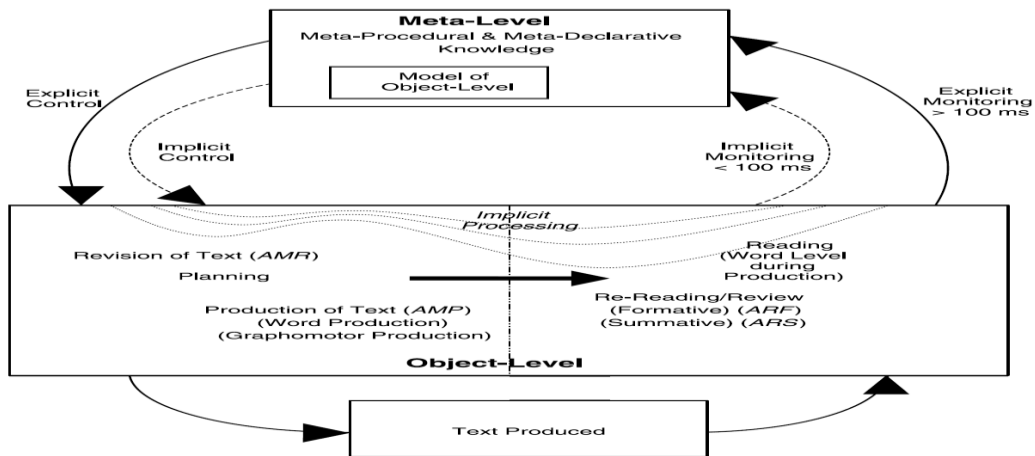
Figure 2.6 Hacker's (2009) metacognitive model of writing (p.162)

To sum up, these writing models, as mentioned above, provide theoretical support for the pivotal role of metacognition in writing. Students are supposed to take charge of their own writing processes on the way to proficient writers. However, it is beyond the scope of this thesis to explore all aspects of metacognition. Metacognitive regulation makes a more significant contribution to the association between metacognition and writing performance than that provided by metacognitive knowledge and experiences (Teng, 2020), while it has received relatively less attention. In this regard, this thesis focuses on metacognitive strategies, which form a crucial aspect of metacognition theory in L1 and L2 writing. No matter in which writing stage, metacognitive strategies operate independently and interactively with other composing processes. They occur in the whole writing procedure as displayed in predetermining the writing goals, inspecting idea generation and organization, monitoring linguistic retrieval and use to turn ideas into precisely written language, self-managing accompanied factors that may influence writing performance, and detecting problems and deciding how to revise.

2.2.3 Relationship among metacognition, self-regulation, and writing

Metacognition is a broad concept discussed and explored in relation to self-regulation and self-regulated learning. These constructs originated from Bandura's reciprocal determination and agency theory, which postulates the complex relationship between individual behaviours

and environmental constraints (Bandura, 2001). It is assumed that learners can exercise their agency to manipulate their cognition and behaviour in line with the situational norms and to assess whether they are taking control (Teng, 2020). Therefore, these constructs are closely tied to an intricate set of abilities that allow individuals to self-observe, self-evaluate, and self-react during the leaner-environment interactions (Zimmermann & Schunk, 2011). Self-regulation is theoretically rooted, for the most part, in the socio-cognitive theory, while metacognition is more likely to take a cognitive orientation. It is argued that metacognition serves as the prerequisite trigger for self-regulation, given that it enables learners to transfer knowledge, skills, and strategies across a range of contexts (Azevedo & Witherspoon, 2009; Schraw, 2009). In other words, metacognition constitutes an important part of agency and has long been taken as a part embedded in self-regulation and self-regulated learning. Moreover, self-regulation development largely depends on eliciting and orchestrating metacognitive strategies since it is a volitional process for accomplishing self-goals that requires individual awareness and control of thoughts, feelings, behaviours, and the environment (Efklides, 2008; Wenden, 2002). In language learning, self-regulation involves "deliberate and goal-oriented attempts to manage and control efforts" (Oxford, 2011, p.12). Metacognition thus assumes an instrumental role in fostering and facilitating the development of self-regulation and self-regulated learning.

Some theorists have proposed a few boundaries to address the conceptual blurriness among metacognition, self-regulation, and self-regulated learning. The first boundary lies in the distinction between academic and non-academic contexts. Unlike metacognition and self-regulation, self-regulated learning is initially conceptualized within an academic context, which represents an integrative construct centring on the interplay of cognitive, motivational, affective, and contextual factors during the process of learning (Teng & Zhang, 2022). However, the contextualization boundary seems to offer a non-optimal solution since the distinction between academic and non-academic contexts is not clear-cut and self-regulated learning

possibly occurs in both academic and other forms of learning (Kaplan, 2008). Dinsmore et al. (2008) argued that another factor demarcating the boundaries of the three constructs is the object to be monitored or controlled. They held that the conceptual core of metacognitive control is individual cognition, while self-regulation is centred on the manipulation of behaviour resulting from intricate individual-environment interactions. Additionally, self-regulated learning represents a hybrid of the former two. Nevertheless, this boundary is still subject to criticism since both the external environment and individual cognition certainly influence metacognition, which also plays an important part in self-regulation. Therefore, the proposed boundaries are permeable to a large extent, and the relationship between these constructs is not one of mutual exclusion but rather one of nesting within each other. Therefore, Fox and Riconscente (2008) concluded that "metacognition and self-regulation are parallel and intertwining constructs that are clearly distinct yet mutually entailed both developmentally and in their functions in human thoughts and behavior" (p.386). Neither can be subsumed under the other. As an attempt to challenge the exclusionary boundaries across these concepts, Kaplan (2008) proposed a multi-dimensional framework involving these constructs as sub-categories of a more general and abstract phenomenon of self-regulated action. As the multidimensional framework depicts (Kaplan et al., 2008), learners may engage in various forms of self-regulated actions in accordance with their purposes. With this conceptual tool, researchers and educators can locate the focus of the self-regulatory process alongside different dimensions of self-regulated action and track its changes with time, development, learning, and intervention. Consistent with this conceptual tool, Teng and Zhang (2021) also recommended an unfixed view towards these constructs and highlighted that the relationships between metacognition, self-regulation, and self-regulated learning are determined by the theoretical stance and pedagogical choice held by researchers and educators. It seems unnecessary to seek any clear-cut boundaries for these concepts because of the variations in contexts where they are used. In

this way, these terms are often interchangeably used for their sharing ground of self-awareness, self-observation, and self-management in educational and language learning studies (Zhang & Zhang, 2019).

As discussed in section 2.1.2, metacognition pervades throughout the writing process despite somewhat conceptual differences in previous writing models. Turning abstract thoughts into a written text requires recursive and deliberate analytical actions. Such demands point out the importance of metacognitive regulation in enhancing writing skills. Previous writing models have consistently acknowledged the importance of metacognition in the writing process, as evidenced by planning, monitoring, and reviewing (Teng et al., 2022). For example, Flower and Hayes' model (1981) posits that writing is assumed to be a complex process comprising three components, i.e., the task environment, long-term memory, and the writing process, and the monitor supervises and assesses writing subprocesses and cognitive operations related to individual memory and task environment factors. Similarly, Kellogg (1996) highlights the role of metacognition writing by specifying the central executive, which fulfils the regulatory function of activating and executing all writing subprocesses. According to Scardamalia and Bereiter's writing models of knowledge-telling and knowledge-transforming, differences between expert and novice writers can be attributed to the ability to use a wide range of metacognitive strategies to some degree (Teng & Huang, 2019). Later, Zimmermann and Risemberg (1997, p.76) stated in a straightforward way that writing is a "self-planned, self-initiated, and self-sustained" practice that demands the use of metacognitive strategies to manipulate the triadic influences from personal beliefs, behaviours, and external environment and finally to accomplish the intended learning goals. Indeed, the meaning-making process is conscious by its very nature, self-evidently demonstrating the close associations between metacognition, self-regulation, and writing. More importantly, attaining writing skills, as Hyland (2003) held, is "essentially learnt, not taught" (p.18). In this way, it is highly valuable

to explore the metacognitive competence of writers and its connection to their writing performance in a specific task context, considering that these skills are primarily acquired through learning. Pedagogical activities informed by these studies would potentially contribute to students' active engagement and agency in writing.

Practically, it is also necessary to account for metacognition, self-regulation, and writing because learners self-regulate their writing processes depending on a set of metacognitive skills. Current writing instruction calls for an innovative and process-oriented approach to enhancing students' motivation and autonomy in writing. Some research has already provided empirical support for the benefits of employing metacognitive skills in writing tasks and incorporating metacognitive instruction in writing classrooms. Magno (2008) investigated how a range of cognitive and affective factors, including metacognition and apprehension, influenced EFL learners' writing proficiency and found that metacognition significantly predicted their writing proficiency. Karlen (2017) assessed students' metacognitive competence in academic writing in a higher education context with a newly constructed metacognitive test. Correlation analyses revealed a moderate and positive relationship between metacognitive competence and writing achievements. As expected, the higher-performing students in academic writing had more elaborated knowledge of metacognitive control than their lower-performing counterparts. In addition, the effectiveness of metacognitive control also significantly boosted college students' writing self-efficacy beliefs (Sun & Wang, 2020). Although participants in their study reported a mediated level of self-efficacy and less frequent use of metacognitive skills, both factors strongly predicted their writing performance. Students who were self-efficacious about their writing ability were more likely to employ metacognitive skills when composing a text. In response to the need to investigate writing strategy use in socio-cultural contexts, Hosseinpur and Kazemi (2022) explored 58 high-performing and low-performing Iranian EFL students' strategy utilization patterns in completing the Cambridge IELTS writing task 2 via a concurrent

verbal protocol method. They found that both high-performing and low-performing participants employed a variety of writing strategies in their writing task completion despite differences in frequency. It's worth noting that high-performing participants in their study were more metacognitively aware of and kept a dominant control in their writing processes than their low-performing counterparts. Thus, metacognitive instruction was recommended as a beneficial pedagogy tool in real-life writing classrooms with particular attention to promoting students' metacognitive knowledge and regulation. Similarly, language teaching research also supports the view that metacognitive instruction appears to be a promising pedagogical tool conducive to writing classrooms. By implementing an instructional intervention in a large sample of Iranian female English learners, Hemmati and Mortazavi (2017) found that the metacognitive scaffolding could significantly increase students' self-regulated skills, subsequently developing their writing performance. Teng (2016) also found a positive impact of metacognitive instruction in writing with a group of Chinese EFL students. Interestingly, his study provided empirical evidence that the embedded metacognitive instruction with cooperative learning training produced the most significant effects in enhancing students' construction of written texts by aiding their use of high-order metacognitive strategies and creativity. More recently, some researchers have put forward integrated frameworks to direct the implementation of metacognitive instruction in teaching-learning-assessment procedures with the use of pedagogical tools such as writing regulatory checklists and writer logs and instructional activities like blended learning (Alfaifi, 2021; Lee & Mak, 2018).

Metacognition, as Efklides (2006) held, affords "a framework for understanding one's as well as the other's cognition and thus guides the interpretation of situational data so that proper control decisions are made" (p.4). It constitutes a prominent aspect of fostering and developing self-regulated learners (Efklides, 2008). Given the challenges posed by L1 and L2 writing, adequate metacognitive competence is needed for students to self-regulate and hold control

over their cognitive processes, thus building a mental representation of task requirements accurately, generating fruitful ideas for writing, retrieving appropriate linguistic knowledge from memory, set specific goals to guide their writing thoughts and behaviours, selecting and adjusting strategies accordingly (Manchón, 2011; Zhang, 2013). Since metacognition plays a pivotal role in facilitating language learners in achieving writing development and taking charge of their learning, it warrants more research efforts to advance toward a better-understood area. Further investigations appear to be important to gain deeper insights into what the writers do to keep their writing going well and how such metacognitive control influences their writing performance.

2.3 Metacognitive strategies and writing

Writing research focuses no longer purely on the quality of students' final writing texts or the linguistic and discoursal patterns that distinguish proficient writers from their less proficient counterparts (Brown & Aull, 2017). Given the vast research movement called "process writing" (Forbes, 2019; Manchón et al., 2007), it has gone deeper into what is going on in writers' minds. This movement initially emerged in the field of L1 research and then sparked increasing attention in L2 studies. Since the mid-1970s, when cognitive theories gained momentum in the field of language acquisition, a proliferation of research has been conducted to emphasize the role of strategy use in improving L1 and L2 proficiency in general and language skills specifically. Information on these strategies was obtained mainly by asking participants to recall their thoughts and behaviour when engaging in language learning or language use or by asking direct questions about what strategies they used. After coding and analyzing these process data, researchers have identified and classified a range of strategy taxonomies to gain a compelling glimpse into language learners' mental operations.

The present study focuses mainly on metacognitive strategies for their determinant effects

on language performance and their important role in maintaining and transferring other strategies across different language use tasks (Cohen, 2014; Forbes, 2019; Griffiths, 2013). As a multi-dimensional construct, metacognitive strategies are those skills that learners use to direct and regulate their learning processes, such as interpreting the task, formulating goals and plans, monitoring, and evaluating during the executive stage (Lee & Mak, 2018). It is highly valued in tertiary education and regarded as one of the most important factors for students to sustain development in writing and other learning areas. This section begins with a theoretical examination of metacognitive strategies as a subcategory of language learning strategies, a critical component of communicative language ability, and an integral part of self-regulated strategy use. This is followed by a comprehensive review of empirical research that explores the relationship between the use of metacognitive strategies and language learners' performance in the domain of writing. Methods used in previous research are also reviewed to afford the rationale for the mixed-method design adopted in this thesis.

2.3.1 Metacognitive strategies as a subcategory of language learning strategies

O'Malley and Chamot (1990) conceived language learning strategies as "special thoughts or behaviors that individuals use to help them comprehend, learn, or retain new information (p.1)". Oxford (1990) expanded this conceptualization to "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferrable to new situations" (p.8). More recently, Griffiths (2020) proposed a concise definition that referred to language learning strategies as "actions chosen by learners for the purpose of learning a language" and completing specific language use tasks (p.608). Researchers have put forward a few inventories of language learning strategies so far to characterize the strategies that language learners apply in language learning and language use. O'Malley and her colleagues (1985) classified language learning strategies into metacognitive, cognitive, and socio-affective strategies. Monitoring, evaluating, planning, and organizing

learning processes are grouped as metacognitive strategies. Cognitive strategies include manipulation or transformation of the learning materials, and socio-affective strategies are mainly concerned with controlling emotions through interpersonal behaviours. Oxford (1990) adopted direct and indirect strategies as two main categories of language learning strategies. The first category of strategies, i.e. direct strategies, consists of memory, cognitive, and comprehension strategies. The second category of strategies, i.e. indirect strategies, can be further divided into metacognitive, affective, and social strategies. In line with Stern's (1992) taxonomy, there are five types of language learning strategies, namely management and planning strategies, cognitive strategies, communicative-experiential strategies, interpersonal strategies, and affective strategies. Management and planning strategies are operations related to the learners' intention of arranging and taking charge of their own learning, which determines what resources, goals, and strategies are involved in language learning as well as monitors the learning progress. Cognitive strategies are used in direct processing and analysis of learning input. Communicative-experiential strategies refer to techniques used to avoid breakdowns in the flow of communication, such as gesturing and explanation. Interpersonal strategies may have a role to play when the learner cooperates with native speakers so as to become familiar with the target culture. Affective strategies are associated with the monitoring of different emotions. Proficient language learners tend to be more conscious about their emotional state and better able to stimulate positive emotions in relation to the target language and the learning environment that they are involved in. Although there are some minor variations among these researchers' terminology of language learning strategies, these classifications have been widely applied in a great deal of research and undoubtedly help to move this field forward.

Theoretically, language learning strategies have been defined as thoughts and behaviours that learners adopt consciously and purposefully to execute and enhance language learning or performance (Huang, 2013; Swain et al., 2009). Specifically in this study, language learning

strategies are those conscious and goal-oriented thoughts or behaviours learners take to complete a writing task and enhance their performance. Learners may first read the task prompt to know what they are going to write about and pre-think how to draft the composition, followed by idea generation and translation under active monitoring. They also evaluate the written text produced so far during writing and revise unsatisfied parts if necessary. In the domain of writing, one of the earliest classifications of strategy use was proposed by Arndt (1987). Based on verbal protocol data from 6 Chinese postgraduate EFL students, Arndt (1987) characterized the academic composing process as eight categories of strategies, i.e. planning, global planning, rehearsing, repeating, pre-reading, questioning, revising, and editing. By asking ESL students to introspect their mental activities when accomplishing a computer-based writing task, Wenden (1991) identified and grouped writing strategies into metacognitive and cognitive strategies. Metacognitive strategies include planning, evaluating, and monitoring used to regulate the writing process, and cognitive strategies are those mental operations for retrieving and implementing information in the composing text, including clarification, retrieval, resourcing, deferral, avoidance, and verification. Sasaki (2000) also classified eight categories of writing strategies among Japanese EFL students of different proficiency levels: planning, retrieving, generating ideas, verbalizing, translating, rereading, evaluating, and others. He found that expert and novice writers differed significantly in the frequency and manners of applying these strategies. For example, expert writers spent a long time planning the general organization and stopped more frequently to think about it than their novice counterparts. In the study by Bai and his associates (2014), young writers were found to utilize three general categories of strategies: metacognitive strategies, cognitive strategies, and social/affective strategies, which kept parallel to O'Malley and Chamot's taxonomy of language learning strategies. More specifically, the primary school students recruited in their study reported the use of three main types of metacognitive strategies, including self-initiation,

planning, monitoring and evaluating strategies. Significant differences were found in the usage frequency of the three types of metacognitive strategies across student groups with different English proficiency levels. As depicted in the abovementioned taxonomies, metacognitive strategies have become an indispensable part of language learning strategies as well as writing strategies.

The necessity of including metacognitive strategies as an essential subcategory of language learning strategies or skill-specific strategies has been demonstrated successively in the above-mentioned taxonomies. In addition, researchers have already pointed out facets unique to metacognitive strategies and their strong links to other categories of strategies. Metacognitive strategies are "a set of conscious or unconscious mental activities which are directly or indirectly related to some specific stage of the overall process of language acquisition, use, or testing" (Purpura, 1999, p.6). It plays a more critical role than other categories of strategies since language acquisition may proceed at a faster speed via the use of metacognitive strategies (Anderson, 2005). Basic categories of metacognitive strategies comprise linking new to old information, consciously selecting thinking strategies, planning, monitoring, and evaluating thinking processes (Dirkes, 1985). Language learners can utilize these strategies to regulate and oversee their cognitive processes when engaged in language learning procedures and particular language tasks (Lee & Mak, 2018). Especially in writing, metacognitive strategies may facilitate students to produce a quality essay, given that applying such strategies takes place in different writing stages and enhances the regulation at linguistic and non-linguistic levels (Guo & Huang, 2020; Cer, 2019). It empowers writers before, during, and after writing. Before writing, writers who can better utilize metacognitive strategies will make appropriate preparations, such as constructing a mental representation of task requirements and planning for the structure and topic (Ong, 2014). While writing, writers can keep track of how their writing processes proceed and make necessary adjustments to fulfil the

goals successfully. After writing, metacognitively competent writers may reflect upon their writing process critically and make necessary revisions in the written text to obtain greater improvements.

O'Malley and Chamot (1990) contended that metacognitive strategies work along with cognitive strategies to support learning and highlighted a combined use of both types of strategies, while Graham (1997) stressed the distinction between metacognitive strategies and others for determining the most influential contributor toward the improvement of learning. Based on Wenden's (1998) application of metacognition theory in language learning, differences between cognitive and metacognitive strategies evolved into a separation of knowledge from self-management and finally into, as Rubin (2001) suggested, a distinction of knowledge from procedures. Knowledge may be more susceptible to individual differences while procedures remain relatively stable within learners and vary as a function of task characteristics and learner objectives. Similar to procedures, metacognitive strategies can be applied and transferred across task situations with regard to learners' active management. It is a fundamental ability applicable to various cognitive activities, thus deserving a privileged place in education. Phakiti (2003) perceived metacognitive strategies as higher-order executive processing which directs and controls other cognitive processing overarchingly in language use and other cognitive enterprises. The use of metacognitive strategies tended to be more strongly associated with the development of language learning (Anderson, 2008). Explicit instruction of language learning strategies may not ensure learning success because of the lack of metacognitive awareness of their thoughts and behaviour (Wenden, 1998). In a nutshell, language learning strategy and writing strategy taxonomies, which have their theoretical underpinning in cognitivism and socioculturalism, are also grounded in metacognition theory. Metacognitive strategies have been acknowledged in the extant literature as an essential part of language learning strategies in general and writing strategies specifically. This group of

strategies take a governing position in the symphony of different cognitive processing involved in writing and other language skills.

2.3.2 Metacognitive strategies as a component of communicative language ability

Research on language learning strategies has long been criticized for being atheoretical and ad hoc since strategies are mostly identified and clustered purely according to students' self-reports rather than built upon a theory of learning or human cognition (Dörnyei & Skehan, 2003; Purpura, 2013; Macaro, 2006). Meanwhile, researchers have already raised some theoretical attempts to frame language learners' strategy use to discern better how language learning strategies relate to cognition and work collectively in successful language learning. Adopting a communicative approach, Canale and Swain (1980) outlined a theoretical model of communicative competence comprising three components: grammatical competence, sociolinguistic competence, and strategic competence. Strategic competence refers to "verbal and non-verbal communication strategies that may be called into action to compensate for breakdowns in communication due to performance variables or to insufficient competence" (Canale & Swain, 1980, p.30). They also claimed that the need for these strategies may change due to the influence of age and language proficiency. It merits attention that Canale and Swain's depiction of strategic competence is mainly concerned with strategies for reconciling problematic communication, while it has not highlighted the manifestations of cognitive processes. Nonetheless, their work opened a new avenue for research on language learners' strategy use and pioneered a strategic competence approach in this field.

Drawing on Canale and Swain's model, Bachman (1990) subsumed communicative competence into language knowledge, strategic competence, and psychophysiological mechanisms of expression. Strategic competence in Bachman's framework is not simply a component of communicative competence but also a more general cognitive capacity. As he (1990) depicted, strategic competence was "the capacity that relates language competence, or

knowledge of the language, to the language user's knowledge structures and the features of the context in which communication takes place (p.107)". It functions through three phases, i.e., an assessment phase, a planning phase, and an execution phase. In line with Bachman's articulation of strategic competence, a learner would first evaluate the stored linguistic resources and estimate the necessary information needed to express ideas mentally (the assessment phase) when approaching an argumentative writing task which prompts him to express personal opinions about a hot topic. The learner then employs topical and linguistic knowledge to form a mental plan about how to draft this opinion essay (the planning phase). Finally, he or she adopts psychophysiological mechanisms to write this essay down (the execution phase).

In a more recent and comprehensive model of communicative language ability, Bachman and Palmer (2010) highlighted the vital role of metacognition and defined strategic competence as "higher-order metacognitive strategies that provide a management function in language use, as well as in other cognitive activities (p.48)." Derived from Sternberg's (1988) description of metacomponents in the theoretical model of human intelligence, these metacognitive strategies are defined in accordance with planning, monitoring, and evaluating in any problem-solving activities. In language use tasks, strategic competence operates in three general areas: (a) goal setting: deciding what to do; (b) appraising: taking stock of what is needed, what one has to work with, and how well one has done; and (c) planning: deciding how to use what one has. However, the observed lack of empirical support for Bachman and Palmer's conceptualization and classification of strategic competence makes it less applicable in identifying and characterising what metacognitive strategies students actually use when completing learning tasks (Ellis et al., 2019). Instead, researchers tend to explore students' metacognitive strategy use via an exploratory approach with reference to the extant literature on metacognition and language learning strategies. For example, in Phakiti's (2003) study on Thailand EFL students,

metacognitive strategies were identified as planning and monitoring. Barkaoui et al. (2013) defined Chinese EFL students' metacognitive strategy behaviors under the taxonomy of identifying the purpose of the task, setting goals, evaluating previous performance, and evaluating the content of what they heard or said. Another study by Zhang (2017) revealed a four-category taxonomy of metacognitive strategies used by Chinese college students: assessing the situation, monitoring, self-evaluating, and self-testing. It can be concluded that Bachman and Palmer's proposal of strategic competence has already inspired many researchers in different language contexts to conduct empirical research on this crucial component of language ability, namely metacognitive strategies that learners employ to complete language use tasks. Its vital role in managing language use and other cognitive processing has been well-illustrated in Bachman and Palmer's communicative language ability model and warrants more empirical studies. Like these researchers, I explored and defined metacognitive strategies that students used in L1 and L2 writing by following the theoretical orientation of strategic competence with an exploratory approach in this thesis.

2.3.3 Metacognitive strategies as a part of self-regulated strategy use

Over the past three decades of sustained efforts, language learner strategy research has emerged as a paradigmatic strand of applied linguistics and language education research, offering valuable and meaningful insights for language learning and teaching (Hu, 2016). It has been a fertile area of inquiries expanding beyond general language learning, specific language skills to a multiplicity of language use tasks, broadening its target learner population of various educational programs and cultural backgrounds and incorporating a range of individual and contextual factors. This area of research has flourished in parallel with controversies with some researchers voicing their concerns regarding unresolved conceptual ambiguity and theoretical shortcomings (Rose et al., 2018). Against the conceptual challenge, Dörnyei (2005) proposed a revitalization of strategy research by aligning it with a more robust and inclusive construct of

self-regulation. Grounded on cognitive and educational psychology, self-regulation provides a relatively stable outsider perspective of exploring strategic behaviours exclusively related to language learning and use. As Zimmermann (2000) defined, self-regulation refers to the individual process of directing, organizing, and adapting self-generated thoughts, emotions, and behaviours cyclically to achieve specific learning goals. It encompasses multiple aspects, including cognition, metacognition, motivation, behaviour, and environment, all managed in a systematic manner to enhance ultimate attainment (Schunk & Greene, 2018). Being a more dynamic notion than language learning strategy, self-regulation captures the proactive nature of learners in their own language acquisition (Dörnyei, 2005). In this way, strategy researchers in favour of self-regulation would no longer be confined to the sole reliance on internally developed theories of conceptualizing and classifying strategies as mere products of learners' thoughts and actions (Roes et al., 2018). Instead, the focus shifts to "the glue and the engine" binding these strategic efforts and driving learning achievements in an active manner (Weinstein et al., 2011, p.47).

The proposal of substituting self-regulation for language learning strategy brings a storm in the strategy sea. Some researchers argue that dismissing language learning strategy as a field without proper consideration is misguided and potentially disadvantageous for the large population of language learners (Hu, 2016). They advocate for the continuation of the well-established paradigm of language learning strategy research while looking for new avenues (Gu, 2012; Grenfell & Harris, 2017). On the other hand, there are proponents of integrating self-regulation into strategy research, either by embracing it fully or incorporating it as an addition (Oxford, 2011, 2017; Rose, 2017). Although it is hard to spell the end to the debate of language learning strategy research in face of self-regulation, metacognition remains a crucial facet of self-regulated strategies in language learning and use. In a recent attempt to model writers' self-regulatory strategies, Teng and colleagues (2022) evidenced that metacognitive

control constituted some core aspects of the self-regulated writing process and had predictive effects on the quality of writing outputs. Thus, these findings provide further impetus for investigating writers' metacognitive strategy use with a self-regulation perspective.

2.3.4 Effects of metacognitive strategies on writing performance

In their investigations, many researchers have confirmed the predictive role of metacognitive strategies in final writing scores along with other categories of strategies. Victori (1999) examined metacognitive strategy use and its impact on the deployed writing strategies and final text quality via a case study of effective and less effective writers. The two good writers in Victori's (1999) study spent more time and effort in devising and organizing their ideas in writing, evaluating both high and surface levels of the text, and resourcing appropriately if necessary. On the contrary, the two poor writers hardly built and reordered a mental plan for their writing, struggled with grammatical and vocabulary problems, and avoided resourcing. In the same vein, Chien (2012) adopted a more prudent methodology, including the concurrent think-aloud protocol, video observations, and retrospective interviews to tap into Taiwan EFL students' metacognitive strategy use in the writing process. By analyzing and comparing these rich process data, he found significant differences between high-achieving and low-achieving writers in planning their opinions and reviewing their written work. As his study suggests, successful writers directed more attention to formulating their position toward the given topic and were more engaged in rethinking and reflecting on their composing texts. Thus, Chien (2012) advised that language teachers should diagnose possible writing problems that students may face and integrate instructional activities to raise their awareness of these strategies in classrooms. In the world of booming information technologies, multimedia devices have been widely adopted in writing classrooms as a teaching tool to enhance students' performance. Facing the changing learning environment, students must execute more metacognitive control to obtain improvement. Considering this, Qin and

Zhang (2019) conducted an exploratory study to examine the relationship between metacognitive strategies and Chinese tertiary EFL students' writing performance in multimedia environments. It was found that the participants' reported metacognitive strategies were significantly correlated to their writing scores. Situated in an authentic assessment setting, Zhao and Liao (2021) examined what metacognitive strategies L2 learners employed in completing a writing task. Factor analysis in their study revealed five main types of metacognitive strategies: task interpretation, planning, translating, evaluating and monitoring, and revising. Correlation and regression analysis results only proved some significant but weak effects of three of the five types of metacognitive strategies, but the authors noted that many individual and contextual factors should be taken into consideration when interpreting such findings. Highlighting the dynamic use of metacognitive strategies during different writing phrases and knowing when and what strategies should be delivered to students of varying proficiency levels is crucial for integrating metacognitive instruction in writing classrooms and scaffolding learning development. In their recent study, Hosseinpur and Kazemi (2022) explored the relationship between the composing strategies employed by Irian students and their corresponding essay writing scores via a concurrent think-aloud method. The researchers found that the awareness and implementation of metacognitive strategies exhibited a significant positive impact on writing ability, while the students in question lacked knowledge of the importance of these strategies.

Research has provided compelling evidence that metacognitive strategies contribute significantly to learners' L1 or L2 writing performance and attainments in different educational contexts (De Silva & Graham, 2015). More empirical inquiries, however, are needed to advance our understanding of how well student writers make use of metacognitive strategies in relation to final writing performance since writing is a challenging task, especially in an L2 (Qin & Zhang, 2019). Among these empirical investigations into writing metacognitive strategies with

a large-scale sample, the development and validation procedure of the used metacognitive strategy questionnaire tool has been explained with fewer details. Meanwhile, the bulk of this vein of research has been conducted in a single language context, namely in either the L1 or L2 context, while comparative inquiries of the interactions between students' metacognitive strategies in both contexts are limited. Against this background, this study takes a further step to explore and compare Chinese tertiary students' metacognitive strategies and their effects on L1 and L2 writing performance, within which the creation procedure of a reliable questionnaire instrument is outlined and specified.

2.3.5 Methods eliciting writing metacognitive strategies

Writers' metacognitive strategies are hardly captured and observed in a direct way. Research on metacognitive writing strategies has long relied on a wide range of qualitative self-report methods to elicit data. These methods consist of concurrent and retrospective verbal protocols (Cohen & Brooks-Carson, 2001; Victori, 1999), post-task checklist sheets (Forbes, 2019; 2020), and stimulated recall interviews (Sasaki, 2000; De Silva & Graham, 2015). These qualitative methods allow for a valid and reliable avenue to collect rich process data and gain deep insights into writers' metacognitive control during the writing process. However, results from these qualitative analyses on a small group of students are largely individual in nature and quite limited in generalizability (Hwang & Lee, 2017). In this respect, researchers also use retrospective questionnaires as the principal quantitative means to make covert metacognitive processes available for analysis (Ong, 2014). Although some methodological drawbacks of questionnaires have been pointed out in research, such as difficulties in acquiring a nuanced understanding and low validity for untruthful answers, they are used for several reasons in this field. Firstly, it can be distributed to a large sample of writers within a short period of time. Collected data applies to statistical analyses for inferential conclusions. Secondly, it is the least intrusive method for exploring mental processes since it rarely interrupts a writer's online

processing. Third, the administration procedure of questionnaires is more workable and less labour-intensive than qualitative methods. Considering the advantages and disadvantages of qualitative and quantitative methods, using both methods together is more likely to offer more profound and valid insights into metacognitive strategies involved in writing compared to using each method alone. Therefore, this study adopts a mixed-methods design to triangulate both data types to investigate students' use of writing metacognitive strategies. The large-scale questionnaire responses allow for more general findings in terms of the use of metacognitive strategies and their effects on L1 and L2 performance. Also, the study gathered data from multiple methods for item generation and statistically supported the validity and reliability of the questionnaire instrument, enhancing the credibility of the questionnaire responses. More detailed insights are framed through post-task stimulated recall interviews of a small sample of the target population. The mixed-methods design combining quantitative, i.e. questionnaire and writing task responses, and qualitative interview data is hoped to obtain a more nuanced and in-depth depiction of students' metacognitive strategy use in L1 and L2 writing.

Some earlier metacognition studies have been conducted in literacy learning, especially in reading, and there is also increasing recognition of the indispensable part of metacognition in process-oriented writing research (Griffith & Ruan, 2005). Over the past four decades, learners' strategic behaviour has gained increasing attention with the foci shifting from writing texts to mental processes in language learning. Reviewing the afore-cited literature both theoretically and empirically indicates strong associations between metacognitive strategies and writing performance. Yet the bulk of process-oriented research has focused on learners' strategy use in general or information processing specific to a particular skill, while how they self-regulate these cognitive processes is somewhat ignored. To address this gap, this thesis, which examines the utilization pattern of metacognitive strategies during the writing process, is intended to shed light on how language learners deliberately manage their mental activities

to fulfil the assigned writing tasks and to what extent such high-order metacognitive control influence writing performance with Chinese undergraduate students as an example. It is also motivated by the fact that researchers have highlighted the value of teaching metacognitive strategies in classrooms. Thus, the results of this study hold considerable promise for both explaining individual differences in writing attainments and informing writing pedagogy. Triangulating qualitative and quantitative data in L1 and L2 writing contexts also affords convincing evidence for how such strategy use interacts within Chinese-English learners, namely the cross-linguistic transfer of metacognitive strategies.

2.4 Cross-linguistic transfer in writing

In recent years, acquiring literacy skills in more than one language has been mandatory for students. According to an estimated report, half of the population worldwide is bilingual (Grosjean, 2010). Correspondingly, bilingual language programs have experienced rapid development in most parts of the world (de Jong et al., 2020). When learning an L2, learners have already developed knowledge and skills specific to their mother tongue. Although a wide range of factors have been proven to influence the language development of bilingual students, cross-linguistic transfer has been a focus that motivated researchers to investigate its role despite ongoing controversies nested on this issue. Traditional transfer studies focused primarily on its occurrence in oral production. Then, the focus has switched to literacy skills, i.e., reading and writing, since the 1990s (Chung et al., 2019). The cross-linguistic transfer phenomenon underlying reading comprehension has been well-documented in the literature, while relatively less scholarly attention has been directed to the potential transfer involved in writing development (Cummins, 2016; Chuang et al., 2012). Therefore, this paper aims to expand our knowledge of the L1-L2 interactions in writing ability via analyzing and comparing students' metacognitive strategy use when completing writing tasks in the two language

contexts. This section aims to step back and systematically synthesize the theoretical perspectives and empirical investigations in this area to offer necessary background knowledge concerning the cross-linguistic approach in this thesis.

2.4.1 Theoretical rationale of the cross-linguistic transfer underlying writing

According to Odlin's definition, crosslinguistic transfer refers to "the influence resulting from the similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired (1989, p.27)." This concept has been extensively used in the SLA field to show the L1 influence on L2 acquisition either positively or negatively, while psycholinguistic researchers prefer to term it as L1 interference (Jarvis & Pavlenko, 2008). Nowadays, cross-linguistic transfer is generally conceptualized as using knowledge and skills of one acquired language to influence the learning of another language (Yang et al., 2017). Writing transfer research is mainly conducted under the guidance of changing theories about cross-linguistic transfer. Therefore, reviewing and discussing highly influential theoretical perspectives on this issue is imperative before settling down on the main study.

The concept of L1 transfer was introduced in SLA research in the 1940s when the behaviourist theory predominantly influenced our conceptions of language acquisition. According to the behaviourism perspective, language learning was a process of habit formation, and what actually occurred in the transfer was the subconscious use of L1 behaviour when learning an L2. Thus, language researchers during this period were motivated to compare L1 and L2 linguistic features systematically. Fries (1945), as a key figure of behaviourism, stressed the importance of contrasting L1 and the target language and perceived L1 interference as one of the major problems preventing L2 learners from mastering the target language. One of his students, Robert Lado (1957), later confirmed the impact of L1 on L2 acquisition and proposed the Contrastive Analysis Hypothesis (CAH). Notably, prior interest in transfer studies was

closely related to the contrastive analysis approach with a careful examination of the structural similarities and differences between L1 and L2. The effects of transfer could be positive or negative depending on linguistic comparisons of the two languages. Similarities between L1 and L2 were considered facilitative factors for L2 learning, while differences between the two languages add obstacles in acquiring an L2 (Connor, 1996). Contrastive analysis researchers preferred to pay the most attention to negative L1 influence due to the lack of observed evidence for positive L1 transfer (Ortega, 2014). However, the contrastive analysis approach to L1 transfer received many criticisms by the late 1960s. Influenced by generative linguistics, it was believed that children were born with an innate ability specific to language learning. Hence, L1 and L2 learning remain the same to a large extent despite the acquisition order. L2 learners' errors were naturally a developmental result rather than caused by the L1 transfer. The L1 transfer was then disregarded in language education with the decay of behaviourism theories. Additionally, the contrastive analysis of this period focused on structural aspects, while it hardly helps to explain the cross-linguistic transfer in relevant skills with a psychological nature, such as cognitive and metacognitive strategies and processes involved in L1 and L2 learning (Genesee et al., 2008). Not all L1 transfers can be simply classified as positive or negative according to structural comparisons (Chung et al., 2019). Therefore, a more complex and nuanced theory is critically needed to interpret the L1 influence on L2 development. As an attempt to address these criticisms, Selinker (1972) proposed an interlanguage theory to define L2 learners' evolving system of rules of the target language by acknowledging the impact of a host of additional factors such as the L1, the L2 input, language teaching, and developmental mechanisms in L2 acquisition. Essential to the interlanguage theory, L2 development is not a result specific to learners' L1 but derives from an interplay of different factors, thus motivating researchers to investigate the unique developmental trajectory of L2.

Cross-linguistic transfer research undergoes further development and speculation under

the guidance of another representative theoretical orientation, namely Cummins' LIH and CUP (1979, 1981). His hypotheses postulate that "the development of competence in a second language is partially a function of the type of competence already developed in L1 at the time when intensive exposure to L2 begins (Cummins, 1979, p.222)." In other words, students' L2 development was partially determined by their already developed L1 competence, provided that they were extensively exposed to L2 input. A branch of empirical studies emerged to support the LIH by investigating the associations between parallel skills of L1 and L2 via correlation and regression analyses. To illustrate, Bernhardt and Kamil (1995) consolidated this hypothesis by measuring a group of American students' L1 and L2 reading skills in three levels of Spanish courses. Their results demonstrated that students who read well in their primary language (English) were more likely to read well in their L2 (Spanish). Jiang and Kuehn (2001) examined the relationship between young bilingual children's linguistic skills in L1 and L2. Moderate positive correlations between corresponding domains of both languages provided evidence for the positive transfer of linguistic and cognitive skills present in L1 to L2. After synthesizing studies on writing from sources, Cumming et al. (2016) concluded that L1 and L2 writing literacy skills overlapped to a large extent so that the development of the two languages is hardly separated.

According to Cummins (1980), language proficiency involves multiple skills of two dimensions: basic interpersonal communicative skills (BICS) and cognitive/academic language proficiency (CALP). BICS refers to those skills for daily communication, such as accent and oral fluency, while CALP closely binds to the development of L1 and L2 literacy skills. Language learners should reach a certain level of BICS before developing CALP in the target language, which contributes to advanced reading and writing competence. L1 and L2 CALP are interdependent, and they overlap to manifest a common underlying proficiency (CUP): "To the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this

proficiency to Ly will occur provided there is adequate exposure to Ly (either in school or environment) and adequate motivation to learn Ly" (Cummins, 1980, p. 90). As Cummins (2000) further explained, "the cognitive/academic proficiency that underlies academic performance in both languages" is interdependent (p. 38). Simply put, the CUP postulates that learners possibly transfer their cognitive and literacy skills between L1 and L2. Its core presupposes that the proficiency developed in the native language can also serve as the basis for the acquisition of an L2. It allows for the "possible transfer of concepts, skills, and learning strategies across languages" (Cummins, 2016, p. 940). Nonetheless, the extent of transfer is determined by the context, in particular, the opportunities to develop both languages and the motivation to learn them (Cummins, 2016). To date, Cummins' interdependence framework has inspired a significant research volume in this field, but it provides little in-depth information concerning the interdependence concept and the transferred knowledge and skills (Genesee et al., 2008), which warrants more empirical inquiries and theoretical specification. In addition, these hypotheses have received criticisms for being so simplified that the presence of other factors influencing bilingual literacy development, such as individual characteristics (e.g., L2 proficiency, self-efficacy beliefs), task features (e.g., task difficulty, language skills under investigation), and contextual variables (e.g., socioeconomic state, learning background), are somewhat ignored (Pae, 2019).

The majority of previous studies looked at the cross-linguistic transfer in writing with the guidance of Lado's contrastive analysis approach and Cummins' hypotheses. In recent years, researchers have also characterized the transfer as cross-language relationships which not merely involve surface features but also expand further to the underlying cognitive processes and the strategy repertoire elicited in L1 and L2 writing. Specifically in bilingual writing development, there is a consensus that L2 writers may revert to their conceptual and discursive knowledge developed beforehand in L1 during their L2 composition process (Bernhardt &

Kamil, 1995; Cummins, 1991), and cognitive abilities underlying L1 and L2 writing are intrinsically linked to each other. It would seem reasonable to assume that these mental processes and strategies used in their L1 writing are available and accessible in L2 writing (Levy & Ransdell, 1996). Thus, this study is intended to validate whether Cummins' LIH and CUP apply to metacognitive strategies underlying L1 and L2 writing. It is also worth noting that L1-L2 relations are less likely to be stable. Previous cross-language studies have been conducted to examine the presence or absence of L1 and L2 connections, but they failed to consider diverse factors that possibly moderate these connections. To fill in the niche, therefore, this study attempts to explore the dynamic transfer mechanism of metacognitive strategies with different groups of learners, namely, to test whether the transfer effect is moderated by learners' L2 proficiency level and academic major.

2.4.2 Empirical research on the cross-linguistic transfer underlying writing

A careful review here tracing the development of empirical studies on the cross-linguistic transfer underlying L1 and L2 writing knowledge and skills is an effort to deepen our understanding of bilingual writing development. It shows that the cross-linguistic transfer is a broad conceptual framework related to various writing aspects of bilingual students: vocabulary, syntactic knowledge, rhetorical patterns, strategies and cognitive processes. Discussion on the extant empirical literature in this section is developed regarding these different aspects of writing knowledge and skills involved in L1-L2 transfer.

Vocabulary skills are fundamental to writing development no matter the language context, given that one cannot produce a text without knowing the form and meaning of words. In short, vocabulary acquisition is a primary indicator of writing development. As shown in Jiang's model (2000), there are two practical constraints on L2 lexical development: one is the poverty of target language input in both quantity and quality, and the other is "the presence of an established conceptual/semantic system with an L1 lexical system closely associated with it"

(p.49). Due to the established L1 linguistic and conceptual systems, L2 learners tend to rely on their L1 when learning a new L2 vocabulary. In this way, L1 lexical features would naturally have an impact on L2 vocabulary learning and then influence the development of L2 writing skills, providing some support for the L1-to-L2 transfer at the lexical level. Research in this vein has revealed two major types of lexical transfer in writing: formal and semantic transfer (Bardel, 2015; Ringbom, 2001). The formal transfer refers to the use of formally similar words of L1 when producing an L2 text as manifestations of borrowing, foreignizing, and spelling transfer; the semantic transfer is often shown in the incorporation of semantic contents from L1 words into L2 lexical representation and processing such as lexeme matching, semantic extensions, and direct translations. The use of various types of lexical transfer varies across different L2 proficiency levels. Among these types of lexical transfer, foreignizing was predominantly used by higher-proficiency L2 learners, while borrowing appeared regularly in written products of L2 learners with comparatively lower proficiency levels (Pfenninger & Singleton, 2016; Ringbom, 2006). L1 lexical knowledge can facilitate or hinder L2 vocabulary acquisition (Wolter, 2006). On the one hand, the L1 lexical knowledge is helpful for L2 learners to structure their L2 vocabulary networks, but the transfer of L1 lexical knowledge, on the other hand, has been investigated as a significant cause of written errors made by L2 learners. Researchers have scrutinized a full range of errors in L2 essays caused by the L1 lexical transfer. Analyzing a small corpus of 32 essays composed by German-speaking ESL learners, Nesselhauf (2003) found that more than half of the verb-noun combination errors resulted from L1 interference. He argued that due to the L1 lexical transfer, the German participants produced inappropriate collocations in their English writing, such as *make homework* and *close lacks*, which contradicted the findings in previous studies that L1 influence did not play a significant part in learners' production of collocational errors (Lennon, 1996). In a systematic and large-scale study, Chan (2010) revealed four types of lexical errors in written products of Hong Kong

Cantonese ESL learners: inaccurate directionality, synonym confusion, vocabulary compensation, and synforms. As he noted, the participating learners were prone to generate ideas in their L1 first before literally implementing them into written forms of L2. Some exception cases who thought firstly in L2 would tend to retrieve words from their previous L1 linguistic repertoire to tackle difficulties in composing L2 written texts. Chan provided a possible explanation for the erroneous output in his study: the lack of typologically comparable equivalents between L1 and L2 somewhat weakened the facilitative effects of the L1 transfer in written works. Besides, as Jarvis (2009) points out, the lexical transfer can also take place intentionally as a strategy to tackle linguistic difficulties encountered in writing. Nevertheless, intentional cases are less investigated in this field since learners' writing performance is not often susceptible to the influence of time pressure (Fuster & Neuser, 2020). In this way, there is an apparent need for future research to reveal the positive effects of the L1 lexical transfer on L2 writing from the perspective of intentionality.

Writing requires language use beyond the word level, and researchers further examined the possible transfer of syntactic structures from L1 to L2. The collective insights of the extant empirical literature so far have shown a somewhat mixed picture of L1-L2 syntactic transfer in writing. Triangulating the data from individual interviews, translation practices, and grammaticality judgment tasks, Chan (2004) found that Chinese ESL learners' L1 normative sentence structures strongly influenced their L2 written production, and the extent of reliance on L1 linguistic repertoire varied as a function of general L2 proficiency. With the large database for five syntactic error types (i.e., confusion in verb transitivity, incorrect distribution of adverbs, failure to use the relative clause, lack of control of the copula, and the inability to use the there-be structure for the expression of existential or presentative function), Chan's (2004) study provided compelling evidence for the syntactic transfer from Chinese (L1) to English (L2) writing. The findings are consistent with the claim that typological differences

between the two languages inhibit the acquisition of an L2 (Anderson, 1983). Aside from the negative effects of L1 syntactic transfer, the author provided alternative explanations for the anomalous structures in L2 written outputs like developmental sequences and avoidance behaviour. Adopting a longitudinal design, Yip and Matthews (2000) revealed the transferability of several syntactic properties in the early writing development of a Cantonese EFL learner. The patterns of language dominance and input ambiguity were the primary cause of the observed syntactic transfer. As the two authors concluded, although L1 and L2 in this study had distinct linguistic systems, considerable interactions between L1 and L2 took place in early bilingual development. However, in a recent written corpus analysis involving EFL learners from six different L1 backgrounds, Larsson and his associates (2020) found that the positional distribution of adverbs in L2 academic written output was strongly associated with several linguistic factors, including the presence/absence of auxiliary, verb type, and lexis instead of L1 influence. Inconsistent with previous findings (Osborne, 2008), very limited evidence could be noted in this study regarding the adverb placement of the L1 syntactic transfer in advanced learners' L2 writing.

The rhetorical transfer from L1 to L2 refers to "the reuse or reshape of L1 rhetorical knowledge in L2 writing" (Wei et al., 2020, p.2). It is argued that the L1-to-L2 rhetorical transfer is a common phenomenon in L2 writing (Zhang, 2016). Once a language learner has formed his/her own ways of organizing a written composition in their native language, this schema will undoubtedly influence the writing rhetorical structure in the target language (Hirose, 2003; Sheldon, 2011). The L1-to-L2 rhetorical transfer in writing involves two aspects of rhetorical knowledge: the rhetorical styles or organizational patterns associated with a given genre, shown mainly by similar ways of communicating information in technical writing of L1 and L2 and rhetorical operations that facilitate the composing process of a specific genre. Kaplan (1966) undertook the first attempt of contrastive analysis on rhetorical styles in writing

and provided some empirical evidence indicating that L2 writers with multiple L1 backgrounds organized paragraphs as they did in L1 writing. Based on the ESL essays of Japanese learners, Kubota (1998) revealed that most participants employed similar organization patterns in their L1 and L2 texts in terms of the location of main ideas and the macro-level rhetorical way, while they received relatively higher scores in L1 writing than in L2 writing. Combining the retrospective questionnaire with interview results, Kubota pointed out that the poorer quality of ESL texts may result from the lack of English writing experience and language skills rather than the negative rhetorical transfer from L1 to L2. Another study conducted with Japanese writers revealed similar deductive organizational patterns in L1 and L2 argumentative essays (Hirose, 2003). Most Japanese writers in Hirose's study were found to be identical in their positions, evidence to support positions, location of positions, and macro-level patterns. Hirose concluded that the possible rhetorical transfer from L1 to L2 writing resulted from the fact that there were no highly different patterns in Japanese and English writing. However, the author did not obtain evidence from the voices of participating writers in support of her conclusion. Text-based analysis of rhetorical transfer has received criticism due to little process evidence to inform the rhetorical behaviour in writing. To fill this gap, succeeding research sought to delve into the rhetorical processes with more qualitative insights. Combining text analysis and stimulated recall interviews, Uysal (2008) found the associations of rhetorical patterns in L1 and L2 essays composed by Turkish writers and the influence of different cultural-educational factors in shaping the final written products. Nevertheless, the rhetorical transfer identified in L2 writing studies does not simply occur as a result of L1 interference with the mediating effects of cultural and educational factors but due to "a cognitive mechanism underlying second language acquisition" (Jarvis & Pavlenko, 2008, p.387). It is the L2 learner who executes and monitors during the rhetorical transfer process. In this regard, individual differences deserve more attention in L1-to-L2 rhetorical transfer studies. In a recent study conducted by Wei and

his associates (2020), the rhetorical transfer from L1 was closely connected to Chinese ESL writers' perception of L2 writing difficulty and L2 writing proficiency.

Over the past four decades, the focus of L2 writing research has witnessed a shift from a product-oriented approach to a process-oriented approach (Guo & Huang, 2020), and more attention has been directed to covert strategies and processes that learners experience as they develop writing skills and complete writing tasks (Cohen, 2006). One crucial issue pertinent to this shift is whether or not the transfer of these strategies and underlying processes between L1 and L2 takes place. Several studies have compared the strategies and processes engaged in L1 and L2 writing (Lee, 2005; Shoonen et al., 2003; Thorson, 2000; van Weijen et al., 2018; Wang & Wen, 2002). However, these empirical studies have not consistently supported the L1-L2 transfer of writing strategies and processes. Some researchers focused on the view that strategies and cognitive processes engaged in L1 and L2 writing are different since writers have more than one linguistic repertoire at their disposal in L2 writing. In contrast, others devoted their attention to revealing similarities between them. Jones and Tetroe (1987) analyzed and compared L1 and L2 writing strategies used by a group of 6 Spanish ESL adult learners. The verbal report data demonstrated that those learners who used to construct a global plan in the L1 writing task would plan similarly when completing the L2 writing task, thus partly supporting the L1-L2 transfer of writing processes from the angle of planning. Beare (2000) also conducted a small-scale study with eight proficient learners whose native language was English or Spanish. Despite their L1 background, it was found that the content-generation and conceptual-planning strategies were transferrable from L1 to L2 writing. Similar composing processes between L1 and L2 writing have also been recognized in Weijen's study with a group of 20 Dutch ESL learners (2009), notwithstanding differential aspects regarding when cognitive operations were carried out and whether they were positively correlated to the text quality. Most recently, Guo and Huang (2020) used questionnaires, think-aloud methods, and

retrospective interviews to explore whether L1 and L2 writing strategies are transferrable from a small sample of Chinese ESL graduate students. They identified 72 individual strategies and found a high degree of similarity in strategy use when writing in L1 and L2, lending further empirical evidence to the transferability of writing strategies and processes. One thing worth noting is that although the overall writing processes and strategies were highly similar in L1 and L2 writing tasks, their study also reported differences in the usage frequency of specific cognitive strategies and the participation of L1 in several L2 writing strategies. L1 involvement in L2 writing has also been noted as a facilitative factor by some previous studies in which L2 learners used L1 to assist their idea generation when composing a written text (van Weijen et al., 2009; Wang & Wen, 2002).

2.4.3 Individual factors moderating the cross-linguistic transfer

Noteworthy is that the cross-linguistic transfer is not invariant. Researchers have also given substantial attention to the idea that a third factor may have the potential to moderate the relationship between L1 and L2 skills. As reviewed above, the transfer not only occurs across different levels of surface linguistic levels but also embeds in the production process, which is underpinned by individual cognitive abilities. As an "individual-level phenomenon," it is the learner who exercises discretion in reusing and reshaping what is acquired in the source language to enhance the performance in the target language by interacting with contextual factors (Jarvis & Pavlenko, 2008; Larsen-Freeman, 2013). In this regard, learners sit at the heart of any transfer phenomena. In other words, transfer occurrence is impossible without learners' critical engagement. It possibly varies as a function of individual characteristics. Studies on these individual factors are hoped to provide more enlightened and illuminating insights into the sophisticated interactions of L1 and L2 within bilingual students.

Taking the linguistic threshold hypothesis (LTH) as an example, learners' L2 proficiency is a possible moderator variable that possibly changes the strength of the relation between L1

and L2 skills. As the LTH posits, the cross-linguistic transfer effect may differ regarding the learners' L2 proficiency levels, and it may be short-circuited below a certain linguistic threshold (Cummins, 1980). So far, this hypothesis has motivated a growing number of studies examining and validating the linguistic threshold underlying L1-L2 transfer in the writing domain. With a group of Turkish EFL learners, Uysal (2008) found that L2 proficiency was an essential factor in determining whether learners could apply L1 rhetorical knowledge to their L2 writing. However, the threshold level was possibly changeable as a function of transferred objects. To illustrate, rhetorical features such as transitions were used effortlessly by the Turkish learners in both their L1 and L2 essays, while the use of certain macro-level features like initial thesis statements was still a challenge even for proficient L2 learners in writing. Worth noting is that these findings should be approached cautiously since they are purely based on qualitative analyses, i.e., text analysis and stimulated recall interview. More recently, Pae (2018) found a notable variation in the connections between L1 and L2 writing skills among learners with different levels of L2 proficiency, and the impact of L2 proficiency as a moderator remained consistent in both low and high cognitive demand task situations. In his study, the path coefficients between L1 and L2 writing were significant among both groups of learners, while the transfer was more statistically pronounced in the high-proficiency group than in the low-proficiency group. This pattern remained the same in low-cognitive-demand narrative writing tasks and high-cognitive-demand argumentative writing tasks. Therefore, the results of Pae's (2018) study supported the LTH within the writing domain. It demonstrated that learners with higher L2 proficiency were able to transfer their L1 writing skills into L2 writing more successfully compared to their lower L2 proficiency counterparts. It held true irrespective of the cognitive complexity posed by the writing tasks at hand. Nevertheless, as Roca de Larios et al. (2001) found, Spanish EFL writers' time allocation during formulation processes of L1 and L2 writing appeared to be invariant across different levels of L2 proficiency. These

conflicting results in previous studies call for more empirical efforts to understand further the role of L2 proficiency in the found L1-L2 transfer.

At the same time, researchers have also devoted attention to identifying a host of other individual factors that are relevant to the cross-linguistic relationship, such as L1 proficiency, gender, grade, language acquisition order, attitude, and perception. Existing evidence has indicated that the L1-L2 connection degree is determined by the learners' L1 proficiency levels (Edele et al., 2016) and varies between male and female learners and between simultaneous bilinguals and sequential bilinguals (Grant et al., 2011). As for the moderating effect of grade levels, Baker and his associates (2012) found that the L1-L2 transfer may not occur during the early stage of learning, which kept invariant across Grades 1-3. In addition, students' enjoyment of writing and perceived difficulty of writing tasks may facilitate the occurrence of transfer (Forbes, 2019; Kobayashi & Rinnert, 2008; Kim & Yoon, 2014; Wei et al., 2020). These empirical investigations indicated the presence and absence of the moderator role played by these individual factors. Learners' academic major is another possible factor for the variations of cross-linguistic transfer because it makes intuitive sense that English majors and non-English majors, who have variant exposure to the target language and different instructional environments in tertiary education, possibly differ in how they transfer knowledge and skills between L1 and L2. Yet, studies framed on the moderating effects of individual factors in cross-linguistic transfer are scant, and most of them are conducted typically in the domain of reading comprehension. More empirical studies are needed to determine whether individual differences exist in the cross-linguistic transfer in other domains, for example, in writing.

2.5 Summary

The theoretical and empirical perspectives reviewed above demonstrate the importance of studying writing metacognitive strategies in L1 and L2 writing, especially from a cross-linguistic perspective. In view of the above-reviewed studies, this thesis identified three gaps.

The first gap was the lack of discussion about how the questionnaire instrument was developed and validated in existing studies in attempts to measure metacognitive writing strategies quantitatively. Most studies in this vein appeared to apply or adjust the questionnaires to their own needs, while few of them elucidate the procedures of questionnaire development and provide statistical evidence to guarantee its reliability and validity (Teng et al., 2022). Combining collective insights from multiple data sources, Phase 1 of this thesis comprises a good procedure demonstration of designing and developing a valid survey tool to measure students' metacognitive strategies in both L1 and L2 writing contexts. The second gap is the uneven understanding of the effects of metacognitive strategies on L1 and L2 writing performance. Although previous studies have provided empirical support that metacognitive strategies were statistically significant determinants of writing performance across several levels of education programs, the bulk of these studies were conducted in an L2 context and the L1 context (i.e., Chinese) was less investigated. Therefore, to examine whether the effects of metacognitive strategies remain the same in the two writing contexts, a simultaneous model including L1 metacognitive strategies, L2 metacognitive strategies, L1 writing performance, and L2 writing performance was tested to illuminate the relationship between metacognitive control and writing performance comparatively.

Finally, Phase 2 of this thesis also uniquely contributes to the current literature on cross-linguistic transfer theoretically and empirically. Research has provided empirical evidence that knowledge and skills related to writing already developed in one language may be available and accessible when writing in other languages. However, research on cross-linguistic transfer in writing is extremely sparse. Among the limited number of studies, the bulk appears to focus on surface linguistic levels, such as the transfer of vocabulary skills, syntactic structures, and rhetorical styles, whereas the transferability of strategies or processes in L1 and L2 writing has been comparatively under-researched. In other words, analyses in writing cross-linguistic

transfer studies featured a product-oriented rather than a process-oriented approach, which indeed affords profound and in-depth insights into the transfer phenomenon. It is also worth noting that the findings of Phase 2 also enrich knowledge about the cross-linguistic transfer underlying writing by addressing whether the strength of the L1 and L2 relationship varies as a function of the learners' academic major and L2 proficiency levels. There is a lack of research into individual factors that may facilitate or hinder the L1-L2 transfer. In this way, investigations into these possible moderation factors would contribute to a better and updated understanding of the transfer phenomenon in writing. The moderating effect occurs when a third moderator changes the strength of the L1-L2 relation. Nevertheless, it warrants attention that the extant studies on the moderating effect are conducted to directly compare the correlation indexes between L1 and L2 skills or the R^2 value. Therefore, there is a lack of empirical research investigating the causal relationship between L1 and L2 variables simultaneously with identified measurement errors (Pae, 2018). With a multigroup analysis via SEM, it is well addressed in this study as to explore the moderation role of academic major and L2 proficiency levels.

Chapter 3 Overview of Research Design

Theoretical motives, i.e., metacognition and strategy research, and methodological concerns, i.e., multi-methods approach to development and validation of questionnaire and mixed-methods design combining quantitative questionnaire and writing task responses and qualitative stimulated-recall interview reports, are introduced briefly in this section to give a quick look of what, why and how this thesis is conducted.

3.1 Theoretical orientations

As reviewed above, metacognition theory is initially rooted in cognitive and educational psychology and has been applied in language learning and teaching since the 1980s, which provides a strong impetus for empirical inquiries conducted and published with its connection to language achievement. As a superordinate and multifaceted construct, metacognition refers to learners' awareness and control of their knowledge, thinking, experience, actions, and emotions accompanied by language teaching and learning activities, which commonly incorporates three subordinate components, namely metacognitive knowledge, metacognitive regulation/control, and metacognitive experience (Lee & Mak, 2018). Despite its conceptual blurriness, researchers have consistently called attention to the importance of metacognition as a strong predictor of learning success by fostering learners' active role in learning processes as well as enhancing their learning performance in a general language or specific skill domains such as writing (Sato, 2020). Current theoretical models of metacognition agree on the dynamic aspect of metacognitive regulation as a central binding part. Theoretically grounded on the classification of metacognitive regulation, planning, monitoring, and evaluating are adopted as three core components of metacognitive strategies through which writers direct, manage, and regulate any covert processing and observable actions involved in the writing process (Brown, 1987; Flavell, 1979; Dunlosky & Metcalfe, 2009).

As a productive language skill, adequate writing proficiency requires more self-initiated,

self-sustained and self-regulated efforts and practices in this domain. Thus, metacognition has long been situated within established cognitive models of writing to varying degrees. In their groundwork model of writing, Flower and Hayes (1981) describe metacognitive involvement in writers' composing in the monitor that arranges and manages the sequence and iteration of basic writing subprocesses explicitly as well as in the planning and reviewing. In Scardamalia and Bereiter's models of writing (1987), metacognitive activities are seen as an integral part of writing development, progressing from simple knowledge telling of novice writers to advanced knowledge transforming of expert writers. Novice writers employ an elementary metacognitive mechanism by testing the appropriateness of information retrieved from memory and monitoring their mental representation of the writing task. In contrast, expert writers rely more heavily on metacognitive mechanisms by engaging in reflective thinking about the interaction between content and rhetorical problem spaces and active monitoring problem analysis and goal setting. Kellogg's (1996) writing model assigns a salience to working memory and acknowledges metacognitive engagement by specifying the central executive, which regulates the activation and execution of all writing subprocesses and designating planning as anticipating content and monitoring as inspection and evaluation of the produced texts. Zimmerman and Reisemberg (1997) attribute metacognitive regulation in their model as the manipulation of the triadic influences from personal cognitive beliefs and affective states, motoric behaviour, and external environment. In a recent model proposed by Hacker and associates (2009, 2018), writing is reconceptualized as applied metacognition, demonstrating that metacognitive dynamics operate across all stages of writing processes. In a nutshell, the above-specified writing models have led us to examine how writers operationalize their metacognitive regulation in the writing process and its connection to final writing achievements.

Writing is a strategic process in which the writer engages in processing and managing different types of knowledge and resources iteratively to produce a desired text (Abdel Latif,

2021). Consulting language learning strategy literature is also valuable in research on writing metacognitive strategies. The bulk of language learning strategy literature has long been focused on strategy classification. From Rubin's (1981) initial effort of compiling a list of strategies directly and indirectly related to language learning performance to Oxford's (1990) widely recognized strategy inventory for language learning, metacognitive strategies have been successively necessitated as an important subcategory. In the domain of writing, researchers have identified specific strategies used in line with writers' metacognitive control, including self-initiating, orientation, planning, monitoring, re-reading, evaluating, and revising (Arndt, 1987; Bai et al., 2014; Qin & Zhang, 2019; Teng et al., 2022; Wenden, 1991; Zhao & Liao, 2021). Metacognitive strategies hold greater importance among these various strategy taxonomies, as they serve as the higher-order executive that coordinates and regulates other types of strategies, thereby enhancing writers' cognitive engagement and composing efficiency (Anderson, 2005). Furthermore, writers' ability to use metacognitive strategies has also been referred to as their strategic competence, which is later conceptualized as a constituent component of communicative language ability in Bachman and Palmer's (2010) framework. However, there has been a rise in criticisms against research on language learning strategies since the 1980s. Criticisms highlighted issues concerning definitional fuzziness, insufficient theory support, lack of a unified theoretical framework, etc. It prompted Dörnyei's (2005) proposal of revitalizing strategy research by aligning it with the robust construct of self-regulation. Self-regulated learners often rely on a variety of metacognitive strategies to control and regulate cognition, motivation, behavior, and environment in the learning process (Zimmerman, 2013). Metacognitive regulation forms a core part of the self-regulated writing process in alignment with other dimensions of self-regulation (Teng & Zhang, 2016). Therefore, language learning strategy literature in the face of self-regulation forms another drive for this thesis.

In this thesis, I examined Chinese college students' metacognitive processes of guiding, monitoring, and regulating their cognitive processes and related behaviors within L1 and L2 task-situated writing and show how these processes influence final writing performance within both language contexts by bringing together the already established metacognition theories and its configuration within cognitive models of writing and language learning strategy theories. It hopes to inform the constructivism understanding of language learning and development as an individual enterprise transforming from a passive cycle of knowledge import-export to an active process of managing and regulating cognitive processing and behaviour (Schunk & Greene, 2018). In addition to this, Chinese EFL learners under investigation represent a large bilingual population. To reveal the possible L1-L2 interactions within such a large bilingual population, this thesis further explores the transferability of metacognitive strategies underlying writing with reference to Cummins' LIH and CUP hypotheses. Participants' L2 proficiency level and disciplinary major background are also taken into the investigation so as to afford deep and profound insights into the complexity embedded in the L1-L2 transfer mechanism. Figure 3.1 presents the theoretical motives behind this thesis.
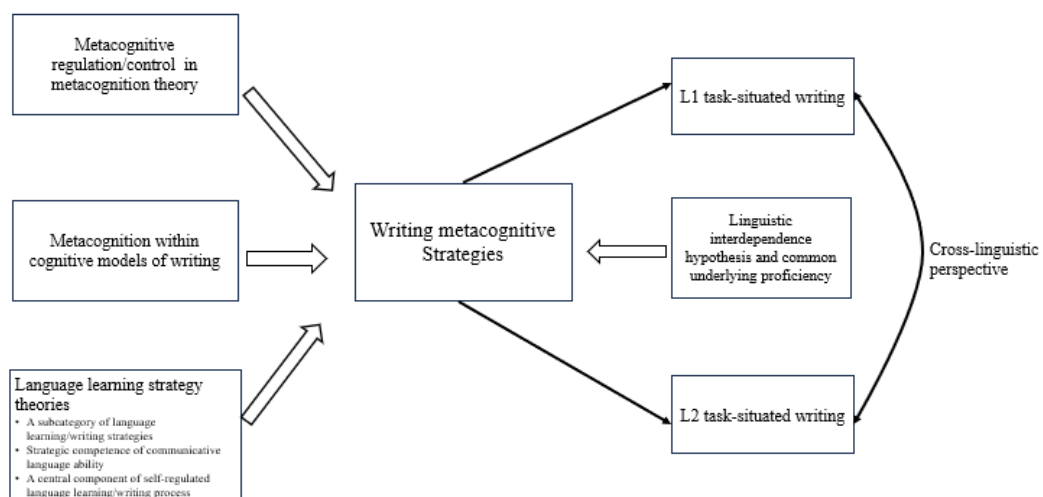
Figure 3.1 Theoretical motives for the thesis

3.2 Research methodology

One issue of strategy research has faced criticism as a result of the psychometrically unjustified adoption of previous strategy taxonomy. For instance, the Strategy Inventory for Language Learning (SILL), developed by Oxford (1990), is one of the most widely used inventories in strategy research. Many researchers rely on SILL, applying it directly or adapting it partly, to measure learners' strategies in language learning and use, whether it be for a general language or a specific language skill. However, there is insufficient evidence regarding its psychometric soundness within the particular context and for the participant sample under investigation (Rose et al., 2018). Few attempts have been made to create and validate the used questionnaire instrument with multiple sources of data in the analysis. To address such criticism surrounding the measurement instrument dogged in this field, this thesis adopts a multi-method approach during Phase 1 to conceptualize and validate the questionnaire instrument to assess Chinese college learners' metacognitive strategy use in L1 and L2 writing contexts with various insider perspectives into consideration. It displays a complete circle of questionnaire design, development, and validation. To be specific, focus-group interviews and literature synthesis were combined to generate an initial item pool. Researcher judgment, teacher comments, and pilot feedback from a group of potential candidates were substantively adopted to revise and refine the questionnaire items. Factor analyses, including EFA and subsequent CFA, collectively provide statistical evidence for the psychometrical quality of this questionnaire instrument in both L1 and L2 writing task completion procedures. Along with designing and validating the questionnaire instrument, this phase was guided by the following two research questions: (1) what are the main types of metacognitive strategies do students use when completing L1 and L2 writing tasks? and (2) what structural models can better represent the dimensions of L1 and L2 writing metacognitive strategies?

Based on the developed and validated questionnaire instrument in Phase 1, this thesis

takes a further step forward to examine how metacognitive strategies influence writing performance in both L1 and L2 in Phase 2. It also seeks to determine the transfer availability of metacognitive regulation between the two language contexts and whether individual characteristics, i.e., L2 proficiency and academic major, moderate such transfer. Writing is a complex and dynamic activity requiring active regulation of cognitive processing no matter the language context, which presupposes the transfer potential. Meanwhile, it is worth noting that transfer is not a stable aspect that underlies L1 and L2 connections. Metacognitive regulation is a self-initiated and self-managed process that is indeed confined to individual characteristics such as L2 proficiency level and disciplinary background. Thus, it is essential to include individual differences in the research design when seeking to understand the complex transfer mechanism of metacognitive strategies in writing domains. Therefore, in addition to investigating the effects of metacognitive strategies and the possible transfer underlying L1 and L2 writing, Phase 2 of this thesis also made a unique contribution to the existing bilingual research to examine whether the strength of the relationship between L1 and L2 writing metacognitive regulation varied as a function of the participants' L2 proficiency and academic major background. The reliance on the quantitative questionnaire method constitutes the basis of another criticism in strategy research (Rose et al., 2018). Using survey as a single method in strategy research seems to be problematic and more situated, and qualitative data is expected to offer rich and valuable insights (Griffiths, 2013). To overcome the possibly biased results from single questionnaire measurement, a mixed-method design was applied in Phase 2 to triangulate quantitative (i.e., questionnaire and writing task responses) and qualitative (i.e., stimulated recall interviews) insights to address the other two research questions: (3) To what extent do students' metacognitive strategies predict their L1 and L2 writing performance respectively? and (4) Is there a cross-linguistic transfer of metacognitive strategies underlying L1 and L2 writing? If so, do L2 proficiency and academic major moderate such transfer?

Statistical analysis techniques, including correlation, regression, SEM, and multiple-group analyses and the thematic approach to qualitative analysis, were combined to answer the research questions. Figure 3.2 depicts the overview of the research procedure to provide a systematic account of the data collection methods, data analysis techniques, and research objectives involved in the two phases of this thesis.
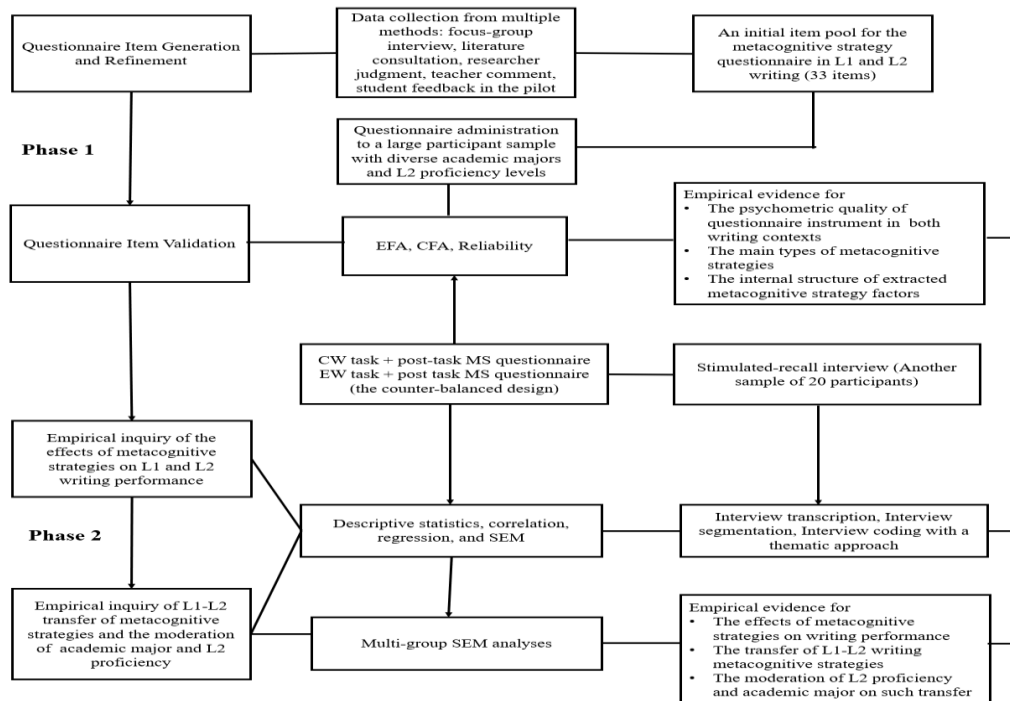
Figure 3.2 Research procedure for the thesis

3.3 Summary

This chapter provides an overview of the research design, including theoretical orientations and research methodology for this thesis. Writing metacognitive strategies, the focus of this thesis, are theoretically oriented in line with metacognitive regulation in metacognition theory, metacognition within cognitive models of writing, and language learning strategy theories. The cross-linguistic perspective underlying the L1-L2 writing comparison is set out to examine the possible transfer of writers' ability to employ metacognitive strategies. Methodologically, this thesis adopts a multi-method approach to developing and validating the

writing metacognitive strategy questionnaire in Phase 1 and the mixed-method design to reveal

the effects of metacognitive strategies on final writing performance and its transfer between L1

and L2 contexts in Phase 2.

Chapter 4 Phase One: Metacognitive Strategies in L1 and L2 Writing and the Factorial Structure

Phase one aims to address RQ1 and RQ2 to reveal the main categories and factorial structure of metacognitive strategies that the participants used to complete L1 and L2 writing tasks during the development and validation of the writing metacognitive strategy questionnaire. Multiple sources of data were collected by adopting focus-group interview, literature reference, researcher judgement, teacher comment, and pilot student feedback collectively to build the initial scale of metacognitive strategies in the two writing contexts. Factor analyses, i.e., exploratory and confirmatory factor analysis on students' questionnaire responses, were run to offer statistical evidence. Post-task stimulated-recall interviews were also analyzed to complement and refine the theoretical conceptualization and operationalization of metacognitive strategies.

4.1 Participants and setting

The participant sample in this phase included 522 undergraduate students. University-level students were recruited since they had enough Chinese and English writing experience in their previous learning programs and current college courses at the time of data collection. Thus, they were assumed to be able to fulfil the questionnaires and writing tasks. Initially, 541 Grade 2 university students were recruited from two medium-ranking universities in mainland China to complete the writing tasks and questionnaires on a voluntary basis. After careful data screening, 522 valid cases with parallel questionnaire responses (i.e., for L1 and L2 writing) were retained for the following statistical analyses (response rate: 96.5%). Deleted cases took only 3.5%, suggesting that the missing and outlier data was a predominantly random result. Year-two college students were purposely selected in this study in order to control variations in metacognitive strategy use possibly caused by grade levels, which was outside of the scope of this study. Of note, this thesis also intends to explore whether academic majors influence

students' L1-L2 transfer of metacognitive regulation after one-year learning of college subject knowledge in Phase 2. Thus, a balance control over English- and non-English major sample size was determined at the beginning of participant recruitment. Table 4.1 presents the demographical information of all the valid respondents. The recruitment of bilingual learners from various academic majors and different L2 proficiency levels was essential to enhance the generalizability of the findings in this study. Among the 522 valid respondents, 250 English majors (47.9%) were recruited in this study initially, and the other 272 non-English major participants were enrolled later (52.1%), indicating that the two groups of Chinese EFL learners almost reached a balance in number. Specifically regarding the non-English subsample, there were 43 participants (15.8%) specialized in arts-oriented subjects, including journalism and public administration, 105 participants (38.6%) majored in computer science and technology, 124 participants (45.6%) were economy and management-related majors such as accounting and auditing. The participants in this study were L1 Chinese speakers who had received more than ten years of English instruction on average (M=10.38, SD=2.18) in both traditional classroom environments and after-school tutoring centres at the time of data collection because English was a compulsory subject for them since Grade 4 of primary school in mainland China. Chinese was one compulsory subject for the participants since Grade 1 in primary school. When entering college, they also took 16 Chinese classes (90 minutes for each class) for the past academic year to learn advanced Chinese reading and writing skills. Their age ranged from 18 to 22 years old (M=19.45, SD=0.74). Regarding gender distribution, 141 were male (27%), and 381 were female (73%). The gender distribution indicated that female students outnumbered male students because English majors took half of the sample. In addition, these participants have no learning experience in English-speaking countries as to control the background variance possibly caused by the learning environment.

Table 4.1 Demographical information of the participants in Phase 1 (n = 522)

Groups of participants	Academic major	Gender F/M	Age				Years of learning English			
			Min	Max	Mean	SD	Min	Max	Mean	SD
Total	N=522/100%	F: 381/73% M:141/27%	18	22	19.45	0.74	5	19	10.42	2.18
English majors	N=250/47.9%	F: 220/88% M: 30/12%	18	22	19.62	0.78	7	17	11.09	1.25
Non-English Majors	N=272/52.1%	F: 161/59% M:111/41%	18	22	19.29	0.67	5	19	9.79	2.63

Notes. Three subgroups for non-English majors: subgroup1= arts-oriented majors (43/15.8%); subgroup2= science-oriented majors (105/38.6%); subgroup3=economy-related majors (124/45.6%).

A two-step sampling procedure was adopted in this study to enrol the participants. Due to resource limitations, participant samples that the author was more accessible to were first chosen according to the convenient sampling method. The author explained the research purposes and design to university directors in mainland China to seek support via personal networks. Two directors from two universities agreed to offer support for the data collection of my thesis. They helped deliver the participant recruitment poster to as many teachers and students as possible. Finally, five instructors and 541 students from 10 intact classes agreed to participate in the research project voluntarily. All the questionnaires and tasks were administered during regular classroom hours. The five instructors helped assign these questionnaires and writing tasks to their students in classes where they taught academic writing. During the participant recruitment procedure, the author deliberately maintained a balanced number of English and non-English majors for the following comparison in Phase 2. The participant information sheet and consent form were delivered to all the participating students before data collection. The author explained the research purposes and procedure to the participants beforehand and informed them that none of the task and questionnaire responses would influence their course grades. However, the participants were encouraged to carefully complete these writing tasks and questionnaires for valuable information regarding their

current writing abilities and active control over their writing processes and behaviors in both L1 and L2 contexts. Worth noting is that the participants took part in this research project voluntarily and had the right to withdraw from it at any time without any penalty.

4.2 Questionnaire development and validation

The writing metacognitive strategy questionnaire was constructed and validated in this study through four main steps. At first, the item pool of metacognitive writing strategies was generated based on focus-group interview data collected from 20 undergraduate students, along with references from prior theoretical and empirical studies. The 20 undergraduate students were diverse in gender, academic subjects, and English proficiency levels (as reported by their gaokao English test scores). They were recruited in the focus-group interview to reflect on their previous writing experiences and anticipate and discuss extensively how they would accomplish the assigned L1 and L2 writing tasks. Prompts designed and used in the focus-group interview to spark discussion were presented in Appendix A. The author acted as a moderator to arrange the interview schedule, introduce the prompts, invite the interviewees into the discussion, and keep the discussion going. It allowed for a coarse list of metacognitive strategies involved in completing L1 and L2 writing tasks with critical reference to the extant literature. To confirm the construct and statement of the questionnaire, this step also included consulting metacognition and language learning strategy theories (Brown, 1987; Bachman & Palmer, 2010; Flavell, 1976, 1979; Oxford, 2011; O'Malley & Chamot, 1990) and comparing with established questionnaires and coding schemes developed for measuring writing metacognitive strategies (Forbes & Fisher, 2020; Guo & Huang, 2020; Hwang & Lee, 2017; Teng et al., 2020; Zhao & Liao, 2021; Zhang & Qin, 2018). It is a crucial step to ensure the construct validity of the initially generated questionnaire instrument by incorporating valuable insights already obtained from the extant literature (Dörnyei, 2010). Theories of metacognition

and language learning strategies offered insights for constructing the main dimensions contained in the questionnaire instrument. Established questionnaires and coding schemes in related empirical studies informed particular content and wording of item statements. In this way, the combination of focus-group interviews and existing literature gave rise to a preliminary 46-item metacognitive writing strategy questionnaire in both L1 and L2 contexts. Of note, the generation of the initial item pool follows the rule of including as many items as possible, and a specific item can be a result of multiple sources of insights (Devellis & Thorpe, 2022).

Then, researcher judgment and teacher comments were adopted in this study to ensure the content quality of questionnaire items for the target context (Dörnyei & Taguchi, 2009; Petric & Czárl, 2003). Four experienced researchers with considerable expertise in writing skills, foreign language teaching, bilingual development, and language assessment were invited to evaluate and scrutinize the original item pool. They assessed these items in terms of two main aspects: whether these items suitably represented writers' metacognitive control in writing and whether these items were capable of eliciting writers' recall of metacognitive processes effectively and accurately in L1 and L2 writing. Following this, two experienced teachers of the intended candidature were also invited to offer comments and refinements on questionnaire items to evaluate whether they could be suitable for target educational settings. Evaluation and assessment from professional researchers and teachers led to the deletion of ten items for the following identified problems: low quality, confusing statements, double-barreled expressions, lack of specificity, and being overlapped with other items. Thirdly, another group of thirty Grade 3 undergraduate students were recruited to participate in the initial pilot of the questionnaire instrument. They had a similar educational background to the target candidature involved in this study, but they were not included in the main phase of data collection. The questionnaire items corresponding to Chinese and English writing were presented to the

students in a random order. They were required to read the questionnaire items, answer them according to their personal writing experience, and offer comments on the clarity, relativeness, and readability of item statements and the parsimony of questionnaire length. Their feedback helped the author to draft clear and natural item statements. After that, some modifications were made to the questionnaire items, and another three problematic items were removed based on the students' comments for confusion and lack of relativeness. Additionally, all the students participating in the pilot section agreed that the questionnaire could be completed comfortably within a 15-minute time limit. They also found that the remaining items were intricately related to their active control over cognitive processing, actions, and affective experience during the writing process. Finally, the developed writing metacognitive strategy questionnaire with 33 items was subject to large-scale administration and statistical validation in L1 and L2 contexts separately.

Evidence for the scale validity was later gathered through statistical procedures, i.e., factor analyses on two questionnaire datasets from 522 valid cases. EFA was performed on questionnaire responses from a sample of 257 undergraduate students to ascertain primary factors. CFA was then employed on questionnaire datasets of another sample of 265 undergraduate students to explore the internal factor structure underlying questionnaire responses. Noticeably, EFA and CFA were performed separately on Chinese (L1) and English (L2) writing questionnaire datasets. The results of factor analyses were comparatively examined to check whether the common factors and their internal structure operate invariantly across L1 and L2 writing contexts. The writing metacognitive strategy questionnaire instrument was operationalized with a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). The 6-point Likert scale was used as to avoid Chinese participants' tendency to choose the mid-point since the doctrine of mean is promoted in the Confucian culture of China (Brown, 2004; Cohen et al., 2018). As shown in Appendix B, The

questionnaire items were administered in a Chinese version in relation to the two writing contexts, given that all the participants in this study spoke Chinese as their mother tongue. It would not obscure the actual meaning entailed in questionnaire items. As Appendix C shows, questionnaire items were also translated into an English version for readership. Therefore, the construct of metacognitive regulation was actualized as a list of written statements, each presenting an assertion about learners' metacognitive strategic behavior during the writing process.

4.3 Questionnaire administration

The questionnaires for Chinese and English writing were distributed separately to the participants in an online format immediately after completing each writing task. The administration of writing tasks helps to minimize the retention interval and offer the anchor writing context for reference, thereby increasing the reliability and accuracy of questionnaire responses. The online format was adopted for the following two advantages: its feasibility during the serious COVID-19 epidemic situation and its accessibility to a large sample of students within a relatively short period of time. They were administered as a self-assessment tool for metacognitive control engaged in Chinese and English writing processes. The questionnaire QR codes were first offered to these students by their instructors in class. The participants scanned the QR code and accessed the questionnaire items with their mobile phones or laptops immediately after completing the corresponding writing task. They were asked to complete the questionnaire items according to their actual completion procedure of the assigned Chinese and English writing tasks. No strict time limit was enforced to complete the questionnaires. All the participants could complete one questionnaire comfortably within 15 minutes as expected. At the beginning of data collection, the participants were required to read the information sheet, fill in their background information, and sign the consent form to demonstrate their willingness to participate.

4.4 Data analysis

Collected data was checked and screened carefully before conducting subsequent data analyses. EFA was firstly conducted on the questionnaire responses from a sample of 257 participants in the initial validation of the questionnaire via the use of IBM SPSS Statistics program ver.26. Essential steps were undertaken to meet the statistical assumptions for performing EFA, such as descriptive statistics and Cronbach's alpha which were run to check the univariate normality of item responses and the overall reliability of the whole questionnaire datasets. As a data reduction technique to summarize items into several common factors (Phakiti, 2018a), EFA was conducted on the questionnaire responses from a subsample of 257 participants to identify the main types of metacognitive strategies that learners employed in their L1 and L2 writing tasks. A set of criteria was used to determine the factorability, the number of factors, and the items that load onto each factor. Firstly, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of Sphericity ($p < 0.05$) were used to determine the adequacy of the sample and the factorability of the datasets for EFA. Secondly, the factor number was determined by the traditional criterion of the eigenvalue greater than 1 along with the scree plots. Thirdly, the factor loading value of 0.5 or greater was used to select items that load onto each factor (Field, 2013).

After testing the plausibility of EFA, the second round of questionnaire responses from the remaining 265 participants was subjected to CFA in SPSS AMOS ver.24 as to cross-validate the factorial structure generated from EFA results and test the hypothesized models representing the construct measured by the finalized metacognitive strategy questionnaire with confirming factors, correlations, covariance patterns, and residual or error values (Byrne, 2016). Prior to the CFA, the datasets were thoroughly scrutinized with data screening and cleaning steps. The assumptions for multivariate analysis, such as normality, linearity, and homogeneity

of the datasets, were also checked to meet the prerequisite for conducting CFA (Beauducel &

Herzberg, 2006). The maximum likelihood (ML) method was selected in this study to evaluate

the hypothesized models underlying writing metacognitive strategy questionnaire responses. It

is the most common type of parameter estimation in CFA models. As suggested by Byrne

(2016), a number of goodness of fit indices have been developed for researchers to evaluate a

hypothesized model: chi-square statistics (χ^2), the ratio of chi-square (χ^2) divided by the degree

of freedom (χ^2/df), the p value, the comparative goodness-of-fit index (CFI), root mean residual

(RMR), root mean square error of approximation (RMSEA), the incremental fit index (IFI) and

the Tucker-Lewis index (TLI). Table 4.2 presents the acceptable levels of these indices (Phakiti,

2018b). Although chi-square statistics were a universally accepted test of a model to reproduce

the sample variance, it is easily vulnerable to sample size (Bollen, 1989). Thus, the model fit

was interpreted as being reasonable with reference to the combined indices, including χ^2/df $\leq$5,

p >0.05, CFI, IFI, and TLI $\geq$0.90, RMR and RMSEA $\leq$0.10. The acceptable level of p value

may not be an adequate index for model fit since significant chi-squares are possibly produced

due to the large sample size. As Newsom (2010) recommended, the criterion of $p > 0.05$ is not

appropriate for evaluating model fit when the sample size is larger than 200. Also worth noting

is that it is hard to reach all satisfactory levels of these fit indices, and the hypothesized model

can be acceptable if most of the following criteria are met. In CFA, the target coefficient index

(i.e., the ratio of chi-square statistics of the first-order model to the chi-square statistics of the

higher-order model) was used to test for the existence of a second-order metacognitive

regulation construct (Marsh & Hocevar, 1985). The T value entails the percentage of variations

in the first-order model explained by the higher-order one. Thus, its value closer to 1 provides

evidence that the higher-order model can replace the first-order one, resulting in a higher

precision of the structural model.

Table 4.2 Summary of acceptable levels of key fit indices for CFA and SEM

Fit indices	Acceptable levels
the ratio of chi-square (χ^2) divided by the df value (χ^2/df)	$\leqslant 5$
the p value	> 0.05
the comparative goodness-of-fit index (CFI)	$\geqslant 0.90$
the root mean residual (RMR)	$\leqslant 0.10$
the root mean square error of approximation (RMSEA)	$\leqslant 0.10$
the incremental fit index (IFI)	$\geqslant 0.90$
the Tucker-Lewis index (TLI)	$\geqslant 0.90$

4.5 Results

4.5.1 Descriptive statistics and reliability analysis

Descriptive statistics of the 522 valid cases show that the mean scores of questionnaire item responses ranged from 3.98 to 5.33 for Chinese writing and those for English writing ranged from 3.86 to 5.07, indicating a medium and upper level of strategy use frequency. The skewness and kurtosis values were within the accepted limits of ±1, suggesting that the two datasets met the normality assumption and were appropriate for further inferential analyses (Bachman, 2004). The overall Cronbach's alpha coefficients for the whole questionnaire in L1 and L2 writing were 0.967 and 0.965 respectively (See Table 4.3), indicating its high internal reliability in both writing contexts.

Table 4.3 Cronbach's alpha coefficients for the writing metacognitive strategy questionnaire

	Reliability statistics	
	Cronbach's alpha	N of items
Chinese (L1) writing	0.967	33
English (L2) writing	0.965	33

4.5.2 EFA results

The questionnaire datasets of the group of 257 participants were subject to EFA. The sample size met the threshold subject-to-item ratio of 5:1 to produce correct model solutions

(Byrne, 2016). Cronbach's alpha coefficients of the 257 questionnaire responses (i.e., 0.950 and 0.952 for L1 and L2 writing) demonstrated the high reliability of the questionnaire instrument as a whole in the two writing contexts. Both questionnaire datasets of the 257 participants satisfied the univariate normality assumption since the skewness and kurtosis values of each item fell within the acceptable range of ±1. A careful inspection of the correlation matrix suggests that all the item responses were significantly correlated, albeit in a weak or moderate degree. There were no perfect or near-zero inter-item correlations. These results highlighted that all the item responses of this subsample could be included in subsequent EFA. The KMO measure was used to show the data sampling adequacy. Its values were 0.939 in the Chinese writing questionnaire dataset and 0.933 in the English writing questionnaire dataset, higher than the commonly recommended value of 0.60 (Fabrigar & Wegener, 2012; Field, 2013). The Bartlett's test of sphericity showed that the questionnaire statistics were significant, namely $\chi^2(528) = 5416.14$, $p < 0.001$ and $\chi^2(528) = 5782.61$, $p < 0.001$, thus demonstrating the factorability of the two questionnaire datasets. Results from the KMO test and the Bartlett's test of sphericity further demonstrated the feasibility of EFA. Then, principal component analysis (PCA) was chosen as the extraction method based on varimax rotation as it is a reasonably robust and widely used method for factor extraction of EFA (Fabrigar & Wegener, 2012; Field, 2013; Osborne, 2014). The Kaiser criterion for an eigenvalue greater than 1 was adopted in consultation with the scree plots to determine the number of factors to be extracted (Plonsky & Gonulal, 2015). As is shown in Tables 4.4 and 4.5, there are five common factors with eigenvalues greater than 1, which is the same in L1 and L2 writing contexts. Thus, five common factors were recommended to be retained in both writing contexts, and they explained 62.56% and 64.59% of the total variances of students' metacognitive strategy use in L1 and L2 writing separately. Figures 4.1 and 4.2 present the scree plots. The two scree plots showed that the curve of eigenvalues was quite flat to the right of Factor 5, which further supported that

five factors should be extracted from the two questionnaire datasets. As a whole, the five-factor

solution was conceptually meaningful and statistically robust for the two questionnaire datasets.

Table 4.4 Total variances explained in Chinese (L1) writing questionnaire dataset (five-factor extraction)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.632	41.308	41.308	13.632	41.308	41.308	6.666	20.199	20.199
2	2.162	6.552	47.860	2.162	6.552	47.860	4.004	12.134	32.333
3	1.786	5.414	53.274	1.786	5.414	53.274	3.551	10.759	43.092
4	1.589	4.815	58.088	1.589	4.815	58.088	3.318	10.054	53.147
5	1.476	4.473	62.561	1.476	4.473	62.561	3.107	9.415	62.561

Note: Factor 1 (evaluating strategies), Factor 2 (task interpreting strategies), Factor 3 (non-linguistic monitoring), Factor 4 (linguistic monitoring), Factor 5 (planning strategies)

Table 4.5 Total variances explained in English (L2) writing questionnaire dataset (five-factor extraction)

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.759	41.694	41.694	13.759	41.694	41.694	6.671	20.216	20.216
2	2.683	8.131	49.825	2.683	8.131	49.825	4.250	12.880	33.096
3	1.928	5.842	55.667	1.928	5.842	55.667	3.674	11.134	44.230
4	1.611	4.881	60.548	1.611	4.881	60.548	3.451	10.457	54.687
5	1.335	4.044	64.592	1.335	4.044	64.592	3.269	9.905	64.592

Note: Factor 1 (evaluating strategies), Factor 2 (task interpreting), Factor 3 (non-linguistic monitoring), Factor 4 (planning strategies) and Factor 5 (linguistic monitoring)

Figure 4.1 Scree plot for the Chinese writing metacognitive strategy questionnaire dataset
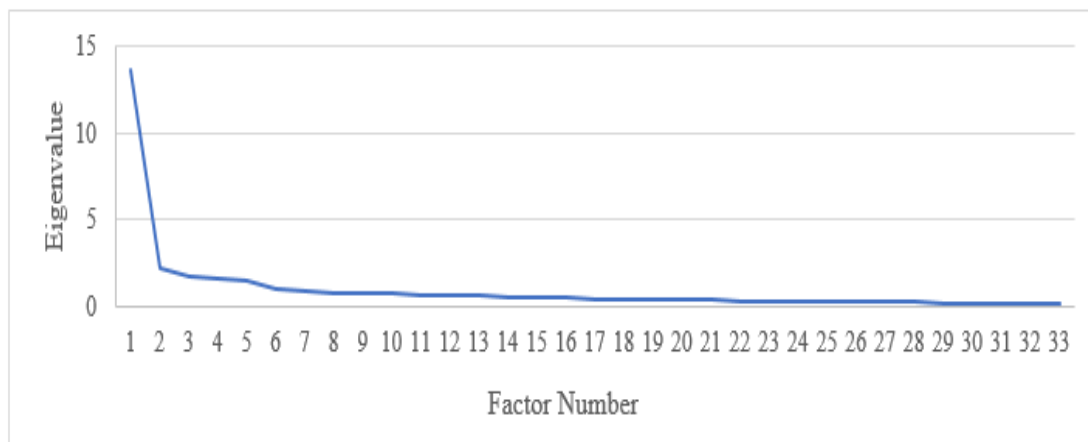
Figure 4.2 Scree plot for the English writing metacognitive strategy questionnaire dataset
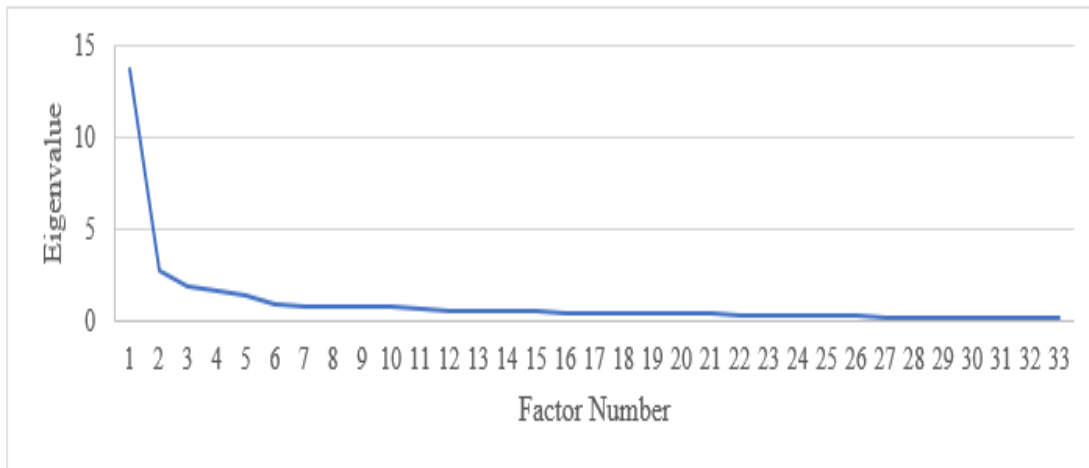
Tables 4.6 and 4.7 present the factor loadings and communality values of each item in the two writing contexts. Although factor loadings over 0.50 are often considered adequate (Phakiti, 2018a), Questions 7 and 12 in L1 writing were still retained for the following considerations: (1) their factor loading values were slightly below 0.50, and some researchers still recommend that factor loadings over 0.40 can also be considered acceptable (Field, 2013); (2) making an outline and planning the essay structure before writing were rather important beforehand thinking strategies that may influence writing task performance no matter in which language context (Johnson, 2020; Ong, 2014). Factor loadings of all other questionnaire items were higher than 0.50 for both L1 and L2 writing contexts, with the extracted communalities of each item higher than 0.30 (Phakiti, 2018a). Therefore, all 33 items were finally retained in this study, and they fit the corresponding factors well in both writing contexts. With reference to metacognition and language learning strategy theories, the identified five factors in L1 and L2 writing contexts were named as task interpreting (Factor 2 for both writing contexts), planning (Factor 5 for L1 writing and Factor 4 for L2 writing), linguistic monitoring (Factor 4 for L1 writing and Factor 5 for L2 writing), non-linguistic monitoring (Factor 3 for both writing contexts) and evaluating (Factor 1 for both writing contexts). Among the five factors extracted

by PCA, two were included as expected with reference to key theories of metacognition and language learning strategy. The task-situated writing in this study necessitates the importance of task interpreting strategy factor, although it was not explicitly highlighted in previous literature. Another unexpected two, i.e., linguistic monitoring and non-linguistic monitoring are related to writers' oversight and regulation in the composing process, which implies that monitoring may be a multidimensional factor that can be further decomposed into two sub-components, allowing for a more in-depth classification of monitoring.

Table 4.6 Factor loadings and communalities in Chinese (L1) writing questionnaire dataset

Items	ES	TIS	NLMS	LMS	PS	Communalities
CQ27	0.806					0.795
CQ30	0.801					0.784
CQ29	0.800					0.779
CQ28	0.773					0.745
CQ26	0.757					0.774
CQ25	0.754					0.763
CQ32	0.711					0.709
CQ31	0.647					0.638
CQ33	0.642					0.539
CQ2		0.802				0.695
CQ3		0.764				0.726
CQ1		0.736				0.627
CQ5		0.691				0.591
CQ4		0.631				0.586
CQ6		0.561				0.479
CQ17			0.760			0.701
CQ15			0.700			0.673
CQ16			0.697			0.568
CQ18			0.612			0.612
CQ14			0.562			0.481
CQ19			0.560			0.497
CQ22				0.786		0.728
CQ23				0.770		0.665
CQ21				0.623		0.594
CQ20				0.618		0.594
CQ24				0.576		0.586
CQ10					0.764	0.662
CQ8					0.711	0.566
CQ9					0.610	0.494
CQ11					0.539	0.427
CQ13					0.514	0.491

CQ12				0.491	0.544
CQ7				0.471	0.536

Table 4.7 Factor loadings and communalities in English (L2) writing questionnaire dataset

Items	ES	TIS	NLMS	LMS	PS	Communalities
EQ30	0.840					0.817
EQ29	0.825					0.793
EQ28	0.799					0.786
EQ27	0.796					0.784
EQ26	0.771					0.735
EQ32	0.758					0.749
EQ31	0.744					0.738
EQ25	0.733					0.725
EQ33	0.584					0.651
EQ2		0.825				0.745
EQ3		0.796				0.736
EQ1		0.784				0.737
EQ5		0.726				0.648
EQ4		0.583				0.542
EQ6		0.551				0.474
EQ15			0.743			0.626
EQ16			0.727			0.608
EQ17			0.700			0.647
EQ18			0.645			0.633
EQ19			0.591			0.462
EQ14			0.547			0.465
EQ13				0.730		0.631
EQ8				0.707		0.514
EQ12				0.624		0.562
EQ11				0.593		0.548
EQ7				0.567		0.531
EQ10				0.558		0.624
EQ9				0.527		0.419
EQ22					0.785	0.757
EQ23					0.696	0.649
EQ24					0.670	0.679
EQ21					0.647	0.677
EQ20					0.593	0.623

To sum up, the retained 33-item metacognitive strategy questionnaire responses fell into five factors, which kept the same in both writing contexts. In this way, the general

metacognitive strategy pattern was similar in the two writing contexts, suggesting that metacognitive regulation is possibly a common skill applicable to L1 and L2 writing. Items 1, 2, 3, 4, 5, and 6 together loaded on task interpreting factor, which accounted for the interpretation and assessment of the writing task in terms of its instruction, purpose, genre, evaluation criteria, and difficulty. Planning strategies, including items 7, 8, 9, 10, 11, 12, and 13, are concerned with writers' beforehand thinking about time allocation, content, language use, structure, and outline manner. Monitoring functions with two dimensions, i.e., linguistic and non-linguistic ones. It is needed not only to distribute attention selectively when retrieving and executing linguistically based knowledge but also to manage and regulate non-linguistic aspects along with writing-related activities such as emotions and time. More specifically, Items 14, 15, 16, 17, and 18 loaded on linguistic monitoring factor involve writers' online oversight of the retrieval and use of linguistic resources and non-linguistic monitoring with items 19, 20, 21, 22, 23, and 24 focuses on writers' conscious manipulation of non-linguistic volitional, timing, and attentional factors that may have an impact on the writing process. Items 25 through 33 exhibited a cohesive clustering pattern and coalesced into the final factor of evaluating strategies. Evaluating strategies occur when writers review and reexamine their written products and task completion experience. Factor loadings of these items ranged from 0.471 to 0.806 in Chinese writing, and those in English writing ranged from 0.527 to 0.840. The Cronbach's alphas for the five factors underlying the metacognitive strategy questionnaire were 0.862 (TIS), 0.807 (PS), 0.848 (LMS), 0.846 (NLM), and 0.949 (ES) for L1 writing and 0.882 (TIS), 0.820 (PS), 0.861 (LMS), 0.834 (NLM), 0.956 (ES) for L2 writing, suggesting the high internal consistency for all questionnaire subscales in both writing contexts. These results demonstrated the five-factor structure of the writing metacognitive strategy questionnaire with sound reliability and validity in L1 and L2 contexts.

4.5.3 CFA results

CFA was then conducted on questionnaire datasets of another group of 265 participants to confirm the hypothesized structure underlying the five strategy factors generated from EFA. The data screening procedure was performed before conducting CFA in the AMOS program as mentioned in Section 3.2.1. The sample size met the suggested requirement of greater than 200 (Phakiti, 2018b) and the subject-to-item ratio of larger than 5 for successfully performing CFA in accordance with the thumbs-up rule (Kline, 2016). The values of the skewness (from-1.004 to -0.198 in L1 writing and -0.697 to 0.221 in L2 writing) and the kurtosis (-0.724 to 0.520 in L1 writing and -0.877 to 0.211 in L2 writing) of the 33 items fell within the cut-off ranges of univariate normality, evidencing the approximately univariate normal distribution of all item responses among the participant subgroup. The multivariate normality of all observed questionnaire item responses was examined with reference to Mardia's normalized estimate of multivariate kurtosis (Mardia & Zemroch, 1975). According to the output from normality assessment in AMOS, the Mardia's coefficient of multivariate kurtosis of the 33 questionnaire item responses reached 740.65 in the L1 writing dataset and 425.99 in the L2 writing dataset with their corresponding critical ratio values of 125.43 and 72.14 (C.R.), exceeding the cut-off value of 5 for multivariate normality (Bentler, 2006). In this way, the assessment of normality results for the two datasets were highly suggestive of violating the assumption of multivariate normality for performing CFA. Based on these results, a bootstrapping procedure in AMOS was needed for normal correction (Kline, 2016). The bootstrapping procedure was performed to generate bias-corrected estimates and confidence intervals to examine whether the violation of multivariate normality influences parameter estimation, i.e., the significance of each regression path. Following Collier's (2020) recommendations, a bootstrap on 5000 random samples with the maximum likelihood (ML) estimator was performed, and the bias-corrected confidence interval at 95% level was set as a default. The bootstrapping results in both L1 and

L2 questionnaire datasets suggested that all the parameter estimations of the 33 questionnaire items were within the 95% error confidence interval, indicating the trivial influence of non-normality. Thus, the two sets of questionnaire data were ready for CFA.

On the basis of the theoretical framework and EFA results, we tested a first-order correlated model and a second-order hierarchical model involving the five identified factors via CFA for Chinese and English writing respectively. Bootstrapping maximum likelihood was run to calculate the model fit indices and parameter estimates. Results in Tables 4.8 and 4.9 showed that the first-order five-factor correlated model fitted the data well in both L1 (χ^2 =1324.31, df = 485, p < 0.001, χ^2/df = 2.731, RMSEA = 0.081, RMR=0.054, CFI = 0.905, TLI=0.896, IFI=0.905) and L2 (χ^2 = 1190.68, df = 485, p < 0.001, χ^2/df = 2.455, RMSEA = 0.074, RMR = 0.064, CFI = 0.910, TLI = 0.902, and IFI = 0.910) writing contexts. P < 0.05 was a result of a sample size larger than 200. As Kline (2016) suggested, standardized estimate loadings in the one-way direction from observed to latent variables should be above the benchmark value of 0.50. The standardized estimate loadings of the 33 items ranged from 0.698 to 0.909 in L1 writing and from 0.684 to 0.909 in L2 writing, and all these item loadings were larger than the recommended threshold level, thus indicating that these distinct items loaded well on the extracted five factors. The 33-item parameter estimates had a p-value lower than 0.001, thereby signifying statistical significance. The results substantiated that the postulated five factors of metacognitive strategies exhibited distinctiveness as well as interconnections across L1 and L2 writing contexts. Figures 3.3 and 3.4 present the first-order five-factor correlated model with major standardized estimates in L1 and L2 writing respectively. According to the two first-order model figures (i.e., Figures 4.3 and 4.4), the five factors in L1 and L2 writing had moderate and high correlations. Although some of the correlation coefficients between factors were larger than 0.80, the acceptable level of fit indices of the first-order five-factor correlated model in both writing contexts demonstrated that retaining the

five factors as separate but consistent ones was defensible (Liu & Brown, 2019). Moreover, these inter-factor correlation coefficients also indicate the possibility of a hierarchical construct among the five metacognitive strategy factors. In light of these high inter-factor correlation coefficients, the hierarchical model was tested on the five factors that were retained.

Table 4.8 Fit indices for the first-order five-factor correlated MS model in Chinese (L1) writing

Model fit indices	CMIN/df	p	RMSEA	RMR	CFI	TLI	IFI
Value	2.731	0.000	0.081	0.054	0.905	0.896	0.905
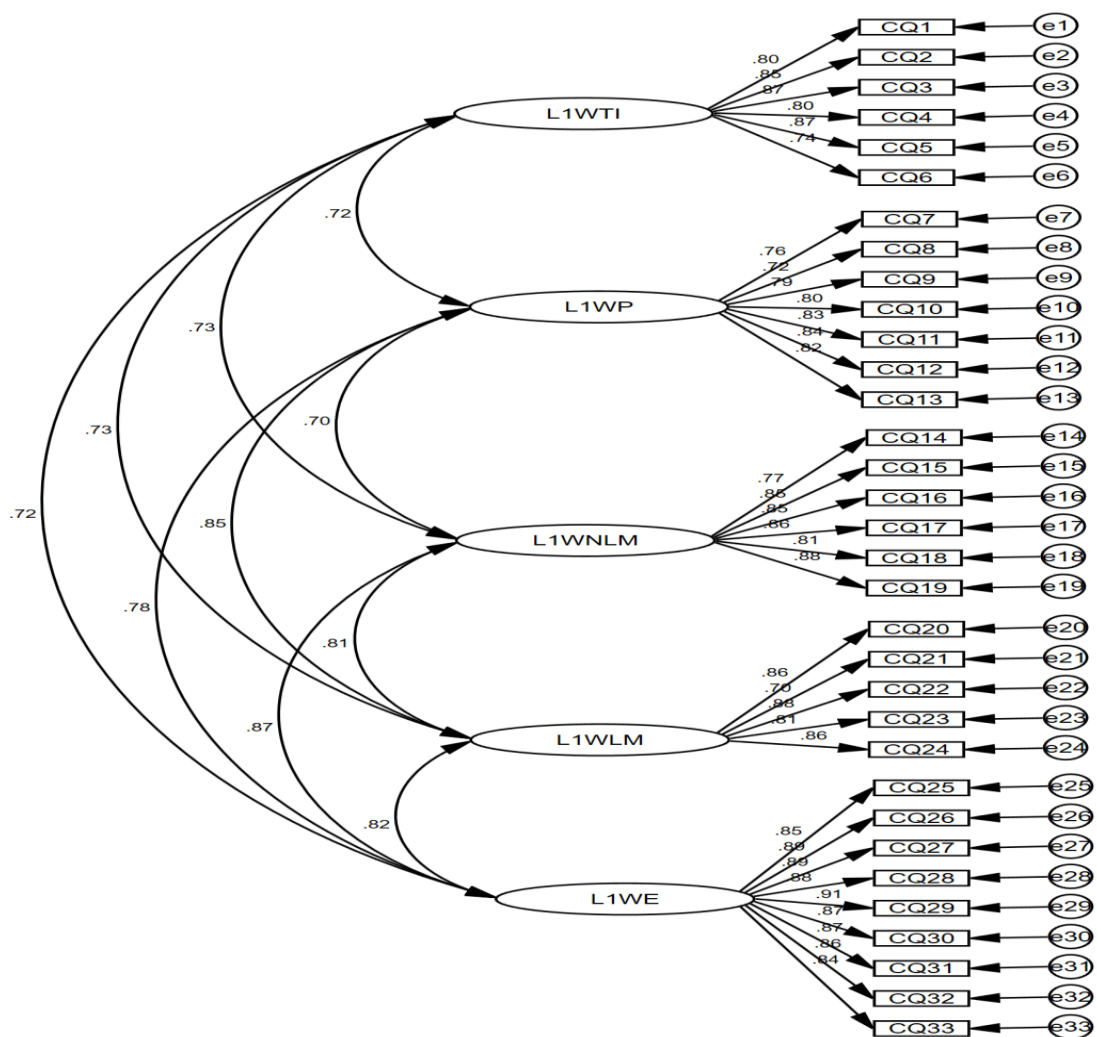
Figure 4.3 The first-order five-factor correlated MS model in Chinese (L1) writing

Table 4.9 Fit indices for the first-order five-factor correlated MS model in English (L2) writing

Model fit indices	CMIN/df	p	RMSEA	RMR	CFI	TLI	IFI
Value	2.455	0.000	0.074	0.064	0.910	0.902	0.910
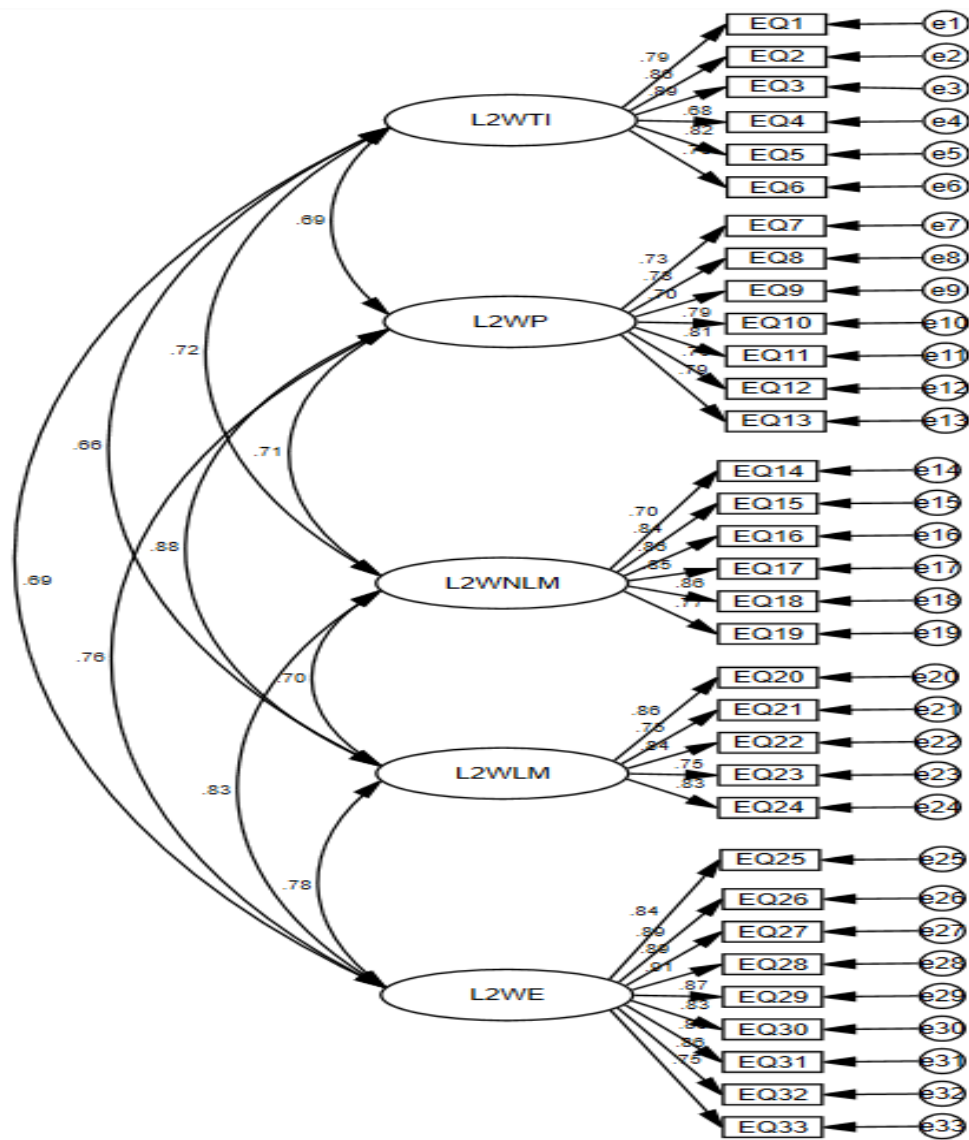
Figure 4.4 The first-order five-factor correlated MS model in English (L2) writing

Since all five factors came from the general domain of metacognitive dynamics, it was anticipated that they could be explained by a higher-order factor. In this way, the second-order one-factor hierarchical model for metacognitive strategies was tested separately in each language context to examine whether the five factors were contingent on metacognitive regulation. Following are the results of the second-order one-factor hierarchical model in two writing contexts. Figures 4.5 and 4.6 depict the second-order one-factor hierarchical model with standardized regression weights. Once again, the 33 items demonstrated acceptable

loadings on each assumed factor within both datasets. The standardized estimate loadings of the 33 items from observed to latent variables were all higher than the benchmark value of 0.50 (Kline, 2016), representing an acceptable effect size. Structural loadings of the five factors on the construct of metacognitive regulation ranged from 0.801 to 0.919 in L1 writing and from 0.781 to 0.899 in L2 writing, suggesting the validity of the internal structure of the questionnaire instrument. Results indicated acceptable model fit: $\chi^2 = 1367.701$, $df = 490$, $p < 0.001$, $\chi^2/df = 2.791$, RMSEA = 0.082, RMR = 0.060, CFI = 0.900, TLI = 0.893, and IFI = 0.901 in L1 writing; $\chi^2 = 1247.98$, $df = 490$, $p < 0.001$, $\chi^2/df = 2.547$, RMSEA = 0.077, RMR =0.071, CFI = 0.903, TLI=0.896, and IFI=0.904 in L2 writing (see Tables 3.10 and 3.11). Thus, metacognitive regulation functioned as a higher-order construct taking charge of the five strategy factors in both writing contexts. Simply put, it is a hierarchical construct that can be further subdivided into five types of strategies.

CFA of the first order and the second order models were tested respectively. Although one or two fit indices slightly deviated from the acceptable criteria, the fitness results collectively suggest that the first-order correlated and second-order hierarchical models of metacognitive strategies are satisfactory in both language contexts. To better decide the model fitness with the data, the target coefficient proposed by Marsh and Hocevar (1985) was calculated to compare the first-order and the second-order ones. Using the first-order correlated model as the target one, the T value is equal to the ratio of the chi-square of the first-order correlated model to the chi-square of the second-order hierarchical model. The T values of the two models of metacognitive strategies in L1 and L2 writing are 0.968 and 0.954 respectively, which offer statistical evidence for the representativeness of the second-order model of metacognitive strategies in the two writing contexts. The higher-order metacognitive regulation construct explained almost ninety-seven and ninety-five percents of the variations in the first-order five-factor correlated models in L1 and L2 writing contexts.

Thus, the results of Phase 1 support that the developed questionnaire instrument is a valid and meaningful tool with sound psychological quality to measure students' metacognitive strategy use in both Chinese (L1) and English (L2) writing task completion. Observed responses from this instrument can serve as a basis to explore the predictive effects of metacognitive strategies on writing performance and the relationship between such types of strategies in L1 and L2 writing contexts in Phase 2.

Table 4.10 Fit indices for the second-order one-factor hierarchical MS model in Chinese (L1) writing

Model fit indices	CMIN/df	p	RMSEA	RMR	CFI	TLI	IFI
Value	2.791	0.000	0.082	0.060	0.900	0.893	0.901
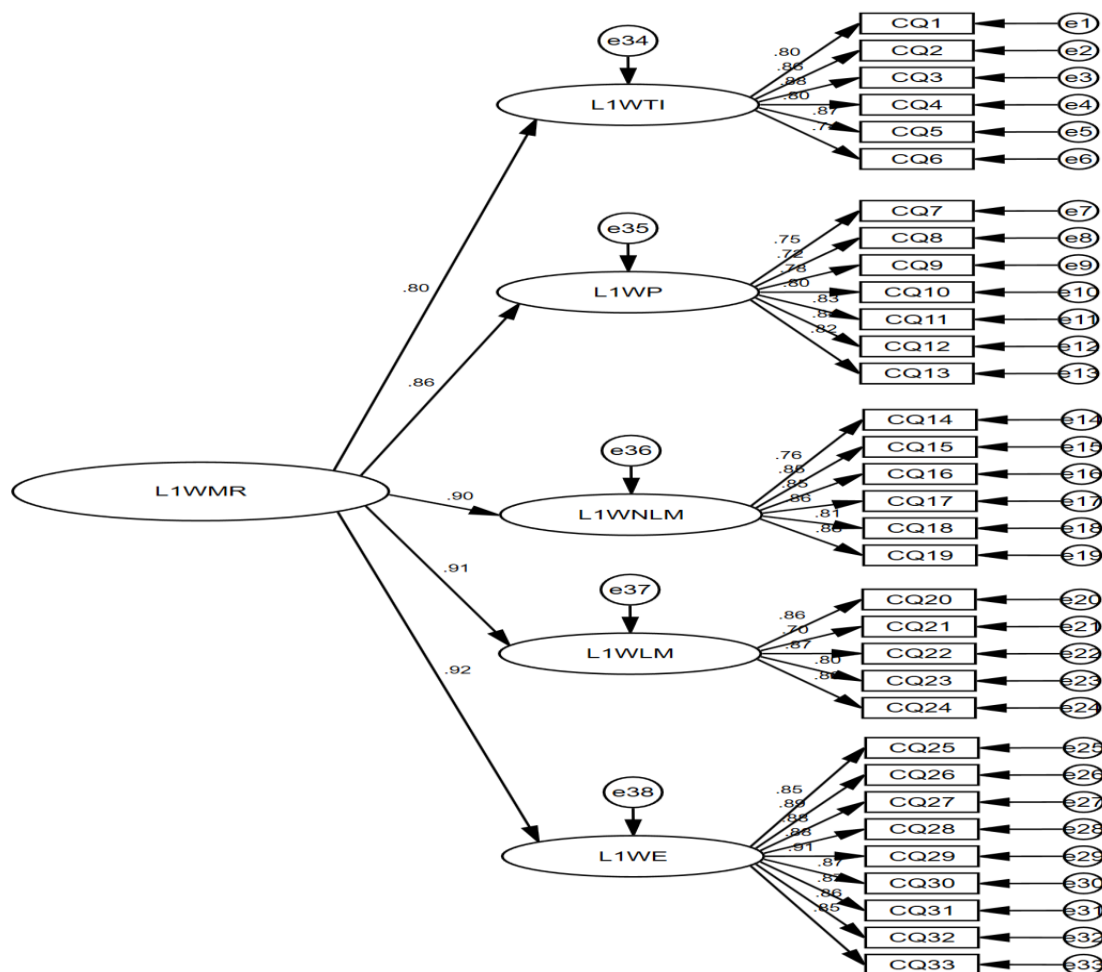
Figure 4.5 The second-order one-factor hierarchical MS model in Chinese (L1) writing

Table 4.11 Fit indices for the second-order one-factor hierarchical MS model in English (L2) writing

Model fit indices	CMIN/df	p	RMSEA	RMR	CFI	TLI	IFI
Value	2.547	0.000	0.077	0.071	0.903	0.896	0.904

Figure 4.6 The second-order one-factor hierarchical MS model in English (L2) writing

4.6 Summary

This chapter aims to address the prior two research questions of the thesis along with the development and validation of the questionnaire instrument. By administering parallel questionnaires to a large sample, evidence was obtained for identifying major categories of metacognitive strategies that Chinese tertiary students deployed to complete L1 and L2 writing tasks and the internal relationship among the extracted strategy factors.

Chapter 5 Phase Two: Effects of Metacognitive Strategies on Writing Performance and the Possible Transfer

Phase two adopts a mixed-methods design to examine the impact of metacognitive strategies and the L1-L2 transferability of such strategy use as a response to RQ3 and RQ4, combining quantitative analyses of questionnaire responses and writing scores and qualitative analyses of interview data. Correlation, regression and SEM analyses were performed to test the effects and transfer potential of metacognitive strategies across L1 and L2 writing contexts. The multi-group analysis was later run on the SEM structural model to examine the moderation of individual L2 proficiency levels and academic major background on the observed transfer further. Interview data was analyzed with a thematic approach to triangulate the quantitative data and add interpretive and deep insights into the results regarding RQ3 and RQ4.

5.1 Participants and setting

Phase 2 is intended to examine the effects of metacognitive strategies on writing performance and the L1-L2 transfer mechanism with the moderation of academic subject and L2 proficiency. Researchers are confronted with missing data when collecting multiple data sources in two language contexts. Incomplete cases without submitting all the tasks would not be considered in subsequent SEM and multigroup analyses. A listwise deletion was adopted in this study as to ensure that all remaining participants had complete data, i.e., two questionnaire responses, two writing texts with one for Chinese and the other for English, and the background form with self-reported gaokao English scores and academic major. In this way, some participants were excluded from Phase 2 for the following reasons: no successful submission of their Chinese and/or English writing texts, the lack of or incomplete report of NMET scores, and the fake or missing report of their academic major. All datasets were screened and checked carefully, leaving 502 complete cases. Among the sample of 502 students, 129 were male, and 373 were female. The participants' ages spanned from 18 to 22, averaging 19.46 years old with

a standard deviation of 0.75. These participants had no learning experience in English-speaking countries, and writing has been a crucial part of their previous Chinese and English instructions since primary school. The two groups of participants still maintained a rough balance in size: 244 (48.6%) were English majors, and 258 (51.4%) were non-English majors. The participants were diverse in their English proficiency levels according to their self-reported NMET scores, which ranged from 43 to 145 (M = 115.70, SD = 14.71). Another sample of 20 participants was recruited to take part in the post-task interview to extensively recall and report their metacognitive processes in writing and provide in-depth insights into research questions with the recorded videos of task completion replayed as stimuli. The 20 participants were selected based on their academic major and L2 proficiency measured by NMET scores with a purposive sampling method. Half of the interview participants majored in English Language and Literature, also known as English, and the other half were non-English majors. These participants were diverse in their English proficiency levels so as to be representative of the target candidature. Table 5.1 presents detailed information about these participants regarding gender, age, and English proficiency scores.

Table 5.1 Background information of the interview participants (n = 20)

Interview participants	N	Gender	Age				English proficiency scores			
			Min	Max	Mean	SD	Min	Max	Mean	SD
English majors	10	M: 1 F: 9	18	21	19.50	0.85	96	140	121.5	13.87
Non-English majors	10	M: 4 F: 6	18	20	19.50	0.71	75	142	118.2	23.52

5.2 Instruments

This study included a total of five types of instruments: 1) background form; 2) two argumentative writing tasks, one for Chinese and the other for English; 3) The scoring rubrics for writing essays; 4) the validated metacognitive strategy questionnaires for Chinese and

English writing; 5) the retrospective interview guide for an in-depth probe into metacognitive strategies in writing and the possible L1-L2 transfer effect.

Background form. Before the main study, all the participants were required to fill out a background form (see Appendix D), which elicited information about their demographical details including age and gender, educational background including grade and academic major, L2 proficiency proof, i.e., gaokao English test scores, language learning experience about years of English learning in this study.

Chinese (L1) and English (L2) writing tasks. One Chinese (L1) argumentative writing task and one English (L2) argumentative writing task were designed and used in this study (see Appendices E and F). The argumentative writing tasks were selected in this study for the fact that it was an important writing genre commonly used in the participants' real-life writing practices and assessments. The argumentative genre, compared to expository and narrative ones, is complex enough to promt university students in this study to have a variety of metacognitive strategic efforts. In the two writing tasks, the participants were required to present and argue for their opinions on the given debatable topic. More specifically, the participants were prompted to articulate their views on early education in the Chinese writing task and online education in the English writing task. The task prompt offered the time limit and evaluative criteria as a reminder for the participants to complete the task on time and pay particular attention to those aspects of writing during their task completion processes. The topics selected for the writing tasks were closely associated with the participants under investigation, with the perspectives of their teachers and target students into consideration. The participants were provided with a total of 45 minutes to finish the writing task at hand. The text length for the Chinese writing task was more than 600 words, and that for the English writing task was more than 200 words, keeping in line with the typical requirements of local testing practices. The two writing tasks were piloted with 30 students of similar education backgrounds

for feedback on topic familiarity and task difficulty. According to their feedback, the topic and task difficulty were suitable for the target candidature.

The scoring rubrics for writing essays The scoring rubric was based on a 5-band holistic rubric that weighted writing quality equally along with four main components, i.e., task achievement, content relevance and sufficiency, organization, and language use (see Appendix G for a bilingual (Chinese-English) version of the scoring rubrics). The maximum score for the writing task was 25 marks, with five marks for each band. Participants' written texts were assessed by two groups of independent raters, with one group comprised of two raters for L1 and L2 writing respectively. These raters were experienced writers with expertise in Chinese and English writing with a master's degree. They were pursuing a doctorate in bilingual education or applied linguistics at the time of scoring. A standard training and norming session was conducted for all the raters before the scoring work. At the very beginning, the author gave a short introduction of the writing tasks regarding its topic, genre, and specific requirements. Then, the raters were assigned the writing tasks and required to complete them within 45 minutes. This step helped them better know the writing tasks. Immediately after familiarizing with the writing tasks, these raters had an immediate discussion on the scoring rubric as to adjust possible discrepancies in used norms and then support their use of different bands of criteria in their ratings. In the pilot rating, each rater assessed a subset of 50 writing responses (approximately ten percent of the whole writing texts) and compared their scoring results. The inter-rater reliability of the pilot rating results was examined separately on the two groups of raters to ensure sound reliability. Each group had an immediate discussion to address any discrepancies in their ratings. Finally, the two groups of raters assessed the remaining writing texts separately and independently. The Spearman correlation coefficient was employed to measure interrater reliability for the two sets of writing samples. As shown in Table 5.2, the reliability coefficient values of the two sets of writing samples reached 0.867 and 0.879

(correlation r) respectively, indicating two raters of each group achieved a high degree of agreement on their scoring results. Thus, sound interrater reliability can be found in the ratings of the two sets of writing texts. The average of the two independent scores was adopted as the final score on the writing sample. In occasional cases when the disparities between the two ratings were five points or above, i.e., beyond a band level, the writing sample would be assigned to a third rater, and the more convergent two scores were averaged as its final score.

Table 5.2 Spearman correlation coefficient between L1 and L2 writing scores

	Coefficient values	p
L1 writing scores	0.867	0.000
L2 writing scores	0.879	0.000

The writing metacognitive strategy questionnaire The writing metacognitive strategy questionnaire was validated as a robust instrument for L1 and L2 writing contexts with high construct validity and reliability in Phase 1. It consists of 33 items, which kept the same across the two writing contexts. It measured students' metacognitive strategy use in terms of a 6-point Likert scale ranging from 1 to 6: 1 denotes strong disagreement, 2 denotes disagreement, 3 denotes slight disagreement, 4 denotes slight agreement, 5 denotes agreement, and 6 denotes strong agreement. There are five inter-correlated sub-categories of metacognitive strategies clustered under a single common factor of metacognitive regulation, which accounted for the internal structure of the questionnaire. The first subcategory (task interpreting) included six metacognitive strategies: Items 1, 2, 3, 4, 5, and 6. The second subcategory (planning) comprised seven metacognitive strategies: Items 7, 8, 9, 10, 11, 12, 13. The third subcategory of metacognitive strategies (non-linguistic monitoring) encompassed across Item 14 to Item 19. The fourth category (linguistic monitoring) contained five metacognitive strategies, namely Items 20, 21, 22, 23, and 24, and the remaining nine metacognitive strategies formed the last evaluating subcategory.

Stimulated-recall interview guide Stimulated-recall interview was administered as a complementary method to questionnaire responses to gain in-depth information to profile students' metacognitive strategy use, the effects of such strategy use, and the transfer mechanism between L1 and L2 writing. More specifically, interview results were expected to afford valuable insights into the types of strategies that the participants employed to fulfil the metacognitive control in writing, the effects of metacognitive strategies on writing performance, and the interactions between L1 and L2 writing metacognitive processes. The interview guide was comprised of four groups of questions. The first group of questions was designed to ask the participants about their perceptions of the assigned writing tasks and their writing task completion procedure in general. The second group of questions was concerned about metacognitive strategies that they employed to tackle the writing task, and a sample question was "What did you do to interpret the Chinese/English writing task?". The third group of questions was asked to evoke participants' perceptions about the effects and the possible transfer of metacognitive strategy use in L1 and L2 writing. The last group of questions was designed to elicit their previous learning and instruction experience specific to writing so as to provide suitable pedagogical suggestions based on the findings of this thesis. Participants were invited to answer these open-ended questions according to their actual task completion processes. In interviews, these questions were raised in Chinese, and the participants were able to answer these questions in either L1 or L2 as they liked. For readership, it is translated into English as presented in Appendix H. Also worth noting is that the researcher was allowed to reorder and fine-tune these guiding questions if deemed necessary in order to facilitate the participants in recalling their prior processes. However, the author would not interrupt the participants' reports and guide them to offer any intended answers.

5.3 Data collection

Participants took part in this study voluntarily by filling out a consent form and a background form before administering the writing tasks and questionnaires. The participants' National Matriculation English Test (NMET) scores were collected as a reliable measure of their English (L2) proficiency. The NMET is designed as part of the University Entrance Examination to Higher Education (UEEHE) in mainland China, namely the gaokao test program, to select tertiary education candidates from the pool of senior high school graduates. It has been developed as a national version widely applied in most provinces and several regional versions and specifically used in some municipalities and provinces authorized and overseen by the National Education Examinations Authority (NEEA) in mainland China (Zhang & Bournot-Trites, 2021). It is a comprehensive English test designed to measure the candidates' listening comprehension, reading comprehension, language usage, writing, and speaking in English (MoE, 2019). All the measures are administered in a paper-pencil mode with the exception of the speaking subtest. Test scores obtained from the NMET are used to make inferences on students' overall English abilities, which in turn support the decisions made on their university admissions together with those from other gaokao subtests (Cheng & Qi, 2006). Scores from such influential tests were highly preferred and requested as authoritative proof of students' English proficiency to illuminate its possible moderating effect on the cross-linguistic transfer of metacognitive strategies underlying L1 and L2 writing.

Due to the severe COVID-19 epidemic, the writing tasks in this study were delivered in a computer-based format, which is also gaining popularity in the participants' daily writing practices and assessment programs at the time of data collection. The participants were given 45 minutes to complete each writing task in class. Corresponding questionnaires were also distributed to the participants via an online format. No strict time limit was enforced for the questionnaire procedure, and all the participants could complete the questionnaire within a time

frame of 15 minutes as expected. To be specific, the participants in this study were required to complete a Chinese writing task and an English writing task with the use of their laptops in class. Immediately after each writing task, these participants would receive a QR code from their instructor. They could scan the QR code to access the online questionnaire corresponding to the writing task, which elicited their responses about the use of metacognitive strategies involved in the prior writing process. A counterbalanced design was adopted to avoid the effects of task order with half of the participants completing the Chinese writing task and its questionnaire and the other half undertaking the English writing task and its questionnaire at first. After one week, they were assigned the remaining writing task and questionnaire. Writing tasks and questionnaires were administered during regular classroom time. Their teachers were assigned to help invigilate the whole procedure when collecting writing task and questionnaire responses as a way to ensure that all the steps were conducted in the same manner for all the participants as planned. Students were allowed to press the hands-up button on the online meeting software and type in their questions in the chatbox at any time during the data collection procedure. The author stood by online to address any questions from the participating students immediately. All the participants were informed that their performance on these tasks would not influence their course grades but were encouraged to complete these tasks at their utmost since these task results provided valuable information about how well they write in Chinese and English currently and execute metacognitive regulation over their cognitive processing and behaviors during writing.

Another sample of 20 students was later invited to take the retrospective interview to recall their metacognitive strategy use in writing processes and its possible transfer between L1 and L2 contexts. The interview participants were recruited by following a purposive sampling method. They were diverse in terms of their English proficiency levels as indicated by self-reported gaokao English scores and disciplinary major background (i.e., 10 English majors and

10 non-English majors) to offer in-depth and profound insights into the underlying mechanism of metacognitive strategy use in writing. They were required to take the interview after completing each writing task. Post-task interviews have been criticized due to the interval between their occurrence and the actual processes, which caused less accurate verbalizations. As a solution to address such criticism, the participants' task completion processes were recorded, and their final written texts were saved. The recorded task-completion videos and the written texts were presented as stimuli during the interview to aid their recall of writing processes. All the interviews were audio- and video-recorded with the participants' permission for further analysis. To avoid information loss and/or other constraints, such as limited working memory capacity and L2 proficiency, the questions were raised in L1, and the participants were allowed to answer in any language they preferred (Cohen, 1996). The whole procedure of data collection in Phase 2 proceeds as Figure 5.1 shows:
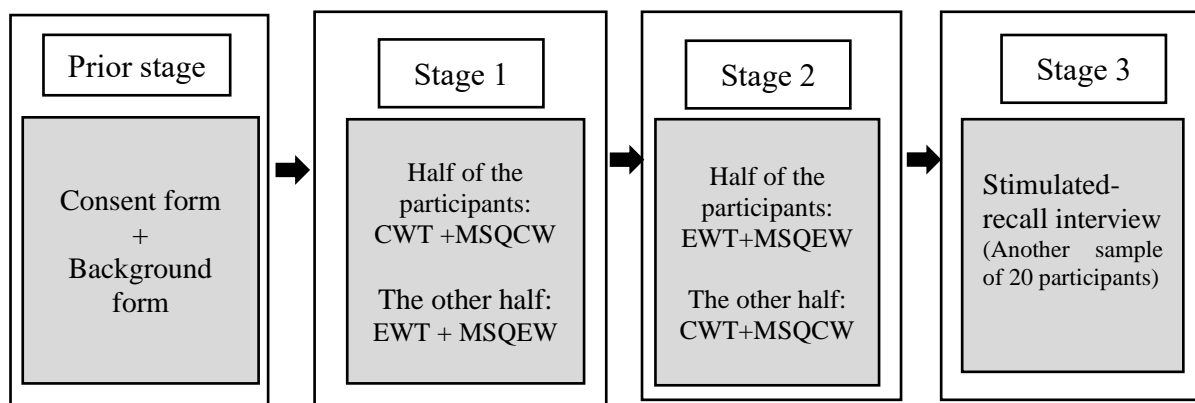
Figure 5.1: The procedure of data collection in Phase 2

5.4 Data analysis

5.4.1 Analyses of questionnaire responses and writing scores

All the data were typed into Excel files for further analyses in the IBM SPSS Statistics program ver.26 and IBM SPSS AMOS program ver.24. The IBM SPSS Statistics program was

used for descriptive statistics, reliability analysis, correlation analysis, and regression analysis. IBM SPSS AMOS program was used to perform SEM and multi-group analyses. Descriptive statistics of the questionnaire responses and writing scores show their basic characteristics, including central tendencies, variations, and distribution properties. Pearson correlation and linear regression analyses were then performed on the valid cases to preliminarily explore the associations between metacognitive strategies involved in L1 and L2 writing tasks and their effects on the quality of final L1 and L2 writing texts. Before simulating the variables of interest, an alternative model was tested via CFA with L1 and L2 metacognitive strategy questionnaire responses loaded on the same factor to rule out the possibility that L1 and L2 writing metacognitive strategies were equal to one construct. After that, the SEM analysis was employed to test the simultaneous relationship among target variables, i.e., L1 writing metacognitive strategies, L2 writing metacognitive strategies, L1 writing, and L2 writing to address RQ3 and RQ4 better. The indirect effects in the structural model were tested with the use of the bias-corrected bootstrap 95% confidence intervals (Bootstrap CIs) (Preacher et al., 2007). It indicates the significance of indirect effects when bootstrap CIs do not straddle zero. Specific parameters of indirect paths were calculated by editing the syntax in the AMOS software program. The moderation effects of L2 proficiency and academic major on the cross-linguistic transfer of metacognitive strategies were finally examined via multi-group analyses. Two multi-group analyses were performed to test whether the L1-L2 bond of writing metacognitive strategies would vary as a function of the L2 proficiency level and academic major background. The L2 proficiency level was operationally divided into higher and lower proficiency groups (n = 245 and 257) by using the median split of the participants' self-reported NMET scores in accordance with Walsh et al. (2008) and Pae (2018). The participants were also divided into two groups according to their academic major, i.e., English-major and non-English-major learner groups (n = 244 and 258). As Pae (2018) recommended, the multigroup

analysis is typically used to test the moderating effect based on the framework of the chi-square difference test, which statistically compares the difference or invariance in chi-square values for the nested SEM model. If the chi-square difference between the constraint model and the baseline model is observed as statistically significant at 1 degree of freedom, the strength of the relationship between L1 and L2 metacognitive writing strategies is verified to be moderated by L2 proficiency level or academic major generally; otherwise, the moderating effect of L2 proficiency level and academic major is absent on the strength of the relationship under investigation. The moderation effect was also further examined via comparing path coefficients between the two L2 proficiency level groups and the two academic major groups. In short, the SEM multigroup analyses in this study were conducted to test the measurement invariance as well as the invariance of the structural path coefficients.

5.4.2 Analysis of interview data

The subsequent interview was administered as a supplement to the post-writing questionnaire, which collectively added interpretive depth and breadth to metacognitive strategies that the participants employed in both writing contexts. All the interview recordings were transcribed verbatim at first for analysis. The transcription work made the author deeply engage with these qualitative data and build an initially coarse understanding of the participants' metacognitive control in the two writing contexts. Then, the author double-checked the interview transcripts for accuracy and segmented them into participants' answers to each interview question and further into thought units. Finally, the coding work was conducted on Nvivo ver.11 software with a thematic approach (Braun & Clarke, 2006; Terry et al., 2017). The theme generation was theory-oriented and data-driven in the analysis, which captured what the participants do to perform metacognitive control, how these metacognitive strategies influence writing performance, and whether the cross-linguistic transfer of metacognitive strategies occurs or not underlying L1 and L2 writing. It was operationalized with three nodes

initially set in alignment with the central issues of the thesis (i.e., metacognitive strategies, the effects on writing performance, and the L1-L2 transfer). Following that, categories and codes were done both deductively and inductively, which involved identifying and labelling interview segments of interest and relevance to the research questions. After iterative refining and revision, all the identified codes were examined, combined, and categorized into emergent themes. Interview extracts were also interpreted, organized, and translated as illustrative examples to shed light on writers' metacognitive strategy use in both writing contexts.

5.5 Results

5.5.1 Descriptive statistics

Table 5.3 presents descriptive statistics of the five MS factors and writing scores in L1 and L2 contexts among the 502 participants in Phase 2. As is shown in Table 4.3, mean scores of the five subcategories of metacognitive strategies ranged from 4.45 to 5.05 with standard deviations ranging from 0.69 to 0.79 in L1 writing and those in L2 writing ranged from 4.29 to 4.82 with standard deviations falling within the range of 0.71 to 0.84. The skewness and kurtosis statistics of the five MS factors for L1 and L2 writing were less than ± 1, indicating that the data of these metacognitive strategy factors satisfied the normality assumption for inferential analyses. According to descriptive statistics in Table 5.3, participants reported relatively higher levels of all the MS factors in L1 writing than in L2 writing. Among the five types of metacognitive strategies, participants interpreted the task requirements and built the mental representation the most while they made relatively less planning before composing, which remained the same in both writing contexts. In addition, average L1 and L2 writing scores reached a similar and medium level, i.e., 13.31 and 13.43 respectively with a standard deviation of 1.96 and 2.72. The participants in this study, on average, achieved an above-average level in both Chinese and English writing. Skewness and kurtosis values indicate the

normal distribution of the two writing score variables.

Table 5.3 Descriptive statistics of MS factors and writing scores (n=502)

Variables		Min	Max	Mean	SD	Skewness (SE)	Kurtosis (SE)
Chinese (L1)	L1WTI (6 items)	2.833	6.000	5.049	0.690	-0.431(0.109)	-0.334(0.218)
writing	L1WP (7 items)	2.286	6.000	4.454	0.793	0.139(0.109)	-0.303(0.218)
metacognitiv	L1WNLM (6 items)	2.667	6.000	4.845	0.691	-0.150(0.109)	-0.228(0.218)
e strategies	L1WLM (5 items)	2.000	6.000	4.552	0.792	0.032(0.109)	-0.256(0.218)
	L1WE (9 items)	1.444	6.000	4.793	0.727	-0.226(0.109)	0.222(0.218)
English(L2)	L2WTI (6 items)	2.833	6.000	4.815	0.713	-0.377(0.109)	0.019(0.218)
writing	L2WP (7 items)	1.000	6.000	4.286	0.835	-0.303(0.109)	0.457(0.218)
metacognitiv	L2WNLM (6 items)	2.667	6.000	4.703	0.726	-0.057(0.109)	-0.380(0.218)
e strategies	L2WLM (5 items)	1.800	6.000	4.347	0.832	-0.075(0.109)	-0.203(0.218)
	L2WE (9 items)	1.000	6.000	4.602	0.808	-0.385(0.109)	0.505(0.218)
Chinese (L1) writing scores		5.833	21.500	13.310	1.964	0.554 (0.109)	1.806 (0.218)
English (L2) writing scores		5.000	22.333	13.431	2.721	0.403 (0.109)	1.035 (0.218)

Notes. CW: Chinese writing; EW: English writing; TI: task interpreting; P: planning; NLM: non-linguistic monitoring; LM: linguistic monitoring; E: evaluating.

5.5.2 Correlation and regression analysis results

Correlation and regression analyses were examined to investigate the potential impact of metacognitive strategies on L1 and L2 writing performance. Following Cohen's (1992) scale, small, medium, and large effects are operationally defined as r larger than 0.10, 0.30, and 0.50 respectively. Table 5.4 displays correlation analysis results between MS factors and writing scores in the two languages. Results shown in this table indicated a small or medium correlation between metacognitive strategy factors and writing performance in L1 and L2 contexts. All the five types of metacognitive strategies were significantly correlated with L1 and L2 writing scores. In particular, task interpreting strategies, planning strategies, linguistic monitoring strategies, and non-linguistic monitoring strategies had a weak positive correlation with students' writing scores in L1 (r = 0.231, 0.166, 0.187, and 0.267 respectively, $p < 0.001$) and

the correlation coefficient between evaluating strategies and L1 writing scores reached a medium level ($r = 0.313$ respectively, $p < 0.001$). All the five types of metacognitive strategies, i.e., task interpreting ($r = 0.422$), planning ($r = 0.434$), non-linguistic monitoring ($r = 0.311$), linguistic monitoring ($r = 0.412$), and evaluating ($r = 0.418$) were strongly correlated with L2 writing scores. All the correlation coefficients were statistically significant at an above-medium level. Correlation analyses between metacognitive strategy item scores and writing scores in both language contexts were also tested to examine further the possible impact of specific strategy use on writing performance. After inspecting the intercorrelation matrix at the item level, it was found that 29 specific metacognitive strategies had a significant, although weak, correlation with writing performance in L1 except for Items 9, 10, 11, and 23. In L2 writing, all 33 metacognitive strategies were significantly correlated with students' writing scores, and most item-level correlation coefficients reached a medium effect size with $r > 0.30$. Subsequent regression analysis results revealed that the use of the five categories of metacognitive strategies as a whole accounted for approximately 11.9% of the variances in students' L1 writing scores (F change $= 13.418$, $R^2 = 0.119$, adjusted $R^2 = 0.110$, $p < 0.001$) and 26.7% of the variances in their L2 writing scores (F change $= 36.044$, $R^2 = 0.267$, adjusted $R^2 = 0.259$, $p < 0.001$). According to Cohen's (1988) rules of thumb for the effect size of R^2, the predictive effects of metacognitive strategies reached a small level in L1 writing and a large level in L2 writing. As is shown in Table 5.5, regression analysis results also revealed that not all the five categories of metacognitive strategies had predictive effects on writing performance. Students' active assessment of writing products and processes (i.e., evaluating strategies) yielded significant predictions on their L1 writing performance (Beta $= 0.314$, $p < 0.001$), while other subcategories of metacognitive strategies did not. In L2 writing, task interpreting strategies (Beta $= 0.254$, $p < 0.001$), planning strategies (Beta $= 0.156$, $p < 0.05$), and evaluating strategies (Beta $= 0.146$, $p < 0.05$) contributed significantly to the participants' final task scores. Overall,

correlation and regression analysis results indicated a somewhat different picture of the effects of metacognitive strategy use in L1 and L2 writing. To sum up, metacognitive strategies as a whole were proven to be a significant variable in explaining writing performance, regardless of language context. From a comparative perspective, metacognitive strategies played a more important role in L2 writing than L1 writing for larger correlation coefficients and higher predictive power.

Table 5.4 Correlation results between MS factors and Writing scores in L1 and L2 (n = 502)

MS factors	L1 writing scores		L2 writing scores	
	Pearson correlation	Sig. (2-tailed)	Pearson correlation	Sig. (2-tailed)
Task interpreting	0.231***	0.000	0.422***	0.000
Planning	0.166***	0.000	0.434***	0.000
Non-linguistic monitoring	0.267***	0.000	0.311***	0.000
Linguistic monitoring	0.187***	0.000	0.412***	0.000
Evaluating	0.313***	0.000	0.418***	0.000

***. Correlation is significant at the 0.001 level (2-tailed)

Table 5.5 Regression coefficients of metacognitive strategy factors on writing performance (n = 502)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
L1	(Constant)	8.592	0.668		12.871	0.000
Writing	TI	0.294	0.172	0.103	1.706	0.089
	P	-0.199	0.157	-0.080	-1.273	0.204
	NLM	0.262	0.193	0.092	1.354	0.176
	LM	-0.265	0.167	-0.107	-1.593	0.112
	E	0.848	0.202	0.314	4.201	0.000
L2	(Constant)	4.126	0.777		5.307	0.000
Writing	TI	0.970	0.207	0.254	4.686	0.000
	P	0.507	0.191	0.156	2.656	0.008
	NLM	-0.331	0.223	-0.088	-1.487	0.138

LM	0.404	0.208	0.123		1.937	0.053
E	0.491	0.224	0.146		2.195	0.029

Note. L1 and L2 writing scores were taken as the average of the scores assigned by both raters.

Correlation and regression analyses were also run on the two questionnaire datasets to explore the associations between metacognitive strategies in L1 and L2 writing contexts. The different correlation coefficients between metacognitive strategy factor scores in the two writing contexts are presented in Table 5.6. It can be seen that the five categories of metacognitive strategies used in L1 writing were significantly and positively correlated with those used in L2 writing. That is to say, students who had higher usage of metacognitive strategies in L1 writing tended to apply these strategies more frequently in L2 writing and vice versa. Correlations between specific L1 and L2 strategy item responses were also tested. Results again pointed to a significant and positive relationship between L1 and L2 writing metacognitive strategies at the item level. Table 5.7 displays the predictive effects of different factors of L1 writing metacognitive strategies on those of L2 writing metacognitive strategies. Regression analysis results on the pair of L1-L2 writing metacognitive strategies showed that the use of the five categories of metacognitive strategies in L1 writing had significantly predictive effects on the use of these corresponding metacognitive strategies in L2 writing: L1-L2 task interpreting strategies: $R^2 = 0.341$, adjusted $R^2 = 0.340$, F change $= 258.712$, $p < 0.001$; L1-L2 planning strategies: $R^2 = 0.266$, adjusted $R^2 = 0.265$, F change $= 181.390$, $p < 0.001$; L1-L2 non-linguistic monitoring strategies: $R^2 = 0.211$, adjusted $R^2 = 0.209$, F change $= 133.684$, $p < 0.001$; L1-L2 linguistic monitoring strategies: $R^2 = 0.246$, adjusted $R^2 = 0.245$, F change $= 163.446$, $p < 0.001$; L1-L2 evaluating strategies: $R^2 = 0.273$, adjusted $R^2 = 0.271$, F change$= 187.557$, $p < 0.001$. All the R^2 reached a medium to large level. Thus, the participants' metacognitive strategies used in L1 and L2 writing were more or less similar in frequency. Their use of metacognitive strategies in L1 writing could significantly predict that in L2 writing.

Table 5.6 Correlation results between L1 and L2 writing metacognitive strategies (n = 502)

Metacognitive strategy factor	L1WTI	L1WP	L1WNLM	L1WLM	L1WE
L2WTI	0.576***				
L2WP		0.521***			
L2WNLM			0.457***		
L2WLM				0.488***	
L2WE					0.513***

Notes. TI = task interpreting, P = planning, NLM = non-linguistic monitoring, LM = linguistic monitoring, E = evaluating, ***denotes *p* < 0.001

Table 5.7 Regression results of L1 and L2 writing metacognitive strategy factors (n=502)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.771	0.191		9.272	0.000
	L1WTI	0.603	0.037	0.584	16.085	0.000
2	(Constant)	1.865	0.183		10.211	0.000
	L1WP	0.544	0.040	0.516	13.468	0.000
3	(Constant)	2.364	0.204		11.567	0.000
	L1WNLM	0.483	0.042	0.459	11.562	0.000
4	(Constant)	1.976	0.188		10.499	0.000
	L1WLM	0.521	0.041	0.496	12.785	0.000
5	(Constant)	1.819	0.206		8.849	0.000
	L1WE	0.581	0.042	0.522	13.695	0.000

5.5.3 SEM analysis results

SEM analysis was run to examine better the structural relationships among L1 writing metacognitive strategies, L2 writing metacognitive strategies, L1 writing performance, and L2 writing performance. It is found that the alternative model with L1 and L2 writing metacognitive strategy item responses loading on the same factor did not fit the data well as

suggested by the following model fit indices: χ^2/df = 5.760, RMSEA = 0.097, RMR = 0.096, CFI = 0.630, IFI = 0.631, TLI = 0.616. Compared to the CFA models (i.e., the first-order correlated one) of L1 and L2 writing metacognitive strategy use, the Chi-square differences $\Delta\chi^2$ reached 10368.67 and 10563.39 respectively, which were significant at the level of $p <$ 0.001. Thus, loading L1 and L2 writing metacognitive strategy items onto the same factor caused a considerable change in model fit. As a consequence, L1 and L2 writing metacognitive strategy use were confirmed as correlated but separate constructs in this study. Then, the contributions of metacognitive strategies to writing performance in L1 and L2 settings could be examined simultaneously. With the presence of multiple measurement errors, the SEM technique can also directly and accurately compare the strength of the relationships between L1 and L2 for metacognitive strategies and writing performance, which were latent variables. As shown in Figure 4.2, the metacognitive-strategies-on-writing model was hypothesized and tested with reference to the abovementioned metacognition, language learning strategy and writing theories as well as existing empirical studies. In the hypothesized metacognitive-strategies-on-writing model, the circles represented latent variables (i.e., L1 writing metacognitive strategies, L2 writing metacognitive strategies, L1 writing performance, and L2 writing performance). A single-headed arrow means a causal relationship. Based on the reviewed literature, metacognitive strategies were assumed to directly affect L1 and L2 writing performance. It was also hypothesized that the L1-L2 transfer would occur between the parallel metacognitive strategies and writing performance variables. Considering the possible transfer and the cross-language facilitation effects found in previous studies, L1 writing metacognitive strategies would influence L2 writing performance via the mediation of L2 writing metacognitive strategies. Finally, the simulation of relationships among these variables is hypothesized as shown in Figure 5.2.

The hypothesized model served as the baseline one in multigroup analysis. When running

a multi-group analysis, a constraint model of L1-L2 writing metacognitive strategies was constructed based on the baseline one. More specifically, an equality constraint would be imposed on the path from L1 writing metacognitive strategies to L2 writing metacognitive strategies. If the addition of equality constraint on the L1WMS-L2WMS path did not lead to a decrease in model fit, it would suggest that the L1WMS-L2WMS path had a comparable value between the two L2 proficiency groups and between the two academic major groups. L2 proficiency and academic major may not moderate the L1-L2 transfer of metacognitive strategies. Conversely, if adding the equality constraint did deteriorate the model fit compared to the baseline one, the estimates for the L1WMS-L2WMS path would differ among the L2 proficiency groups and the academic major groups in this study. In turn, it would indicate that L1-L2 transfer of metacognitive strategies in writing may vary as a function of writers' L2 proficiency and academic major background. As Keith (2019) proposed, adding the equality constraint is rationalized by the fact that constraining the path to be equal would invariably worsen the model fit.
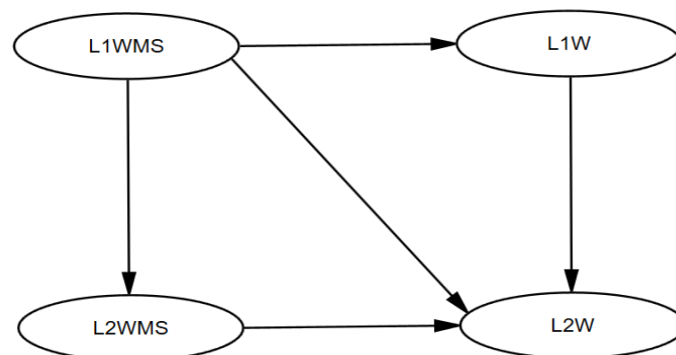
Figure 5.2 The hypothesized metacognitive-strategies-on-writing model

The SEM analysis was performed among a total of four latent variables and 14 corresponding indicators. More specifically, a total of 33 items in the L1 writing metacognitive strategy questionnaire formed five subcategories, i.e., task interpreting, planning, non-linguistic monitoring, linguistic monitoring, and evaluating. Average ratings from these five subcategories of metacognitive strategies served as indicators of the latent variable for L1

writing metacognitive strategies. The five indicator variables underlying the L2 writing metacognitive strategies were drawn in the same way. Rating results from the two independent raters were adopted as the indicators for L1 and L2 writing performance. The model fits the data well as demonstrated by the following indices: χ^2 (38) = 307.155, χ^2/df = 4.523, RMSEA = 0.084, RMR = 0.074, CFI = 0.957, IFI = 0.957, TLI = 0.941. Although the index of RMSEA was slightly larger than the threshold for excellent model fit, that is RMSEA > 0.08, it was still considered acceptable since it is smaller than 0.10, which is also argued as a cutoff value for this model fit index (Hu & Bentler, 1999). As a whole, these model fit indices are indicative of a good explanation of the hypothesized relationship between metacognitive strategy use and writing performance in both L1 and L2 contexts.

Figure 5.3 presents the metacognitive-strategies-on-writing model with standardized parameter estimates of all paths. All the hypothesized paths were significantly different from zero with the exception of the path from L1 writing metacognitive strategies to L2 writing performance. Results indicated that L1 and L2 writing were directly and positively influenced by corresponding metacognitive strategies (β = 0.32, p < 0.001 in the L1 context; β = 0.41, p < 0.001 in the L2 context), thus strongly supporting the general literature about the vital role of metacognitive control in writing performance no matter in L1 or L2 context. L1 writing metacognitive strategies significantly influenced L2 writing metacognitive strategies (β = 0.62, p < 0.001). Similarly, L1 writing performance was found to be a significant and positive predictor of L2 writing performance (β = 0.29, p < 0.001). Although L1 writing metacognitive strategies had no direct effects on L2 writing performance (p = 0.205), the standardized indirect effect of L1 writing metacognitive strategies on L2 writing was significantly positive (β = 0.348, Bootstrap CIs [.272, .441], p < 0.001). More specifically, L1 writing metacognitive strategies exerted positive effects on L2 writing performance indirectly via the mediation of L2 writing metacognitive strategies (β = 0.255, Bootstrap CIs [.177, .343], p < 0.001) and L1 writing

performance (β = 0.093, Bootstrap CIs [.055, .135], p < 0.001), which suggested a cross-language facilitation effect of L1 writing metacognitive strategies on L2 writing performance. The overall results demonstrated that L2 writing performance in this study was influenced by multiple variables. The ability to control and manipulate cognitive processing and behaviors in both L1 and L2 writing and L1 writing were significant determinants of final L2 writing performance either directly or indirectly.
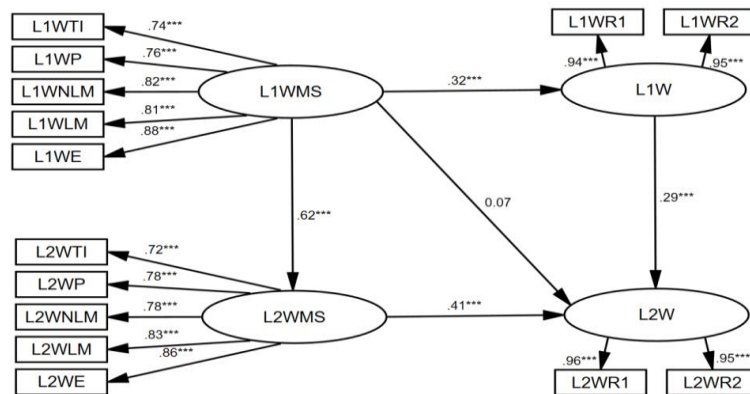
Figure 5.3 The metacognitive-strategies-on-writing model with standardized estimates

5.5.4 The multi-group SEM analysis results

In order to explore whether L2 proficiency and academic major exert a moderation effect on the L1-L2 transfer of metacognitive strategies underlying the writing domain or not, two multigroup SEM analyses were employed. In other words, the invariance of the strength of the L1-L2 relationships of metacognitive strategies between the lower L2 proficiency participants and their higher L2 proficiency counterparts and between the English-major participants and their non-English-major counterparts were examined via the statistical significance of chi-square difference at 1 degree of freedom. L2 proficiency level was operationally divided into two groups with the use of a median split of gaokao English scores. According to participants' self-reported major names, the moderator factor of academic major was defined as English-major and non-English-major groups.

Prior to conducting multigroup SEM analysis, the model fit to the data from each subgroup

was examined respectively. As shown in Table 5.8, the hypothesized model showed an acceptable level of fit to the four different subsets of data, as evidenced by the model fit indices as a whole. Then, the two multi-group SEM analyses were permissible since the two baseline models for each L2 proficiency group and each major group were generally the same.

Table 5.8 Fit indices of the metacognitive-strategies-on-writing model for each group

Model	χ^2/df	p	RMSEA	RMR	CFI	TLI	IFI
Lower L2 proficiency	3.296	.000	0.095	0.082	0.945	0.925	0.945
Higher L2 proficiency	2.349	.000	0.074	0.055	0.964	0.951	0.964
English major	1.590	.000	0.049	0.044	0.981	0.974	0.981
Non-English major	2.975	.000	0.088	0.075	0.962	0.948	0.962

Table 5.9 presents the multi-group SEM analysis results for the two L2 proficiency groups. The baseline model, in which all the parameters across the two L2 proficiency samples were estimated freely, resulted in a chi-square of 378.184 with 134 degrees of freedom. Then, the constrained model, in which the structural path from L1 writing metacognitive strategies to L2 writing metacognitive strategies was constrained equally for both lower-proficiency and higher-proficiency groups, gave rise to a chi-square of 378.462 with 135 degrees of freedom. The chi-square difference between the baseline and the constrained models was 0.278 at 1 degree of freedom, which was insignificant at the 0.05 alpha level. It suggested that the equality constraint on the structural path between L1 and L2 writing metacognitive strategies did not cause a significant decrease in the model fit indices, thereby empirically suggesting that the strength of the L1-L2 transfer of writing metacognitive strategies remained invariant across the two L2 proficiency groups. However, the path from L1 writing metacognitive strategies to L2 writing metacognitive strategies for the higher L2 proficiency group ($\beta_{higher} = 0.655$, $p < 0.001$) was slightly stronger than that for the lower L2 proficiency group ($\beta_{lower} = 0.605$, $p < 0.001$). These results implied that participants with a higher L2 proficiency tended to transfer their active control over thoughts and actions in L1 and L2 writing contexts more than those with a

lower L2 proficiency, although it was not significantly different.

Table 5.9 Multi-group SEM analysis results by L2 proficiency

Model	Equality constraint	χ^2	df	$^\Delta df$	$^\Delta\chi^2$	p
Baseline	Free	378.184	134	--	--	
Constrained: L2 proficiency	L1WMS-L2WMS	378.462	135	1	0.278	0.598

Table 5.10 shows the multi-group SEM analysis results by academic major. As shown in this table, the baseline model, which estimated all the parameters freely across English and non-English major groups, resulted in a chi-square of 305.893 with 134 degrees of freedom. The constrained model in Table 5.10 was imposed an equality constraint on the structural path between L1 and L2 writing metacognitive strategies and allowed the remaining paths to be estimated freely, thus producing a chi-square of 307.489 with 135 degrees of freedom. The chi-square difference between the baseline and constrained models was 1.596, which was insignificant at the 0.05 alpha level. Therefore, it demonstrated that the equality constraint posed on the path between L1 and L2 writing metacognitive strategies did not significantly decrease model fit indices, further supporting the invariance of L1-L2 transfer in metacognitive strategies across different academic major groups. Although the difference did not reach a significant level, the path from L1 writing metacognitive strategies to L2 writing metacognitive strategies for the English major group ($\beta_{English} = 0.682$, $p < 0.001$) was relatively stronger than that for the non-English major group ($\beta_{Non-English} = 0.600$, $p < 0.001$). Although the relationship between L1 and L2 writing metacognitive strategies remained invariant across the two major groups, these results indicated that students who applied more metacognitive strategies in L1 writing would be more active in regulating their thoughts and actions in L2 writing.

Table 5.10 Multi-group SEM analysis results by academic major

Model	Equality constraint	χ^2	df	$^\Delta df$	$^\Delta\chi^2$	p
Baseline	Free	305.893	134	--	--	--

Constrained: Academic major	L1WMS-L2WMS	307.489	135	1	1.596	0.206

To sum up, the relationship strength between L1 and L2 writing metacognitive strategies did not vary significantly as a function of the participants' L2 proficiency and academic major background in this study. However, when further examining and comparing the path parameters, the L1-L2 transfer of metacognitive strategies appeared to be stronger in the participants with higher L2 proficiency than their counterparts with relatively lower L2 proficiency and in the English majors than their non-English peers.

5.5.5 Interview results

Interview data were analyzed to help obtain a more fine-grained understanding of the strategies the participants used to perform metacognitive control in writing, the impact of employing these metacognitive strategies on the quality of written outputs, and the L1-L2 transfer mechanism of metacognitive strategies investigated in this study. In addition, the participant's perception of the writing task was collected for feedback on the suitability of task design, and their learning experience in the writing domain was asked mainly regarding pedagogical considerations. A total of 40 video clips from stimulated recall interviews were collected during the Chinese (L1) and English (L2) writing procedures. They were fully transcribed, which gave rise to a lengthy transcript with 119,735 words. The interview transcripts of each participant were divided coarsely into 25 sections corresponding to the guiding questions at the very beginning and then segmented further in terms of smaller thought units with nodes and categories (Schellings et al., 2006). Then, these segments underwent two rounds of coding by the author at a one-month interval. In the first round, the author coded all the interview transcripts independently, and the second coding round was completed one month later. The two rounds of coding reached an intra-coder agreement of 92%. Another coding was conducted to address the discrepancies between the prior two rounds. The codes were first

identified to capture the participants' metacognitive strategic behavior, the effects of such metacognitive strategy use on writing, and the possible transfer between L1 and L2 contexts closely related to the research questions. Following this, all the identified codes were reexamined and clustered into themes to obtain patterns regarding these questions. The participants' reports of their perceptions concerning the assigned writing task and previous learning and instruction experience in Chinese and English writing were also summarized to some degree. Interview examples were presented in terms of the following questions: what the participants thought of the writing task, what they did to perform metacognitive control in writing, how these metacognitive strategies influenced their writing performance, what the participants thought of the relationship between L1 and L2 writing metacognitive strategies, and in which way these participants were taught to master writing skills.

(1) What the participants thought of the writing tasks

When asked about their perceptions of the writing task, the majority of the interview participants perceived its difficulty as appropriate, which was the same in Chinese or English contexts since the selected topics were familiar and particular requirements (i.e., word limit, time constraint, and question type) matched what they had encountered in previous writing assessments and practices. However, the successful completion of the two writing tasks was still demanding, as they required complex organization and coordination of various knowledge to compose convincing arguments, especially in L2 with the extra burden posed by the lack of proficiency in linguistic knowledge and skills. As follows, Participant 5 was selected to demonstrate the common perception of the writing task.

<u>Participant 5, Chinese writing</u>

Interview transcription: "我觉得任务难度适中，属于有话可说的，不是很难。自己平常也会写点中文作文。和之前一样，看到这个写作任务的时候就可以从自己身边的这些经历想起。我身边有个亲戚，她会给自己小孩安排一

些早教课程，带入到这个处境中，在想怎么做这个选择（作为父母），也会从孩子角度想一想，对孩子有什么影响。"

Translated text: *"I think the task difficulty is moderate, and there's plenty to say. It is not very difficult. I usually write some Chinese compositions by myself. Like before, when I saw this writing task, I could think of some relevant experiences around me. I have a relative who arranges some early childhood education courses for her children, and I can bring this into the situation and think about how to make this decision as a parent. I also think about what impact it will have from the child's perspective."*

Participant 5, English writing

Interview transcription: "我感觉这个任务还是不难的，因为我从高三一直在经历，话题很熟悉，有更多的真情实感可以写。所以在开始构思的时候就比较简单，很快就可以想好。在论证的时候我会想怎样举例子才能让自己的论点更有逻辑，更有说服力。这个过程还是不简单的，而且想要写好还是会挺吃力的，毕竟是二语嘛，还要翻译过来想怎么用合适的语言表达出来"。

Translated text: *"I feel that this task is not difficult because I have experience relevant to the topic since the third year of high school. The topic is very familiar to me, and there are more genuine feelings to write about. So, it was relatively easy for me to come up with ideas when I started to plan. When making arguments, I try to think of examples to make my points more logical and persuasive. This process is not easy, and it can be quite challenging to write well since it (English) is my L2, which requires translating my thoughts into appropriate language expressions."*

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(2) What the participants did to perform metacognitive control in writing

Generally, all 20 participants followed a similar completion procedure in both writing tasks. When assigned the writing task, they read the prompt to generate a preliminary understanding of the task requirements, which provided directions for their subsequent execution and management of writing subprocesses. The participants also attended to the task prompt in the middle of writing as needed. Before writing, they were more likely to construct an initial plan about how to accomplish the task in general. Micro-planning may occur once the writing action began so as to think ahead of certain content and linguistic forms. When writing, they monitored cognitive endeavours in relation to the processing of linguistic and non-linguistic factors in a cyclical manner. They made necessary adjustments once they recognized that the composing was not following the desired track. After completing a piece of writing, the participants regularly reviewed and assessed what they had already written and what they had experienced so far as to improve the text and further inform the subsequent writing process and even future writing development. These metacognitive strategies are employed iteratively throughout the writing process, albeit with varying degrees of prevalence in distinct writing stages. Interview transcripts were selected to exemplify different types of metacognitive strategies that the participants utilized in writing to manage and regulate their mental efforts, behaviors and affective state.

Results of Phase 1 revealed that the participants used five main types of metacognitive strategies during their L1 and L2 writing. In particular, task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating strategies work together for the participants to self-regulate cognition, behaviour, and emotions. When facing any writing tasks, the first thing that students must do is to construct an understanding of the task requirements and then compose a text for the task with these requirements met appropriately. It is similar in L1 and L2 writing that the participants engaged in a cyclical process of interpreting the writing

tasks. They carefully read the instructions, which specified the topic, the scoring criteria, and other requirements at the initial stage of approaching the writing tasks. They tried to internalize these requirements during the writing process and returned to the instruction frequently to refresh and enhance their task representation since their working memory was under strain in timed writing tasks. Seven categories of coding relative to task interpreting emerged in the interview analysis: instruction reading, topic determination, genre identification, interpretation of scoring criteria, purpose identification, task difficulty evaluation, and question type judgment. Table 5.11 contains the definitions and interview transcripts for all specific strategies concerning task interpreting. It is also worth noting that the participants may generate partial and even wrong understanding of the writing tasks. For example, Participant 17 said in the completion of the Chinese writing task, *"setting a title by yourself, um, I did not write a title, maybe not notice it"* (original transcript: *题目自拟，呃，好像没有写题目，应该是漏了没看*). Participant 14 misunderstood the purpose of the English writing task as forcing the candidature to take a single side instead of demonstrating personal opinions on the topic: "*Actually, I am familiar with the topic, and it is present in our surroundings. I have also discussed it online; my previous stance was to keep neutral. However, this task, similar to what I have encountered, requires me to make a choice*" (original transcript: *其实这个也是和我们身边，就是这个论题，自己也在网络上也是讨论过，也是会想到之前自己的态度，是保持中立，但是这篇文章和以前写得差不多，必须要求我做出一个选择*). Additionally, some participants mistakenly took the format as a scoring criterion, although it was not specified in the task prompt.

Table 5.11 Task interpreting strategies with definition and interview examples

Task interpreting strategies	Definition and interview examples
Instruction reading	The writer closely reads the instruction when assigned the writing task.

	Participant 13, Chinese writing: 首先就是读题，然后把自己觉得比较重要的关键信息勾画出来，然后再看题目的要求，看一下有哪些方面。 Translated text: First, I should read the task instruction and underline key information, then pay attention to these requirements and determine what aspects are asked for. Participant 11, English writing: 好的，首先是阅读，阅读整个题目，然后读懂，翻译成母语。 Translated text: Okay, read throughout the instruction at first, and have an understanding by translating it into the mother language.
Topic determination	The writer searches for what the writing task is about. Participant 10, Chinese writing: 这个题目给的很明确，嗯…以该不该让孩子接受早教课程为话题，那就是有两个方面可以写，一个就是可以接受，一个就是不可以让孩子接受。 Translated text: The instruction is apparent…the topic is whether children should take early education courses or not, and the text can be composed from two sides: one is that children should take these courses, and the other is that children should not. Participant 10, English writing: 首先是关注话题，就是线上教育是否比线下教育好。 Translated text: Firstly, attend to the topic, of whether online education is better than offline education.
Genre identification	The writer thinks about what genre the task requires to compose. Participant 17, Chinese writing: 先就是读写作要求，然后开始想一下写作的文本过程，我这次文本过程就是以一种论述文，就是根据题目得出了我写这篇文章就是要用论述文的体裁。 Translated text: Firstly, I read the requirements of the writing task, and then I start to think about the writing process. For this piece, I write in an argumentative style, as required by the task. Participant 14, English writing: 我写出的是议论文，就提出自己的论点和论据来写的。 Translated text: I'm required to compose an argumentative essay in which I present my arguments and evidence.
Interpretation of scoring criteria	The writer comprehends from what aspects the essay will be scored.

	Participant 17, Chinese writing: 阅卷老师们会对文章哪几个方面进行打分，然后可能会对我有一个警示作用，就是提示我在这方面要进行强化，要做得更好，然后方便得到更高的分数。 Translated text: The examiners will grade the essay according to the performance on several aspects, which may serve as a reminder to enhance and improve these aspects and help me achieve a higher score. Participant 17, English writing: 嗯。。。这个内容的组织和语言的质量，然后，和中文写作差不多。 Translated text: Hmm... the organization of the content and the quality of language are criteria similar to Chinese writing.
Question type judgment	The writer judges which question type the writing task adopts. Participant 19, English writing: 议论的话题，比较谁好谁坏，同不同意。因为我之前学过雅思写作，老师会对写作任务分了很多类，就会把这个归类到同不同意，是部分同意还是全部同意，就是联系起来之前所学的，来进行，写这个文章，完成这个任务。 Translated text: The controversial topic concerns whether it is good or bad, agreeing or disagreeing. As I have learned IELTS writing before, the teacher has classified writing tasks into various types. This one can be categorized into agreeing or disagreeing, wholly or partially agreeing. So I can apply what I learned before to write this essay and complete this task.
Purpose identification	The writer considers what the writing task aims at. Participant 10, Chinese writing: 该不该让孩子接受早教课程，你要给出自己明确的立场，第二个要求就是要给出充分的论据，充分证明自己的观点。 Translated text: Whether or not children should receive early education courses, you must show a clear stance and provide sufficient evidence to support it. Participant 11, English writing: 线上教育是否比线下教育好，首先要对于这个话题给出自己明确的观点，第二个就是要写一些具体的原因和例子证明自己的观点。 Translated text: Is online education better than offline education? I need to give my viewpoints on the topic. Secondly, specific reasons and examples should be written in support of my viewpoints.
Task difficulty evaluation	The writer assesses how difficult the writing task is.

	Participant 15, Chinese writing: 对于任务本身，看到题目的时候，是和我比较相关的，我觉得应该比较好写。
	Translated text: Regarding the task itself, when I see the topic, I find it is quite relevant to me, so I think it is relatively easy to write.
	Participant 15, English writing: 我觉得这个写作比较像高中的作文，然后还是算比较好写的那种类型吧。
	Translated text: I think the task is similar to the essays I wrote in high school, which belongs to the simple category.

The participants tried to make advanced planning in which they anticipated content, structure, language use, argumentation techniques, and time allocation for their subsequent writing. Different types of planning strategies seemed to pose varied levels of cognitive demand for the participants. As found in this study, outlining structure appeared to be an automatic process, while brainstorming content required more time and effort. It is also worth noting that the participants not only mentally planned how to finish the writing task but also jotted down key points from the initial plan. This type of strategic move occurred before any piece of composing and went throughout the whole writing process. In particular, the participants in this study reported five subcategories of planning strategies to map out their writing in advance. Table 5.12 showcases the definition and interview examples for each subcategory of planning strategy based on the triangulation of questionnaire and interview results.

Table 5.12 Planning strategies with definition and interview examples

Planning strategies	**Definition & Interview examples**
Brainstorming content	The writer thinks about what ideas should be included in subsequent writing beforehand, including taking a side on the controversial topic, generating sub-arguments, and figuring out evidence.
	Participant 10, Chinese writing: 我是思考了两个方面哪个可能会更好写，所以我在写第一段的时候就比较纠结。我在想我到底是写早教课程比较好，还是写早教课程比较不好，但是最后我还是写了早教课程比较好，因为我觉得这

个方面比较好写一点。因为早教的话可以让孩子更早学习，学习当然是越早越好，然后我就选择了早教课程可以促进孩子成长这个方面，然后我就想怎么展开。我就想的是第一个方面是孩子越早接受教育以后学习水平就会更高，第二个论点是我看这个题目里面提供了兴趣培养类课程，我就想到了孩子的兴趣爱好要从小培养，然后我就写了一个兴趣爱好从小培养才能见卓效的这样一个论点。第三个我就会想从反面论证一下这个立场，如果不让孩子接受早教会有怎样一个后果，从反面进行论证。

Translated text: As I began writing, I faced a dilemma in selecting a side to discuss. I was uncertain whether to write about the advantages or disadvantages of early childhood education courses. Eventually, I opted to support early childhood education courses because I thought it would be easier to write about. The earlier we learn, the better we learn. In this way, I focus on how early childhood education can promote children's growth. Then, I think about how to articulate my arguments. Firstly, the earlier children receive education, the higher their learning level will be. Secondly, cultivating interests from a young age can lead to remarkable results. Additionally, I discuss the consequences of not allowing children to receive early childhood education as the third point from the perspective of the opposite side.

Participant 10, English writing: 线上教育是不是比线下教育好，有两个方面可以写。要么是线上教育更好，要么是线下教育更好。要在这两个之间选一个的话，我是觉得线下教育要更好，因为我觉得这个要更好写一点。线下教育是当代社会主流的教育形式，具有一些线上教育不能取代的好处，可以和老师面对面交谈。然后我第一段先提出了我的论点，我不觉得线上教育要比线下教育更好。我想了下面三个方面开展我的论证，第一个方面是线上教育毕竟用电子设备学习，可能会让学生沉迷手机，玩游戏，看电视剧什么的。第二个是我觉得线上教育会影响学生身体健康，会影响视力还会影响皮肤，然后还有脊椎。然后我写了线下教育的优点，可以实时面对面交流，有一个更好的学习氛围。因为线下教育是面对面一起学习，有一个班级整体的学习氛围，比线上教育要好。线上教育是自己一个人在家上网课，没有好的学习氛围。

Translated text: When discussing whether online education is better than offline education, there are two aspects to consider. One argument is that online education is better, while the other is that offline education is better. Personally, I believe that offline education is superior because it is easier to write about. Offline education is the mainstream form of education nowadays and has advantages that online

	education cannot replace, such as face-to-face communication with teachers. In my essay, I plan to develop my arguments with three aspects. Firstly, online education may make students overly dependent on electronic devices. Secondly, online education may have detrimental effects on students' physical health, including their eyesight, skin, and spine. Lastly, I highlighted the benefits of offline education, such as real-time face-to-face communication and an overall better learning atmosphere. In offline education, students learn together in a classroom and benefit from a better classroom learning atmosphere, which is superior to online education in which students attend classes alone at home without a conducive learning atmosphere.
Outlining structure	The writer thinks about how to organize the essay beforehand such as how many paragraphs should be composed, what rhetorical patterns to follow, and how many words should be included in each paragraph. <u>Participant 3, Chinese writing</u>: 嗯，写作之前是习惯性的总分总，先概括，再提出观点，两三个分论点，最后是过渡段和总结。 Translated text: Well, before writing, I habitually opt for a Zong-Fen-Zong (General-Specific-General) structure. I plan to begin with a brief background summary before presenting my views, followed by two or three supporting sub-arguments, and conclude with a transitional paragraph and a final statement. <u>Participant 3, English writing</u>: 结构的话，最难的是开头，怎么引入这个材料，分两段论证，最后的结尾就是简单总结一下。 Translated text: In terms of structure, the most challenging part is the opening part, as it is tricky to introduce and summarize the materials. Then, two paragraphs are written for argumentation. Finally, a brief summary will be written at the end. <u>Participant 16, Chinese writing</u>: 看了这个字数，也会先，就像打一个小草稿一样，就是决定某一块要写多少那种感觉。 Translated text: After looking at the word limit, I create a preliminary draft to determine how many words for each section. <u>Participant 16, English writing</u>: 每个段落的篇幅我想着还是要不一样的。多写肯定就是他们两个之间的对比，少写的就是开头这个背景肯定是越少越好，就尽量是又少又精练，然后这个也是一句话带过。还有就是结尾一定要精确地表达自己的看法，不能让别人产生误解。 Translated text: I prefer to vary the length of each paragraph. Longer paragraphs are written to compare the two education forms, while shorter ones are ideal for providing brief background information. Keep the background information brief and

	concise, and wrap up with one sentence. Additionally, it's crucial to accurately express your viewpoint in the concluding section to avoid any misinterpretations.
Pre-thinking language use	The writer thinks about particular words or phrases such as old sayings and linking words for their following writing beforehand.
	Participant 17, Chinese writing: 嗯。。。对于这个早教课程，就涉及到教育方面。然后这个十年树木，百年树人，还有望子成龙这种观念。然后包括最后的这个化作星光看顾长路，这个会有想到。
	Translated text: Hmm…the early childhood courses, rooted in education. I may think of the saying, "it takes ten years to grow a tree, but a hundred years to cultivate a person" and the phrase "hoping that the child will achieve greatness like a dragon". The phrase "guiding the long journey as stars" at the end is also thought in advance.
	Participant 12, English writing: Firstly, secondly, additionally, what's more 这些连接词也是我事先会预料好的。
	Translated text: Firstly, secondly, additionally, what's more, like these linking words, I also anticipate before the actual writing.
Formulating argumentation techniques	The writer thinks beforehand about how to argue for their arguments in the written text.
	Participant 8, Chinese writing: 写这种东西不能查手机，所以我就没有上网搜索。所以构思会想到一些和论点相关的具体论据。我觉得就是提供一些案例或者提供一些证据或者数据可能比较支撑我的观点，一般情况下我会写进去的。
	Translated text: I cannot use my phone to browse the internet. Instead, I should brainstorm some evidence relevant to my arguments. I think it is beneficial to incorporate cases, evidence, or data that reinforce my viewpoints. Usually, I will include these in my writing.
	Participant 7, English writing: 我这个写的不是特别多，一个我是准备，想的是先立后破，先写 online education 有什么好处，然后再反驳它，然后最后再总结。
	Translated text: I didn't write (i.e., offline education) extensively for this part. I plan to build before breaking. I begin with arguments favoring online education with its advantages listed, then refute them, and summarize at last.
Time allocation	The writer thinks about how to allocate time in advance during the writing process.
	Participant 16, Chinese writing: 对时间是有一个简单的计划的，我是想着至少要留十多分钟的时间来重新看一遍，从头到尾看一遍，然后再修改一下，然

	后就是这样。 Translated text: I devise a simple plan of time allocation. It involves setting aside a minimum of ten minutes to thoroughly review my written work, make any essential revisions, and finalize it. Participant 10, English writing: 嗯，我具体的会想到大概就是分三个大部分来写，5个自然段，大概开头和结尾各花10分钟，中间三段大概25分钟，时间上大概有这样一个规划吧。 Translated text: Em…I intend to divide my writing into three sections, which will comprise a total of five paragraphs. The opening and concluding paragraphs will take roughly 10 minutes each, while the three middle paragraphs will require around 25 minutes. This is the preliminary plan for my time.		

While writing, the participants were continuously vigilant about monitoring their writing progress and made any necessary adjustments once any problems were detected. Monitoring is an ongoing and proactive process aimed at checking and managing influential issues during the writing process in real time. It assists the writers in organizing and controlling any processing and behaviors, which in turn ensures that their writing stays on track and moves forward to match their intention. Similar to EFA results, this type of metacognitive strategies not simply works on processing multiple levels of linguistic resources but also addresses other non-linguistic aspects such as emotions, attention, and time that may influence the writing course and output. Aligned with the participants' interviews (see Table 5.13), monitoring strategies fell into two main subcategories (i.e., linguistic and non-linguistic ones), which were composed of six specific strategies (i.e., the first three subcategories belong to linguistic monitoring and another three are categorized into non-linguistic monitoring).

Table 5.13 Monitoring strategies with definition and interview examples

Monitoring strategies		Definition and interview examples
Linguistic monitoring	Lexis-level monitoring	The writer checks the retrieval and use of lexical resources in real-time writing.

		Participant 10, Chinese writing: 因为这是一个议论文体裁，我记得议论文就是比较严谨，比较绝对的词不要用在议论文里面，比如说这个第二段我写，随着近些年来我国居民生活水平逐渐提高，我国大部分家庭，这个大部分家庭就是这种词语用了比较谨慎，不能绝对化。
		Translated text: As an argumentative genre, I know the importance of maintaining rigour in vocabulary use and avoiding using absolute terms. To illustrate, in the second paragraph, I am mindful of my words, using "most families" with caution instead of an absolute statement.
		Participant 11, Chinese writing: 我尽量会用到比较书面的语言吧，比如说我在写孩子用更多时间，但是我打上去的时候会改成孩子会花费更多时间，利用词语的转换，使它更书面化。
		Translated text: I will endeavour to incorporate more formal language in my writing. For instance, I will opt for "children will expend more time" rather than using phrases like "children spend more time." Substituting words elevates the formality of language.
		Participant 3, English writing: 写的时候会注意到自己的用词，首先要确保拼写是对的，然后看能不能想出更高级的词汇，还会尽力避免词语不会重复。
		Translated text: When I write, I am mindful of my words. Initially, I double-check the spelling and then strive to incorporate more sophisticated words. I also try to refrain from using the same words excessively.
	Clause-level monitoring	The writer monitors any processing at the clause level during real-time writing.
		Participant 19, Chinese writing: 有时候我会想到如果我，比如说我在写这个地方的时候，我觉得用一个问句会比较恰当，或者用一个排比会增强我想要表达的意思的时候，我会使用一些其他的句式，就是自然而然的。
		Translated text: Sometimes, if I feel that a question sentence or parallelism can better convey my thoughts while writing, I tend to switch up my sentence structures. It occurs naturally for me.
		Participant 15, English writing: 写的话，还有会注意句式，语法正确，可能比较复杂一点，使用很多的从句。

		Translated text: When I write, I also pay attention to sentence structure and grammatical accuracy, using more complex sentences such as multiple clauses.
		Participant 16, English writing: 再就是一些时态句子，你这个语法结构啊，还有就是和中文写作类似，就是我不太喜欢同样的句型，就是一直用，我可能会注意稍微变换一下句型。
		Translated text: Another thing is the use of tenses and syntactic structures. Additionally, similar to Chinese writing, I prefer not to repeat the same sentence structure; instead, I tend to mix up sentence structures.
	Discourse-level monitoring	The writer keeps track of the progress at the discourse level during real-time writing.
		Participant 1, Chinese writing: 写的时候我会比较注重结构吧，句式和用词不是一朝一夕能改变的。我看书也不是很多，我觉得我的文字功底越来越差了，就只能在结构方面紧扣议论文的结构，按照那个来，自己不会跑偏，就不会让自己的想法很没有逻辑感，就是想到什么写什么就不太行。
		Translated text: When I write, I focus on the organization of my writing. I understand that changing my sentence structures and word use is not an overnight process. I haven't read many books, which has caused my writing skills to decline. To combat this, I strictly follow the structure of an argumentative essay to ensure that my ideas are logically organized rather than run away. It tends to be ineffective of writing whatever comes to mind.
		Participant 15, English writing: 我之前预想在我提出了观点要结合线上教育和线下教育，先分别说线上有哪些优点，再说说线下教育有哪些优点，以及指出各自的缺点，最后总结指出他们要结合起来，各取所长。然后写的时候，结构上，总分总那种，按照之前想的那种进行布局，确保结构是完整的。
		Translated text: I plan to argue for the combination of online and offline education, firstly discussing the advantages of online and offline education respectively, then their drawbacks, and finally concluding that they should be combined to make the most of their strengths. While writing, I follow the "zong-fen-zong" structure strictly to ensure it is well-organized and complete.

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| Non-linguistic monitoring | Staying focused | The writer strives to stay focused while writing and regain focus whenever their mind wanders or gets distracted.

Participant 19, Chinese writing: 我写的时候是全神贯注的，如果会分神的话，也是，主要是因为我会想不到，比较卡壳的时候会分神。但是和之前说的，提纲已经列好了，我非常清楚我要些什么，我下一步要怎么展开，我会全神贯注往下写。

Translated text: I am fully immersed in the task when I write. Occasionally, I may get sidetracked, and it's usually because I'm having trouble in generating ideas. However, as I mentioned earlier, I've already created an outline, so I know exactly what to cover and how to proceed with my writing. This allows me to remain focused and keep writing.

Participant 6, English writing: 写的时候有走神，如果走神的话，会抓紧想一下快一点，快一点，别想其他的了，快点往下写。

Translated text: Sometimes, I may lose focus while writing. To regain my focus, I motivate myself to think faster and avoid getting sidetracked by other thoughts. I push myself to write at a faster pace. |
| | Emotion regulation | The writer controls and adjusts emotions when writing.

Participant 7, Chinese writing: 自始至终都是有一些紧张的，然后我觉得也很正常。也能帮助自己更好地绷紧神经，去让自己的思维更加活跃，更加灵敏。然后会控制，并不会慌张，慌张的话，可能对于，如果话题再高深一点，再超过自己的认知，可能会感到有些慌张。

Translated text: I feel a bit nervous throughout the writing process, and I think it is normal. It keeps me on my toes and mentally active and sharp. I consciously keep it in control and avoid any unnecessary panic…panic might…if the topic is overly complex, I may feel slightly daunted.

Participant 15, English writing: 最开始的时候不是那么想写，最开始的时候，可能因为太久没有写了，就觉得很困难，然后给自己一点积极的心理暗示，写着写着就觉得还好。

Translated text: Initially, I struggle to find the motivation to start. It is difficult, possibly because I haven't written anything for a long time. However, I give myself positive cues, and it becomes smoother as I continue to write.

Participant 18, English writing: 这个说实话会有一点，因为就是感觉 |

		原因写了以后不知道去怎么把它展开说，然后会有点急，然后就先把它空着，先写后面那个结尾，结尾我还是比较明确的。
		Translated text: Honestly, I struggle with writing when I am unsure about how to develop an argument. It tends to make me slightly anxious, prompting me to skip that part and write the conclusion I already have a clear idea.
	Time management	The writer keeps an eye on the time left and adjusts the writing speed accordingly.
		Participant 9, Chinese writing: 边看时间边写，想让自己在时间结束前写完，给自己一点暗示，推动自己尽快完成。
		Translated text: I monitor the clock closely when writing and aim to complete the task within the given time frame. I also motivate myself with some hints to complete the task as fast as possible.
		Participant 19, Chinese writing: 我会不时去看一下时间，如果进度稍慢的话，我会有意识告诉自己后面的进度要快一点。
		Translated text: I check the time occasionally. If I'm not writing quickly enough, I consciously remind myself to pick up the pace during the time left.
		Participant 5, English writing: 写作的时间的话，边写边看时间的，我写一半的时候大概时间也就过了一半，然后就继续按照这个速度在写。
		Translated text: I pay attention to the time when I write. If I spend half of the time reaching the halfway point of my writing, I continue writing at the same pace.
		Participant 11, English writing: 时间会看的，写一段结束的时候会去看我还剩多少时间，因为我还是希望我能把所想到的三个方面都写完。
		Translated text: While writing, I notice the time. I check how much time I have left after drafting every paragraph, and I aim to finish drafting all three aspects I have in mind before the time runs out.

After completing any piece of writing or the whole essay, the writer may reconsider and assess what they have written. As reported by the interview participants, evaluating strategies

in writing included four operations: reviewing the written text, assessing it with self-selected standards, modifying any unsatisfactory parts, and reflecting on the writing process. Noticeably, the participants not only utilized this type of strategies at the end of writing but also incorporated them regularly throughout the entire writing procedure once any piece of essay had been completed. The participants may also have blank evaluative judgments on their writing process and products without referring to any criteria or leading to further revisions. For example, as Participant 1 commented on the Chinese writing task, "*I personally think the writing is generally ordinary, lacking any exceptional qualities*" (original interview transcript: 我觉得整体写作很一般，没有很出色的地方). Participant 10 also had the same blank evaluation in English writing: "*I feel this text is acceptable for me; completing it, it is not bad, not exceptional*" (original transcript: 我感觉就是这个文章整体对我来说还过得去，就写完了嘛，觉得还行，不是特别好). Table 5.14 depicts specific categories of evaluating strategies in writing with definitions and interview examples.

Table 5.14 Evaluating strategies with definition and interview examples

Evaluating strategies	Definition and interview examples
Reviewing the written text	The writer goes back and rereads what has been written. Participant 8, Chinese writing: 基本上就是从开始写作就有这种习惯，会再看一遍，也会边写边阅读。 Translated text: Since I began writing, I have habitually reviewed my work as I go along, both after I finish and while I write. Participant 8, English writing: 写完一部分之后，就会阅读前文，就是自己完成的这部分。 Translated text: Once I complete a part, I would read it over, that is, the part I just finished.
Assessing with self-selected criteria	The writer has evaluative judgments on what has been written with self-selected criteria. Participant 15, Chinese writing: 我觉得我自己写得不太好，文章的结构上有

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	些段落可能写偏题了。第三段因为我当时想着要联系自己的专业知识来写，我们学过什么婴儿早期年龄阶段的特点。然后想的是把这个写上去可能更好一点，但是整个段落都在写孩子年龄阶段的特点，都没有结合到这个是不是该不该让孩子接受早教课程的话题。 Translated text: I feel like I didn't write it very well. Some paragraphs may stray away from the topic. In the third paragraph, I aim to incorporate the traits of children during early development stages based on the professional knowledge that I have learned before. I think it might be better to include these, but the entire paragraph ended up elaborating on the developmental characteristics of children without linking it back to the topic of whether children should receive early education courses or not. Participant 16, English writing: 看自己的文本的时候首先评价最多的就是它这个语法，就跟写的时候那些一样，就是语法，语句还有单词不要出现错误。有的时候一句读下来感觉不通顺，然后就仔细看看肯定是哪里表达的不准确或者怎么样。 Translated text: When I read my text, the primary aspect that I focus on is the grammar, similar to what I do when writing, to ensure that there are no errors in sentences and word spellings. At times, when a sentence does not flow smoothly, I take a closer look to identify where the expression is inaccurate or unclear.
Modifying unsatisfactory parts	The writer revises a piece of writing that is unsatisfactory. Participant 5, Chinese writing: 会进行一些修改，主要是，比如说会加一些修饰语在里面，主要就是加一些词语，一些修饰语，让这个句子意思更完整。或者说有些病句会把它修改过来，或者说句式比较单一的话也会调换它的成分，看起来更加丰富一些。 Translated text: I make some modifications, mainly by adding some words and modifiers to make the sentences more complete in meaning. Additionally, I revise some ill-formed sentences and rearrange their elements if the syntactic structure is simplistic, more varied, and appealing to read. Participant 7, English writing: 有的句子比如是并列句，就把它改成一句话，就是状语从句连起来，然后有一些词感觉用得不太好就把它换掉，有些句子写了好像没什么用就删除了。 Translated text: Sometimes, specific sentences, like compound ones, are merged into one single adverbial sentence using conjunctions, and I may replace some words that do not fit well or remove redundant sentences.

Reflecting on the writing process	The writer self-reflects on the whole writing process to prompt further development in writing.
	Participant 15, Chinese writing: 还会反思下，我觉得我应该首先计划好自己应该要写什么，但是我一开始没有计划，就是一来就写了。
	Translated text: I also reflect on (my writing procedure), and I think I should outline my ideas before drafting. Nonetheless, I don't plan this time and rush to write immediately.
	Participant 18, English writing: 我觉得还需要改进，还是有点，论据方面还是有点准备不够充分吧，但当然也不是准备，就是没有很能说的东西，就还是要把自己思维的拓展一下。就除了这两方面，应该能想到其他的一些原因。
	Translated text: I feel that there is still room for improvement; um, I do not have enough preparation in presenting evidence, not preparing for but broadening my perspective. In addition to the two aspects, there could be additional reasons that I can contemplate.

The individuals employed and managed all five kinds of metacognitive strategies, i.e., task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating dynamically during the process of writing, rather than using these strategies following a set sequence of pre-writing, during writing, and post-writing stages. It is worth noting that writing is a recursive process instead of a straight line. All the metacognitive strategies interact intricately and juncture cyclically to fulfil the regulatory need during the complex writing process before finalizing the writing text. In other words, different metacognitive strategies influence reciprocally and work in combination to have active engagement and efficient writing. As Participant 10 mentioned in Chinese writing, planning at the beginning of writing was difficult but important since it raised the direction for which the writing progresses, thereby influencing subsequent metacognitive processes such as monitoring and evaluating (original transcript: *一开始的一个构思，这个很重要，也是比较难的。如果没有构思好，可能会写偏题，或者你写到一半，发现不太对，也要花很多时间阅读修改*). Like traversing

through open waters, a misalignment in the initial steering direction may lead to deviations from the intended course. Despite the persistent monitoring and adjustments to the vessel and navigational elements, it still requires significant time and effort to realign and re-evaluate the trajectory towards the initially planned destination. These qualitative results confirmed the quantitative results concerning the extracted strategy factors and their relationship in L1 and L2 writing.

(3) How these metacognitive strategies influenced writing performance

The statistical results of Phase 2 lent support to the finding that metacognitive strategies could positively forecast the participants' performance in L1 and L2 writing tasks. The interview results align with this finding and afford more profound insights into the role of metacognitive strategies in both writing contexts. The subsequent text elaborates on how the deployment of metacognitive strategies influenced different aspects of writing, such as the writing process, the final written product, and future writing growth.

During the interviews, the participants shared that metacognitive strategies exerted important effects on the writing process. These effects include self-directing involvement, avoiding memory loss, staying attentive, maintaining mental stability, adapting to difficulties, and enhancing writing efficiency. The following interview excerpts provide further insights into the effects embedded in the writing process.

(a) Self-directing involvement

<u>Example 1: Participant 17, Chinese writing</u>

这个第三点要求（评分标准），它提出的，从我们写作者看见这条要求的时候，就会进行心理暗示，可能这一点要求是本次测试的终极目的，写作只是一个表现的手段。就是通过这点，我通过这点要求，会很明确给自己一个心理暗示，引导自己，帮助自己更好地完成许多任务。这应该是我觉得最有价值的一个体验。(Translated text: *The third requirement, i.e., scoring criteria, triggers mental cues for me as a writer. It seems to be the*

ultimate goal of the test, while writing is just a means of demonstration. Fulfilling this requirement provides a clear psychological cue, guiding and assisting me in accomplishing the task more effectively. It's the most valuable experience that I have gained so far.)

Example 2: Participant 3, English writing

写作过程中，事先构思，或者监测自己的语言提取，评价自己的写作表现这些策略对于自己的写作也有很大影响。感觉是在有目标地做，引导我自己的写作，语言的选择和提取，内容的表达和安排。(Translated text: *When writing, specific strategies like prior planning, keeping track of language usage, and assessing writing performance can make a huge difference. They give a sense of goal orientation, allowing guidance in writing actions such as selecting and using language and conveying and structuring content.*)

(b) Avoiding memory loss

Example 1: Participant 5, Chinese writing

我觉得会影响到，如果在动笔之前就能搭建好更好的框架，写起来会更快，也不会遗忘更多的要点。(Translated text: *I think it has an impact. Establishing a solid framework prior to writing helps me write more efficiently and avoid the loss of crucial points.*)

(c) Staying attentive

Example 1: Participant 8, Chinese writing

我觉得会啊，会让我写作过程更加严谨一些，有利于我集中注意力。(Translated text*: I think it helps as I approach my writing with greater focus and dedication.*)

Example 2: Participant 15, English writing

有影响，注意力分散的话，及时调整，会写得更连贯。(Translated text*: It has an impact. Whenever I lose focus, I make necessary changes promptly, resulting in more logical and organized writing.*)

(d) Maintaining mental stability

Example 1: Participant 7, Chinese writing

写完之后会有一种安全感。如果你写得很顺得话，你脑子就会自然而然冒出很多想法，例子知识储备就会很自然而然冒出来。之前构思会引导你写作，写作过程中会有一些改动，让你完成任务有一种安心的感觉。(Translated text: *There is a feeling of security and satisfaction at the end of the writing. When the writing flows smoothly, it's easier to develop ideas, examples, and knowledge. Pre-planning guides my writing despite changes in the writing process, ultimately leading to a sense of comfort upon the completion.*)

Example 2: Participant 17, English writing

会有用，中间有分神的时候，有想过好难，好想放弃什么的，但是也就是告诉自己能编一点是一点，心态放平衡，产出更多点吧。(Translated text: *These strategies are helpful. Although distractions, moments of frustration, and feelings of defeat may sometimes arise, reminding myself that any progress is still progress helps me maintain calm and leads to increased output.*)

(e) Adapting to difficulties

Example 1: Participant 5, Chinese writing

我觉得还会影响到写作过程中，如果有遇到一些障碍的话，可以更好地去应变。比如说我本来打算这样写，但是我发现这样写有困难的话，我会更快切换一种思路。

(Translated text: *I think it also affects my writing process, allowing me to handle any challenges that may arise effectively. For example, when facing problems in writing in a particular way, I can easily switch to an alternative one.*)

Example 2: Participant 5, English writing

我觉得这样能够帮助我更好完成写作，具体来说，就是可以加速我的写作过程，在遇到困难的时候更快解决。(Translated text: *I feel that this can be of great assistance to me in completing my writing. Specifically, it can accelerate my writing pace and enable me to tackle*

any difficulties with greater ease.)

(f) Enhancing writing efficiency

Example 1: Participant 4, Chinese writing

有的，写提纲的话会对我的框架，这样我就会越写越顺。(Translated text: *Yes, creating an outline helps me write more smoothly and efficiently*.)

Example 2: Participant 14, English writing

可能会让我的思路更快导入，我知道怎么去布局，我一开始写作的时候，就是知道有些连接词我可以去用，然后我就有一个整体大体的构思，还有知道它每个板块都需要写些什么，我就可以直接把我的内容填上去，会感觉这样写作效率会比较快一些。

(Translated text: *It allows me to get my thoughts down quickly. I know how to organize my writing, for example, knowing what conjunctions I can use at the beginning. Then, I can create a general outline and determine what needs to be written in each section. I can fill in the content directly, and all these are more efficient for me*.)

Using metacognitive strategies enables the participants to direct and sustain the writing process, leading to a higher-quality written output. It is evident in the presence of advanced lexicon, greater syntactic precision and diversity, enhanced structural organization, and heightened content richness as manifested in the revised written texts. For instance, the strategic operation of evaluating helped Participants 4 and 11 find word- and sentence-level problems and stimulate better linguistic resources to replace, thus enhancing the quality of written text. As Participant 4 reported in Chinese writing: "*Reviewing and monitoring can help identify areas where my sentences lack coherence, allowing me to make revisions and improve writing quality*" (original transcript: 回顾监测可以找到自己语句不通顺的地方，然后进行修改，所以挺有帮助的，可以改善自己的写作文本). Participant 11 recalled in Chinese writing: "*I may find some informal or inappropriate words in the previous text while reviewing, prompting me to replace them with better ones, thus enhancing the content richness and*

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language fluency" (original transcript: *像回顾之前，前文有一些不太好，不太书面的词，就会想更好的词替换，替换之后可以增加文章的丰富性和语言的流畅性*). Similarly, Participant 11 also mentioned that keeping an eye on language usage helped to produce a better English written text: "*For example, if I desire to write a subordinate clause or use a word, I will naturally incline towards it. Active writing can enrich the content and stimulate the use of a wider range of words and sentence types*" (original transcript: *有，比如说我想主观想写一个从句，运用这个词汇，我肯定想往这方面靠。主观想写这个内容，会丰富这个内容，用丰富的词汇和句式去写*).

The deployment of metacognitive strategies also has a far-reaching impact beyond improving the current writing process and product. It also helps individuals to become aware of their current writing abilities and motivate them for future growth. Participant 10 commented regarding Chinese writing: "*I think it has an impact. These strategies can help me recognize errors and better understand my writing ability. Self-reflection fosters a clear understanding of my writing weakness and allows me to improve these aspects, which can significantly enhance writing*" (original Transcript: *我觉得是有影响的，我觉得这样一个策略可以让人认识到自己的错误，清晰认识到自己的写作水平，通过反思自己，认识到自己的不足，对于自己以后改正自己的写作不足，提高写作水平是有很大帮助的*). Similarly in English writing, she also noted that post-writing evaluation can help the writer identify shortcomings and prompts to rectify them in subsequent writing practices, which gradually leads to development (original transcript: *写作后的评估可以让自己发现不足，提醒在下一次的写作中进行改正，循序渐进，慢慢提高自己的写作水平*).

The participants also observed that the impact of metacognitive strategies is relatively limited compared to individual language proficiency and task characteristics. Additionally, they also noted that incorrect and/or excessive usage of these strategies may lead to a negative effect.

When Participant 18 completed the Chinese writing task, his writing process was slowed down due to the excessive monitoring and evaluating of vocabulary usage: "*Even if I can write this article in 30 minutes, it may take longer, 40 or 50 minutes if I get too caught up in certain details or specific words. I tend to obsess over these minor things, which may be a bit of OCD. Although I know the first draft is never perfect, I strive to make it as close to perfect as possible through continuous revisions; this does slow down my writing speed*" (original transcript: *影响的话，可能会减慢一下进度吧，比如说，我可能 30 分钟写完这篇文章，我要修改他，我可能会纠结一些细节，或者一个词语，然后可能会拖到 40 分或者 50 分才能提交，就完成这篇文章，就可能有一点强迫症吧。就是会纠结几个词。因为第一遍写嘛，总是不可能达到自己百分之百的一个预期，就是尽量让他达到百分之百吧，通过这个修改，但是写作进程就会受到影响*). As Participant 6 reported in Chinese writing, using metacognitive strategies did not contribute as much to her writing as task topic did: "*Initially, I feel a bit anxious, but it gets better as I continue writing. These strategies help me regulate my emotions, but their impact was not that significant. My writing performance is more influenced by task content and topic rather than by the use of these strategies*" (original transcript: *一开始的时候就比较紧张，但是写到后面就会好一点。有调节自己的情绪，这些策略对写作表现的影响，还行吧，没有很大的影响，我自己写的话，水平也就是这样，内容和话题影响比较大，这些策略使用影响没有那么大*). Participant 17 also held the same position in English writing that language proficiency is crucial for writing, and the active regulations may not yield desired results without a solid language foundation (original transcript:*语言能力比这些策略来说，首先它是一个基础，没有这些语言能力的支撑的话，这些主动的调控可能没有那么有用*).

(4) What the participants thought of the relationship between L1 and L2 writing metacognitive strategies

Correlation and regression analysis results in Phase 2 showed that the participants who used metacognitive strategies more often in L1 writing tended to use them more frequently in L2 writing and vice versa. SEM results further confirmed such transfer relationship of metacognitive strategies underlying L1 and L2 writing. Interview results in this section supplement these findings from the writers' perception of the relationship between metacognitive strategies in L1 and L2 writing contexts. It is observed that the participants performed metacognitive control in a similar pattern in L1 and L2 writing. In the interview, most participants admitted that metacognitive strategies employed in L1 writing would also be used in L2 writing. For instance, Participant 6 stated:

I follow a similar approach for both Chinese and English writing, creating an outline, paying attention while writing, and continuously revising and modifying sentences. I also structure the two writings in a similar way, listing my points and concluding with a summary.

Original transcript: *中英文写作基本都差不多，我都有列提纲，而且在写的时候我都会格外注意，把它给不断进行修改，写过的句子也会进行改，结构的话也是差不多，列出我的观点，然后结尾。*

In addition to the similar pattern of strategy use, the L1 and L2 transfer is also identified in the use of L1 when planning in both writing tasks. In particular, the participants used L1 to pre-plan when completing L1 and L2 writings. For example, Participant 19 commented：

As Chinese is my mother tongue, I approach every writing task by initially thinking in Chinese, which includes outlining my main arguments and subpoints and considering how to support them. The planning processes in Chinese and English writing are alike to a large extent, involving a comparable structure and outline and the same procedure of analyzing the topic and breaking it down into points.

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Original transcript:*因为我的母语是中文，我在看到对待每一个语种的写作任务构思我都是用中文在想，想出我的观点，有哪些分论点，怎么支持我的分论点，在思考构思方面是非常相似的，都是同样的结构，审题，破题。*

During the interviews with the participants, it was observed that they also recalled L2 while writing in L1. Participant 10, for example, reported the use of L2 linking words when arranging her thoughts for L1 writing due to limited exposure to L1 writing as an English major:

I keep an eye on my writing. Since my university days, I haven't had much exposure to Chinese writing. As a result, I tend to forget how to write in Chinese, which has made me a bit rusty. Under the influence of English writing, English linking words such as "first of all" and "secondly" come to my mind naturally, and I write "Shouxian" and "Qici" in Chinese accordingly.

Original transcript: *有监测自己的写作。因为上大学之后很少接触中文写作了，感觉比较少，今天写的时候会受到英文写作的影响，感觉忘了中文写作怎么写，有点生疏了。平时中文写作比较少，就忘记了之前学习的中文写作的内容。受到英文写作影响就比如首先，其次，最后，这个就是英文的时候就会用这些连接词，first of all, secondly,当时脑子里蹦出来的就是这些连接词。*

In addition to the transfer possibility, there are also some differences in the way by which the participants applied and executed their metacognitive strategies in actual writing between L1 and L2 contexts. Taking Participant 6 as an example, she had a more detailed plan in L1 writing than in L2 writing:

The difference lies in that the English outline is not as elaborate as the Chinese one. While composing in English, the outline may not exactly match the final content. However, in Chinese writing, the outline usually remains the same as the final text.

Original transcript: *不同的是，英文的提纲就没有中文提纲那么详细，因为我写*

英文，就是这个提纲和我写的不太一样，但是中文写作的那个提纲就是我写的内容。

When monitoring real-time writing, Participant 10 considered different levels of criteria for word use between L1 and L2 contexts:

There are disparities between Chinese and English writing regarding the monitoring of word usage. In Chinese writing, I had a higher standard: conveying the meaning is not enough, and appropriateness and accuracy must also be taken into account. However, I only require the words to convey the intended meaning in English writing.

Original transcript: *在监测词语过程中对于中英文写作不一样的，中文写作可能对自己要求会更高，不仅仅是要可以写，更会考虑使用是否合适准确，但是在英文写作中可能要求比较低一点，主要是看能不能表达出我想表达的意思。*

On the contrary, Participant 5 invested more time in reviewing the text in L2 writing than in L1 writing:

Perhaps I have not dedicated enough time to reviewing my written text in Chinese writing, but I tend to spend more time assessing the process and product when it comes to English writing. Chinese writing is relatively difficult for me as I finish the composing without much hassle, but I tend to commit more spelling errors in English writing, so I need to allocate more time to review.

Original Transcript: *可能在中文写作的时候我没有花很多时间去检查复阅自己的写作文本，但是在英文写作的时候我可能花费在这部分的时间比较多一点。可能中文写作对于我来说更难一点，然后写完之后感觉任务已经完成了，但是英文的话我在拼写方面出现的错误更多一点，需要更多时间检查。*

(5) In which way these participants were taught to master writing skills

As most of the participants reported in the interviews, the teaching of writing skills has

often been neglected in language instruction compared to other language skills, such as listening and reading, with a limited number of resources and teaching methods available to develop in this domain. Participant 17 shared her experience in learning Chinese writing skills, stating that formal writing instruction was scarce. Instead, he mainly relied on self-learning methods such as reading, writing weekly diaries, copying and noting down sample essays to enhance their writing abilities:

There is a lack of formal writing instruction. As a child, I began reading extracurricular books, regularly writing weekly diaries, and copying and adapting excerpts from high-quality articles for my use. Whenever I came across well-written essays and sentences, I modified them to fit the writing task at hand.

Original transcript: *写作方面的指导比较少。可能很早之前就是通过看课外书啊，然后包括写，小时候写周记，写作文的时候会去摘抄，会去改编一些我看过得比较好的文章，为己所用。然后，还有自己接触的美文美句，然后进行改编，使其更加贴合自己当前所面临的写作任务。*

Similarly, Participant 5 recalled that he had received limited instruction for English writing in which the teacher was more likely to consolidate genre knowledge and decompose sample essays:

The instruction that we receive for English writing is somewhat restricted. It primarily involves learning knowledge of different writing genres, analyzing sample essays, and then applying those in our writing. The emphasis is on understanding different writing genres, evaluating excellent essays, and using what we have learned in writing.

Original transcript: *我们接受的写作教学本来就很少，主要是先学习一些不同文体一些写作知识，然后去欣赏分析，然后学习，应用到自己的写作当中。主要是针对不同文体的解释，欣赏分析范文，然后将学到的应用到自己的写作。*

A few participants even expressed unfavourable feelings and conceptions about these writing courses. For example, Participant 12 answered:

Language teachers seldom offer writing instruction, and students are not very enthusiastic about attending these courses. Hence, we are only required to develop a habit of gathering materials in our day-to-day lives. After each exam, teachers provide us with some exemplary essays to assess and find some points that we can learn from, which is also a way to gather writing materials.

Original transcript: 其实语言老师开展写作是比较少的，相对而言，开展写作课大家兴趣不是很高。那可能就是要求我们去在日常生活中培养积累素材的习惯，每次考试结束之后给我们鉴赏一些高分作文，剖析可以借鉴的点，也是让我们在积极积累一些素材。

To sum up, the results obtained from the interviews are of great use in addressing the research questions from a profound angle. Supplementary to quantitative questionnaire responses, they add value to our understanding of metacognitive strategies used in L1 and L2 contexts, the effects of such strategy use on writing performance, and the possible transfer mechanism from the writers' perspective with deeper insights. Taking a closer look at the participants' previous learning and instruction experience in the writing domain also provided an essential angle for the author to offer effective pedagogical implications.

5.6 Summary

This chapter specifies how this thesis addresses the other two research questions by collecting and analysing data. With questionnaire and interview data in analyses, it clarifies the influence and the transferability of metacognitive strategies between L1 and L2 writing. The presence or absence of moderating effects of academic major and L2 proficiency is further examined to elaborate the sophisticated transfer mechanism. Quantitative and qualitative

insights were triangulated to afford a better understanding of these questions.

Chapter 6 Discussion

Triangulating large sets of questionnaire data and qualitative retrospective interview data, this thesis sought to understand how learners execute what strategic operations to perform metacognitive regulation in L1 and L2 writing with a comparative perspective. It was also conducted to explore whether and to which extent learners' use of metacognitive strategies influences their writing performance. Considering the possible interactions between L1 and L2 contexts, this study examines further the transfer potential of metacognitive strategies. To deepen our understanding of such transfer mechanism, learners' L2 proficiency and academic major were also obtained to examine their possible moderation role. The Discussion section is formed in terms of the four proposed research questions to discuss these findings in a well-organized manner by referring to what has been found in previous studies.

6.1 Main types of metacognitive strategies

This study used EFA to extract common factors underlying the two large sets of responses from immediate post-task questionnaires as to identify the main types of metacognitive strategies that the participants employed during the whole process of L1 and L2 writing. The EFA results revealed that the extracted five factors collectively underpin writers' metacognitive regulation: task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating; such metacognitive strategic patterns apply to both L1 and L2 contexts. The participants executed moderate to high levels of the five types of metacognitive strategies in both Chinese (L1) and English (L2) writing tasks.

The first factor (i.e., task interpreting) measured learners' interpretation and analysis of what they were required to do for the writing task, which offer specific guidance for writers during the entire writing process. Writing is one type of communication involving writers' intentions. Writers' mental representation of the assigned writing task will certainly have a role

in performing metacognitive dynamics (Negretti, 2012). Upon receiving a task, students are inclined to commence task interpretation and analysis immediately, which prompts an appraisal process rooted in two types of metacognitive knowledge: person knowledge and task knowledge (Boekaerts, 1992). Situated in a writing task, the former pertains to students' subjective understanding of their writing-related knowledge and skills, and the latter involves their understanding of the requirements and expectations associated with the writing task at hand. As questionnaire results suggest, specific task interpreting strategies included learners' processing and understanding of the task instruction, purpose, genre, evaluation criteria, and difficulty. These task-interpreting strategies were corroborated by the results obtained from stimulated recall interviews. Noticeably, task interpreting was also evident as the participants judged on the question type of the given writing task, which in turn helped them determine how to accomplish the task at hand according to what the participants reported in interviews. To elaborate, the participants in this thesis were required to give their opinions in terms of whether children should receive early education courses in the Chinese writing task, while they were required to compare online and offline education in the English one. Consistent with Zhao and Liao (2021), task interpreting is a distinct type of metacognitive strategic operation that occurs at the outset and evolves throughout the whole procedure of L1 and L2 writing task completion (Khuder & Harwoord, 2019). Although researchers rarely articulated this type of metacognitive strategy explicitly in previous theoretical or empirical attempts at modelling writing processes, it is reasonable to derive such a metacognitive strategy factor from the participants' questionnaire and interview responses as a result of its context-specific feature (Wenden, 1998). When completing a particular writing task, it is naturally essential for learners to interpret and analyze the assigned task, which plays a determining role in seeking ways to address it. To be specific, they must pay attention to task instructions and specifications, such as the given topic, genre, scoring criteria, and question type. They must also determine what

the writing task is designed for in comparison with their existing task knowledge and experience. Additionally, they may assess the task difficulty compared to previous writing tasks and current writing ability. Similar to what some researchers found (Khuder & Harwood, 2019; Nelson, 1990; Wolfersberger, 2007), participants' interpretations of the writing task might not match what the task designers had intended. Participant 14 in this study, for example, aimed to stand by a single side between online education and offline education in English writing, which knowingly subverted the actual purpose of task requirements asking test takers to demonstrate opinions on the controversial topic instead of taking a side.

The second factor (planning) focused on writers' pre-thinking of how to accomplish the writing task at hand, echoing findings from previous studies (Johnson, 2020; Manchón & de Larios, 2007; Teng et al., 2022; Zhang & Qin, 2018). It occurs prior to composing any piece of writing and is woven into the writing process (Cumming, 1989; Johnson, 2020; Manchón & de Larios, 2007; Zamel, 1983). As found in this thesis, the planning process was comprised of brainstorming content, outlining structure, pre-thinking language use, formulating argumentation techniques, and time allocation, which appear to parallel the process planning and textual planning in Hayes and Nash (1996) and the global planning and local planning in Sasaki and his associates (2018). It is interesting to find that different types of planning placed multiple demands on attention and memory resources within the time limit. Contrary to previous research (Bai, 2018; Hirose & Sasaki, 1994; Sasaki, 2000), planning the structure appears to be a mechanical process which demands less cognitive effort for Chinese English learners in this thesis rather than a less frequent strategy associated with expert writers. In qualitative interviews, the participants attributed less effort to organization planning due to teachers' pedagogical practices in writing, which had an over-emphasis on the structure of argumentative texts. In this way, it supports the claim that previous instruction plays a moderation role in the use of planning in writing (Johnson et al., 2012).

Quantitative questionnaire results in Phase 1 and qualitative interview results in Phase 2 also reveal that monitoring in writing can be divided into two dimensions: linguistic and non-linguistic monitoring. The third factor (linguistic monitoring) tapped into writers' active surveillance and regulation of different levels of linguistic processing during real-time writing, which can be further broken down into monitoring the usage of lexical, syntactical, rhetorical, and cohesive resources to produce the desired text. Encoding ideas into text leads the writer to think of and keep an eye on how to use linguistic resources, and active monitoring of language use is essential to achieve better writing performance (Soto et al., 2023). Linguistic monitoring substantiates the findings from earlier research that online monitoring of language use plays a pivotal role in sustaining the writing process, especially in argumentative writing (Panahandeh & Asl, 2014). Likewise, a recent study conducted by Teng and his colleagues (2022) also identified such type of monitoring employed by Chinese EFL writers. However, they conveniently defined writers' selective attention to lexical processing as goal-oriented monitoring in combination with monitoring and adjusting writing progress, writing strategies, course learning, and learning process. While such monitoring conceptualization could help writers raise awareness of their writing processes, we should also be cautious about the vagueness of statements and context ambiguity after scrutiny of the items that subsumed the strategy factor in their study. To elaborate, pausing regularly to think about lexical expression in writing is a more specific process compared to adjusting writing strategies and checking writing processes. Furthermore, all three preceding types of monitoring in their study, i.e., attention to lexical processing, monitoring writing progress, and monitoring writing strategies occur during the writing process while monitoring the learning process and checking course learning are more likely to align with learning to write. It is vital to differentiate writing from learning to write when developing a strategy taxonomy (Cohen, 2014). Metacognitive monitoring is shown in writers' control not only for their cognitive processing in producing

written languages, but also in manipulating other individual characteristics and contextual features. The fourth factor (non-linguistic monitoring) was concerned with writers' efforts to control and adjust non-linguistic aspects, including time, attention, and negative emotions when writing. It extends what Teng and Zhang (2016) found in emotional control during writing. We should note that writing is a process intertwined with cognitive, affective, and contextual variables (Abdel Latif, 2019), and the control over emotions and negative feelings is inevitable as well as part of non-linguistic monitoring.

The fifth factor, evaluating, refers to writers' conscious assessment and modification of the already composed text and the previously occurring writing operations. As the statistical results suggest, this type of metacognitive strategy included the assessment of language use, content, and organization, the evaluation of arguments, and the judgment of task fulfilment. Qualitative interview results further revealed that self-reflection in the writing process was also an essential strategic operation of evaluating, which could prompt future development in writing. As the results suggest, monitoring and evaluating functions are two distinct but related types of metacognitive strategies in writing (Lee & Mak, 2018; Zhang & Qin, 2018). It is reasonable for Zhao and Liao (2021) to justify the inseparability of monitoring and evaluating for the fact that writing is not a linear but a recursive process with the two metacognitive operations intertwined. Nonetheless, this thesis evidenced both quantitatively and qualitatively that evaluating was a unique type of metacognitive strategies that was separable from monitoring strategies for its particular focus. Evaluating strategies represent a summative process that involves conscious review and examination of the previous text and processing. In contrast, monitoring strategies mainly address the connection between writers' thoughts and how they are converted into a written text in real-time composing. In addition, caution should be exercised when adopting the monitoring & evaluating strategy factor found in their study. For instance, the strategy factor monitoring & evaluating in their questionnaire contained items

"I tried to use some complex sentence structures (Item 10)" and "I often checked whether my ideas were clear" (Item 12). The differences in their wording make us wonder why "trying to use complex sentence structures" and "checking whether my ideas are expressed clearly" are framed under the same type of metacognitive strategies. Taken together, evaluating strategies are more likely to be categorized as a separable type of metacognitive strategies in writing. It affords a new angle for researchers to distinguish monitoring and evaluating strategies in the writing process.

Also worth our attention is that the use of metacognitive strategies is closely tied to writers' awareness and knowledge of writing genres (Negretti, 2017; Negretti & McGrath, 2018). Adopting L1 and L2 argumentative writing tasks, writers' metacognitive strategies in this thesis were constrained or scaffolded by their prior understanding and mastery of argumentation structure and components, for example, formulating argumentation techniques in the planning category and assessing arguments in the evaluating category. Genre knowledge is elicited and operationalized as writers engage in metacognitive control, which in turn informs its renewal and development.

6.2 Relationships among different types of metacognitive strategies

CFA results in Phase 1 confirmed the first-order five-factor correlated model and the second-order one-factor hierarchical model subsumed metacognitive skills of the participants in L1 and L2 writing. In other words, the five extracted strategy factors, i.e., task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating are distinct but correlated types of metacognitive strategies in L1 and L2 writing and altogether contingent on the hierarchical construct of metacognitive regulation. Theoretically, metacognitive regulation in writing represents a multi-dimensional construct that encapsulates interpreting the demands of a task, constructing advanced plans for its completion, monitoring on-time progress towards

the predetermined goals linguistically and non-linguistically, adjusting processing and behaviors accordingly, and evaluating the written product and self-reflecting on the writing process (Sato, 2020; Veenman et al., 2006). It is not any of the five strategy categories in isolation but a blending of them. These metacognitive strategies work in intricate orchestrations towards the writers' desired outcomes, analogous to a car's wheels with the driver's steering. The held steer and running wheels allow the driver to advance on the expected road. In the case of writing, these metacognitive strategies interact with each other recursively during the dynamic writing process (Manchón & de Larios, 2007). Interview results confirmed and painted a detailed picture of the results of EFA and CFA that writing was a recursive process in which learners implemented the five categories of metacognitive strategies in an ongoing manner to keep the writing progress on the right track, accomplish the writing task with effectiveness and efficiency, and possibly facilitate them to be self-regulatory writers no matter in which language context. These five categories of metacognitive strategies found in this thesis, while seemingly distinct, work reciprocally. The writer, for example, begins with interpreting and analyzing the task requirements, then plans, monitors, and evaluates online cognitive processing and behaviors. Interchangeably, a new round of task interpretation and planning will be activated after identifying the processing malfunction of linguistic and non-linguistic resources during self-monitoring and comparing writing experience and texts in line with specific criteria during self-evaluation. In addition to largely lending support to the conceptualizations of metacognitive strategies proposed by Wenden (1998), the findings also suggest that metacognitive strategies are somewhat universally applicable (i.e., writing domain in this study), not bound by specific language settings, which enriches what has been suggested by Yang and Bai (2019) that the use of metacognitive strategies is free from cultural and learning contexts.

The existing literature has well documented a vast repertoire of theoretical

conceptualizations and empirical operations of metacognitive strategies in the domain of writing, while the relationships among different types of metacognitive strategies have yet to be adequately discussed. This thesis, supported by theoretical and empirical evidence, moved beyond identifying common metacognitive strategic factors toward further discussions on the factorial model among these factors. It seems to be challenging to profile a macro-level construct and its subsumed structure of micro-level components via visual aids such as tables or flowcharts, as these tools appear to indicate rigid hierarchical or causal connections between components (Galaczi & Taylor, 2018). However, these metacognitive strategy factors and their relationship in this thesis are flexible, fluid, and distinguished by fuzzy boundaries. To provide a vivid depiction of metacognitive regulation, this study adopts a tree illustration to metaphorically represent the five types of metacognitive strategies and their potential but dynamic relationships. As a tree, writers' metacognitive regulation can possibly grow out from any terrain and develop into various shapes as a result of the joint influence of a range of internal and external factors (i.e., individual characteristics, task settings, and environmental factors in this thesis). To be specific, the tree represents an evolving continuum of metacognitive skills interacting with learner-internal features, demands posed by the immediate task, and instruction and learning practices in intricate ways. Figure 5.1 presents the tree illustration of metacognitive regulation with the five categories of strategies found in this thesis. The tree chunk represents the writer, who initiates and engages in the execution of metacognitive strategies during the writing process, irrespective of the language contexts and writing formats. It divides into five distinct but correlated branches of metacognitive strategies, from which sprout smaller twigs representing micro-level strategic operations. Taking the task interpreting branch as an illustration, it extends from the metacognitive regulation tree under the intent of writer trunk to smaller metacognitive operation twigs, including genre identification, task difficulty evaluation, interpretation of scoring criteria, instruction reading,

question type judgment, purpose identification, and topic determination. As this thesis does not aim to offer an exhaustive list of micro-level metacognitive operations, some spouted twigs are left unlabeled to accommodate additional important ones emerging from future research endeavours.
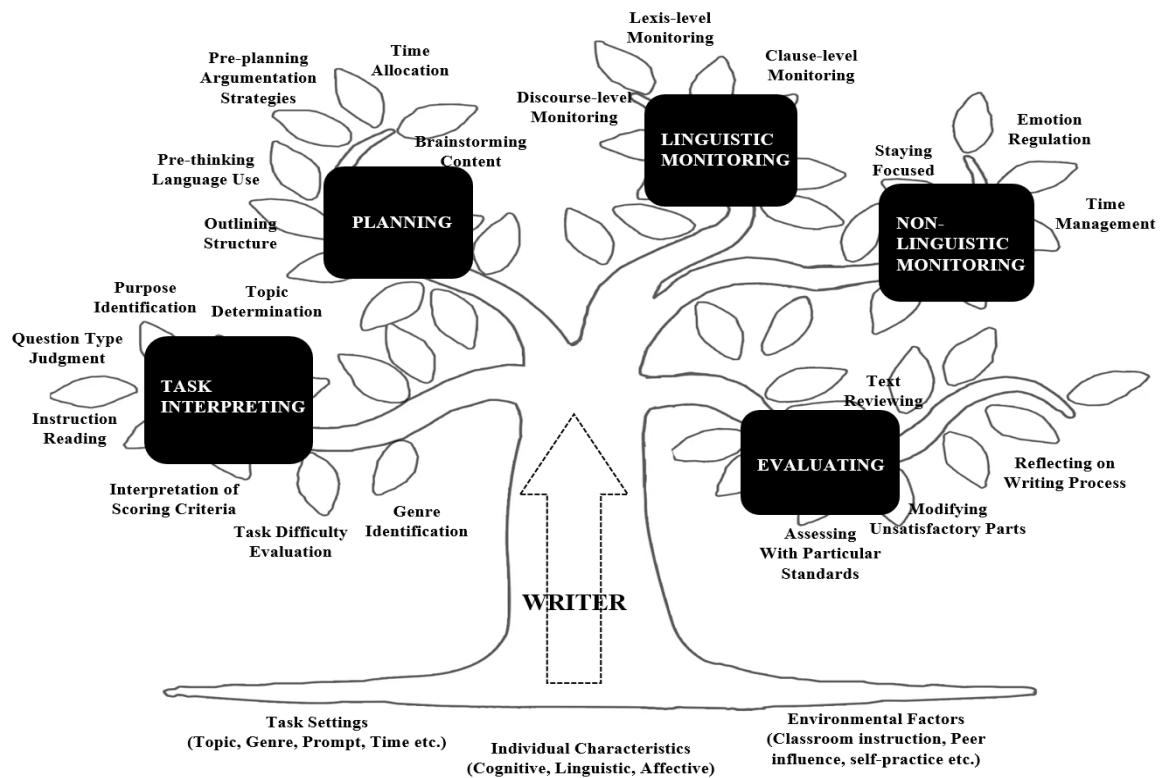
Figure 5.1 The tree illustration of metacognitive regulation in writing

6.3 Effects of metacognitive strategies on L1 and L2 writing performance

Similar to previous studies (Soto et al., 2023; Teng et al., 2022; Zhao & Liao, 2021), strong relationships exist between learners' metacognitive strategy use as a whole and writing performance in both L1 and L2 writing contexts. Learners who execute more metacognitive control in their writing scored relatively higher in their final written texts than their counterparts lacking the use of metacognitive strategies, regardless of which language involved. Although the variability of raters recruited in this study refrains from a firm conclusion of the participants' writing ability (Barkaoui, 2010), quantitative results confirmed that metacognitive control

could be good predictors for L1 and L2 writing quality. As argued by Anderson (2005), successful language learners have a more expansive repertoire of strategies and draw on a variety of them to accomplish their task of learning a language. Specifically regarding writing tasks in this study, the participants partly relied on using a range of metacognitive strategies to perform successfully in L1 and L2 tasks. However, this result contradicts Leijten and his associates (2019), who found no significant relationship between writers' metacognitive processes and writing scores. Such inconsistency could be attributed to the measure of mental processes, the sample size, and the two languages in comparison. More specifically, data analysis of Leijten and his colleagues was conducted on the participants' written texts, which hardly captures the complexity and dynamics embodied in the mental processes under investigation. In addition to this, the large sample size of this study may lead to differences in results obtained from a smaller one with 20 students included in their study. Finally, the two languages chosen to be compared in the two studies were largely different: Leijten and his colleagues selected two closely related languages, namely Dutch and English, in their study, while Chinese and English in this study were two phonologically, orthographically, and morphologically distinct languages (Yang et al., 2017). Despite these differences, the two studies were rare innovative attempts with a within-subject design between L1 and L2 which shed valuable insights into the role of mental endeavours on writing performance from a cross-linguistic perspective (Cumming et al., 2016).

Gauging structural relationships between L1 and L2 metacognitive strategies and writing performance simultaneously, the SEM results revealed that learners' metacognitive strategy use was closely and positively associated with their L1 and L2 writing performance, and metacognitive strategies had a much greater predictive effect on L2 writing than on L1 writing. Simply put, associations between metacognitive control and actual writing performance are influenced by L1/L2 context. The role of metacognitive control becomes more prominent when

writing in an L2, where learners may encounter challenges that are more cognitively, emotionally, and socially demanding than writing in L1 (Kormos, 2012; Xu et al., 2023). Learners may need more active and effective regulation of cognition, affect, and behaviors to achieve their writing goals when completing a writing task of higher complexity (Zimmerman & Schunk, 2011). More specifically, writing in L2 features a more language-oriented and problem-solving-centred process with extra cognitive load posed on formulating ideas, translating ideas into linguistic forms, retrieving and executing mental representation into actual written texts, adhering to conventional standards, managing individual and contextual factors to meet the task requirements (Abdel Latif, 2001; Manchón et al., 2009, Wang & Wen, 2002). Parallel processing in L2 writing turns out to be more effortful and conscious attempts that may burden learners. In contrast, text production in L1 writing with linguistic encoding of the mother tongue happens automatically and below conscious awareness (Kormos, 2012). In this study, metacognitive skills are in a greater need for these L2 learners in English writing to handle the real-time demands smoothly. As Schoonen and associates (2010) hypothesized, other aspects of processing, when writing in an L2, are possibly inhibited due to the high demand on attention and memory resources for linguistic processing. The use of metacognitive knowledge and skills, overseeing and regulating these processing, may play a more compensatory role in reconciling the insufficiency of linguistic knowledge in L2 writing compared to L1 writing. This finding was also supported by the qualitative results elicited from the stimulated recall interviews, in which the participants indicated that L2 writing was a less fluent process than L1 writing so that extensive regulation should be performed. For example, Participant 18 commented: "*The difference lies in… Chinese, it is my native language, and I am more familiar with it, which facilitates expression and makes the writing process smoother. However, when it comes to English, I may need to pause and think about how to express a particular word or check its grammar. Therefore, for the same article, it may take more time to*

write in English. That's what I think" (original transcript: 不一样的地方就是中文的话，因为是熟悉的语言，就是母语，它会很利于表达，就是你的这个写作的过程比较流畅。然后英语的话，就是可能你要停下来想一想这个词用英语怎么说，或者你还要去检查它的语法，就是它相对来说，同样一篇文章，它可能花的时间会多一些，我觉得是这样).

Another possible explanation for the different effect sizes of metacognitive control is that the participants held different conceptions of L1 and L2 writing. As Participant 19 illustrated, L2 writing was a fine-tailored process calling for more attention and memory resources to observe and monitor the language use (original transcript: 可能是因为这不是我的母语，很多东西需要强行的去记忆，把它用上，比较刻意的过程，不是自然而然地我想到要表达的观点我就要，我就能想到好几种表达的方式，就是会需要比较硬性地告诉我自己要去有意识用不同的句式，而且要用不同的词替换，不能老用一个词). By contrast, the participants approached the L1 writing task with a simplistic belief of turning the thoughts into written text. To illustrate, Participant 1 recalled in the interview: "*Like what I did at middle and high schools, Chinese writing is relatively casual, while I pay more attention to its requirements when taking an English writing task.*" (original transcript: 以前在初高中的时候也是这样，中文写作比较那个随意一点，英文写作在应试作文上会注重它的要求) It corroborates Mohsen's (2021) finding that learners experienced less anxiety and devoted less time in their L1 writing than they did in L2 writing to recall lexis and overcome grammatical obstacles. These conceptions of L1 and L2 writing possibly lead to individual varying intentions of metacognitive regulation, thereby bringing different effects on final writing performance. Moreover, metacognitive control requires attention and memory resources, and the participants may prioritize various writing aspects between L1 and L2 contexts (Kormos, 2006), which was also confirmed in interview reports. In L1 writing, the majority of the participants devoted

more resources to regulating the production and organization of content, while they did this with a focus on linguistic processing in L2 writing. Enhancing written content with innovative insights is challenging even in time-constrained L1 writing, while polishing language use may be a safe and effective strategy in L2 time-constrained writing, which may partly explain the different effects of metacognitive control in both writing contexts.

However, not all of the five categories of metacognitive strategies had predictive effects on the participants' final writing scores. More specifically, only evaluating strategies positively and significantly predicted the participants' L1 writing performance, while the use of task interpreting, planning, and evaluating strategies was not found to make a significant contribution to their L2 writing scores. The finding in L1 writing seemed to contradict the results of Schoonen and his associates (2003, 2010) that there was a strong relationship between metacognitive abilities and L1 writing performance. The contradiction can be explained by the differences in the participating students and the operation of metacognitive skills. First of all, the participant samples recruited in this thesis were two groups of university students from mainland China, while their data were collected from secondary school students in the Netherlands. On the one hand, university students, compared to secondary students, may have reached a mature level of writing in their mother tongue, at least surpassing the level beyond which differences in metacognitive control matter heavily in final writing performance. In brief, a ceiling effect occurs and even possibly constrains the learning outcome, especially in postsecondary language education (Rifkin, 2005). This can be the case for university students in this study who had started and continued their mother tongue learning in a traditional classroom setting. They may struggle, if not impossible, to break through this ceiling to become an advanced writer even in their L1. On the other hand, metacognitive abilities in their study were measured by questionnaire items asking participants about their knowledge of writing strategies and operationalized as a language-neutral construct without specifying the situations.

We should note that there are differences between what one knows and what one does. What the participants know about their writing strategies is not equal to how they actually use and coordinate them in writing. Furthermore, it is reasonable to assume that metacognitive competence is applicable in writing despite the language context. Nonetheless, adopting the participants' responses in one questionnaire to represent their metacognitive abilities in both L1 and L2 writing may be problematic due to the fact that the ability to manage cognitive endeavours and operations is not entirely stable across different language contexts.

Although it is still baffling to see that the use of metacognitive strategies made no unique contribution to the prediction of L1 writing scores with the exception of evaluating strategies, we can suspect that the finding is probably a result of a so-called suppressor effect in correlation and regression analyses (Tabachnick & Fidell, 2007). More specifically, the suppressor effect seems to occur when the correlation and regression coefficients between evaluating strategies and other types of metacognitive strategies were higher, thus leading to the result that other metacognitive strategies and L1 writing scores were relatively lower. Guo and Huang (2020) found in their study that there were no strong associations between strategy use and L1 writing performance. Worth noting is that they reached this conclusion based on the lack of significant correlations obtained in their study. However, in this thesis, positive correlations between metacognitive strategies and L1 writing performance were statistically supported with a significant level. However, these metacognitive strategies had no predictive effects on L1 writing performance according to the lack of significant regression coefficients. Such results may indicate that metacognitive strategies may interact with each other and even other factors unique to the individual and context to influence L1 writing performance. Considering this, further research is warranted to determine its role by considering the internal relationship between multiple types of metacognitive strategies with the involvement of individual characteristics and task features that are relevant to active control over processes and products.

Also worth noting is that evaluating strategies hold the main engine propelling enhanced performance in L1 writing task. Therefore, special attention should be given to training writers' self-evaluation in L1 writing.

Regarding L2 writing, the use of task interpreting, planning, and evaluating strategies had a significant contribution to the quality of final written texts. In line with the study of Hosseinpur and Kazemi (2022), the employment of metacognitive strategies was a significant predictor of learners' writing performance in the EFL context. As they found, one of the main differences between high- and low-performing writers was the employment of metacognitive strategies. Compared to low-performing participants, high-performing participants in the English writing task tended to have a higher usage of planning, monitoring, and evaluating to regulate their efforts in writing. Contrary to Zhao and Liao (2021), who revealed the limited contribution of task interpretation strategies to English writing performance, this study found a significant effect of such strategies in the same EFL context. The significant associations between task interpreting strategies and the quality of L2 written texts are reasonably expected since skilled writers need strategies to interpret and tackle the requirements of the assigned task accurately and effectively, especially in test-like conditions (Khuder & Harwood, 2019). In addition, the present study showed that active planning possibly helped the participants to secure a higher score in the L2 writing task, as indicated by the significant correlation and regression coefficients. In accordance with Chien (2012), high-achieving students devoted more concern to establishing advanced plans before any piece of writing and held clear goals throughout the writing process than their low-achieving counterparts in English writing. Evaluating strategies in this study were also proved to play an important role in producing a quality L2 written text. This finding has also been documented in existing literature pertinent to EFL writing (Hosseinpur & Kazemi, 2022; Qin & Zhang, 2019; Teng et al., 2022). Writers' reviewing and revising on their ongoing text during the writing process potentially led to an

increase in writing scores. However, the use of monitoring strategies, neither linguistic nor non-linguistic ones, had significant predictive effects on final L2 writing performance. The lack of predictive effects may be reasonable since writing performance is not certainly promised by the employment of such metacognitive strategies for its multi-faceted nature. The orchestration of a range of metacognitive strategies would have a great impact on composing texts, particularly in the EFL context (Zhao & Liao, 2021). Furthermore, the participants achieved a relatively low score of 13.31 on average in the English writing task compared to the highest score of 25. It can be suspected that the participants may struggle with translating their thoughts into written text with appropriate language forms in L2 writing without the support of threshold proficiency. Thus, the effects of monitoring seem to be relatively trivial during L2 writing.

As a whole, quantitative results revealed a mixed picture of the impact of metacognitive strategies on L1 and L2 writing performance. Metacognitive strategies as a whole are a more potent contributor to L2 writing, which is more linguistically, emotionally, and behaviorally complex than L1 writing. Thus, it is reasonable to suspect that deliberate and goal-oriented control over efforts is exceptionally essential to produce a high-scoring text in such a cognitively demanding task. In particular, self-evaluating strategies are not only conducive to the participants' L1 writing performance but also serve as a facilitator for them to draft L2 texts. Therefore, effective and accurate self-evaluation instruction activities are highly recommended in both L1 and L2 writing classrooms. However, some types of metacognitive strategies (i.e., task interpreting, planning, linguistic monitoring, and non-linguistic monitoring in L1 writing and linguistic monitoring and nonlinguistic monitoring in L2 writing) were not found to have significant predictive effects on the quality of final written texts. These results do not necessarily represent that writing performance is not affected by the use of these strategies due to the fact that a study based on questionnaire responses may run the risk of assuming that higher ratings are equal to more accurate strategy use (Sato, 2022). In this thesis, questionnaire

items were designed to ask the participants whether they used specific metacognitive strategies with various agreement levels during their actual writing process, while it is hard to use them to examine how well they used these strategies for writing. Take planning strategies as an example, it is possible to find the participants making an outline before composing without sufficient rigours in the logic and relevance to the topic. Consequently, the use of this strategy may not contribute to the final writing performance. In other words, the quantity of strategy use does not necessarily mean the quality of strategy use. Besides, the weak impact of these metacognitive strategies on writing performance may result from the absence of individual and contextual factors in research design. Although these factors are out of the scope of this thesis, understanding how they communicate recursively to influence metacognitive control is inevitably conducive. Thus, caution should be exercised when interpreting the results of the non-significant regressions between metacognitive strategies and writing performance.

Coupled with interview results, it is found that the effects of metacognitive strategies are not simply shown in their connections to writing outcomes but also in their supportive role in composing process and even future achievements. Heightened use of metacognitive strategies served as the cognitive facilitator for efficiently directing and sustaining the writing subprocesses. In this case, the participants reported that metacognitive processes were associated with their increased engagement behavior of self-direction, keeping attentive, releasing memory workload, and preserving to difficulties, which echoes results from Bui and Kong's study (2019). In addition, the effectiveness of metacognitive strategies may also relate to positive emotions like the sense of achievement and enjoyment, which motivate learners to pursue writing development. Similarly, Sun and Wang (2020) found that adding writing self-efficacy into the regression model could significantly improve the prediction of metacognitive control on writing scores, indicating the close link between active regulation and confidence in writing, which in turn reinforced final writing performance. The present study also found that

the participants' self-reflection on their writing processes can help boost future growth by enabling them to acknowledge their strengths and weaknesses in writing. As Zhang and Zhang (2019) contended, students can depend on metacognitive strategies to stimulate and coordinate thoughts and behaviors in harmony to progress toward better learning achievements as efforts to be independent and autonomous learners. Similarly, the strategic processes of interpreting task situations, planning ahead of composing, on-time monitoring linguistically and non-linguistically, and self-evaluating processes and products potentially facilitate writers to be an acute observer, an insightful critique, and an effective director of their efforts, and finally become self-regulated and autonomous writers. Based on the abovementioned, a dynamic and diversified view is relatively preferred when discussing the role of metacognitive strategies in L1 and L2 writing.

6.4 L1-L2 transfer of metacognitive strategies

The L1-L2 transfer of metacognitive strategies is also evidenced in the empirical data of this thesis. Correlation and regression results demonstrate that metacognitive strategies that the participants employed in the L1 (i.e., Chinese) writing task were significantly correlated and predictive of those that they used in the L2 (i.e., English) writing task. The SEM results further support the close associations between L1 and L2 writing metacognitive strategies. L2 writers possessed the distinct advantage of utilizing both their L1 and L2 resources concurrently for strategic purposes when writing (Cumming, 2001). It is reasonable to claim that metacognitive regulation and writing ability are transferable between L1 and L2, which concur with the results of previous studies exploring L1-L2 interactions (Guo & Huang, 2020; Pae, 2018; Xu et al., 2023; Zhu et al., 2021). Pae (2018) observed the intertwined relationship between L1 and L2 writing skills in both low- or high-cognitive complexity tasks. Guo and Huang (2020) identified that students used strategies in a similar pattern to complete L1 and L2 writing tasks. Zhu et al.

(2021) further revealed that secondary school students in L2 integrated writing could make use of discourse synthesis skills that have been acquired in L1. Xu and her colleagues (2023) also validated that such L1-L2 transfer applied to learners' perceived ability of their reading-to-write skills. The comparison of metacognitive strategies in this study further proved that writers' deliberate control over their thoughts and behaviors in L1 and L2 contexts were also shared and intertwined. The significant relationship between L1 and L2 writing metacognitive strategies, to some degree, provides empirical support for Cummins' (1979, 2016) LIH in writing, thereby extending the CUP shared by L1 and L2 literacy skills to deliberate control and regulation on efforts. In addition to theoretically testing Cummins' hypothesis from a metacognitive perspective, it is particularly noteworthy that there was a cross-language facilitation effect of L1 writing metacognitive strategies on L2 writing performance with the mediation of L2 writing metacognitive strategies. In this way, a common metacognitive regulation may exist underlying L1 and L2 writing as a result of the transfer of the mental operations that writers employ to manage their efforts, thus facilitating the overall L2 writing performance. It is consistent with the positive cross-language effect of L1 writing skills and beliefs found in Zhu et al. (2021) and Xu et al. (2023). Contrary to the lack of the cross-language facilitation of ideal writing abilities (Zhu et al., 2022), students' metacognitive regulation is more likely to be a relatively stable skill that can be applied to scaffold writing development across languages.

In addition to the strong associations between L1 and L2 writing metacognitive strategies, the L1-L2 transfer is also shown in the use of L1 in L2 planning, which aligns with previous studies that L2 writers resorted to their L1 when generating ideas for L2 writing (Guo & Huang, 2020; Manchón and de Larios, 2007; van Weijen et al., 2009). For example, Participant 3 said in the interview for the English writing task: "*I just write what comes to mind in Chinese writing, but for English writing, I think about the content first and then translate it. Actually, the*

planning process at the beginning is the same" (original transcript: 中文写作想到就写了，但是英文写作我会思考内容，然后把它翻译过来，其实一开始思考的过程是一样的).

There is also a possibility of recalling L2 resources while composing L1 texts, as found in some participants' interview reports, which in some ways points to the bi-directionality of transfer (Pavlenko & Jarvis, 2002). If proficiencies like writing skills and knowledge are shared resources across L1 and L2 and acquisition in L1 possibly facilitates the learning of L2, the transfer may occur reciprocally, that is, L2 literacy acquisition can also influence L1 literacy acquisition conversely. Future research can further explore the bidirectional transfer in the context of writing with triangulated sources of data.

Although correlation and regression results in this study jointly proved that L1 writing metacognitive strategies could be transferred into L2 writing, the findings also indicate certain variations in how to approach and execute these strategies according to in-depth interviews. Firstly, writers varied in the nature of planning in L1 and L2 writing. As Participant 18 mentioned, a more detailed outline was formed during global planning in the Chinese writing task, while he devoted a greater proportion of time to local planning in the English writing task. Contrary to Sasaki and his associates (2018), who found that increased local planning was performed to match the general plan, this study found that local planning was executed in L2 writing as a compensatory strategy for reducing the memory load and enabling the foci shifted to other processes such as translating, supporting the overload hypothesis proposed by Kellogg (1990). Secondly, L2 writers held a higher standard on the retrieval and use of linguistic resources in L1 writing than in their L2 one. For example, when comparing linguistic monitoring between L1 and L2 writing, Participant 13 recalled: "*The focus during Chinese writing is different from that during English writing. In Chinese writing, more attention is devoted to how to make the written text more graceful, while in English writing, I may consider more about grammatical accuracy*"(original transcript: 中文关注的地方和英文不太一样，

中文就是想如何把自己的文章写得更有文采，英文如何就是关于语法上可能要多思考一下。). In addition, linguistic monitoring in L2 writing appeared to be a more deliberate process in which the writer kept self-reminded of using various words and sentence structures. Taking Participant 19 as an example, she commented in L2 writing: "*I try to use advanced vocabularies and sentences as many as possible in my English writing. The reason for this is that English is not my native language. I need to memorize many things and consciously apply them instead of naturally recalling different ways to express my thoughts. I keep reminding myself to use different sentence structures and avoid using the same words repeatedly*" (original transcript: 英文写作的时候，我会尽可能用高级的词汇和句子。可能是因为这不是我的母语，很多东西需要强行的去记忆，把它用上，比较刻意的过程，不是自然而然地我想到要表达的观点我就要，我就能想到好几种表达的方式，就是会需要比较硬性地告诉我自己要去有意识用不同的句式，而且要用不同的词替换，不能老用一个词). As for self-evaluation in L1 and L2 writing, the participants prioritize different writing aspects. The report of Participant 16 helped to exemplify the difference in evaluating between the two writing contexts: "*When reviewing Chinese text, I pay less attention to individual sentences, such as word choice and grammar errors. I focus primarily on the overall logical structure. However, I tend to scrutinize every sentence and check for any possible grammar conflicts between sentences in English writing, reading more carefully*" (original transcript: 写中文的时候，基本就很少会留意你这一句话，一些用词和语法之类的错误，这种就会很少。主要中文的时候，主要会看你整体的这个逻辑，然后英文就每句都，每句都看一看，就是前后有没有语法冲突的，就会仔细一点).

6.5 Moderation of L2 proficiency and academic major on L1-L2 transfer

For the moderating effect of L2 proficiency on the transfer of L1 and L2 writing

metacognitive strategies, results of the multigroup analysis failed to identify statistically significant differences in the strength of the relationship between L1 and L2 writing metacognitive strategies for undergraduate students of lower- and higher-L2 proficiency levels. Considering the lack of moderation effect of L2 proficiency, this study provides no statistical support for the Linguistic Threshold Hypothesis (LTH) of metacognitive regulation in the context of writing. Learners, no matter in which L2 proficiency group, could successfully transfer L1 writing metacognitive strategies to L2 writing. It is in sharp contrast to the findings of Pae's (2018) study supporting the LTH that the efficient L1-L2 transfer of writing skills is more likely to occur for higher L2 proficiency learners than for their lower L2 proficiency peers. Although the difference in path coefficients from L1 to L2 writing metacognitive strategies was not statistically significant, a careful inspection of the path strengths shows that the higher proficiency group ($\beta_{higher} = 0.655$, $p < 0.001$) had a relatively stronger path coefficient than that of the lower proficiency group ($\beta_{lower} = 0.605$, $p < 0.001$). The unexpected result may be ascribed to the restricted dispersion of L2 proficiency scores of the sample in this thesis. The coefficient of variation, shorted as CV, can be calculated to illustrate this result better. CV is a statistical measure that can be used to standardize the dispersion of a dataset. As the following formula $V\sigma = 100\% \times (\frac{\sigma}{\mu})$ shows, the CV (represented by $V\sigma$) is calculated as the ratio of the standard deviation (represented by σ) to the mean (represented by μ) and expressed as a percentage (Everitt, 1998). According to this formula, the CV of the L2 proficiency scores in this thesis was 12.71 % with a standard deviation of 14.71 and a mean value of 115.70. Although there is no common threshold for the CV in the field of language assessment, a CV of 12.71%, less than 20%, still indicates a relatively small amount of dispersion of the participants' L2 proficiency level, which partly explains the lack of moderation effects of L2 proficiency on L1-L2 connections.

The lack of moderation effect on the relationship between L1 and L2 writing

metacognitive strategies is also found in the two academic major groups, and the path strength from L1 writing metacognitive strategies to L2 writing metacognitive strategies was not significantly different with the moderation of disciplinary major. Thus, the L1-L2 transfer of metacognitive strategies in the context of writing is unchangeable for learners of different academic majors. Previous studies have examined university learners' L1 and L2 skills in relation to their disciplinary major, but a limited number of this vein of studies have investigated its moderation effects on the cross-language transfer. However, it is reasonable to suspect that learners may vary in their development of metacognitive skills in the domain of writing and in the ability to transfer what they have developed between L1 and L2 contexts as a result of the varied influences of disciplinary teaching and learning environment (Johnson et al., 2012). The finding that the relationship strength between L1 and L2 metacognitive strategies did not vary as a function of writers' academic majors in this thesis was not anticipated. However, the path strength from L1 to L2 writing metacognitive strategies for the English major group (β_{EM} = 0.682, p <0.001) was comparatively larger than that for the non-English major group (β_{NEM} = 0.600, p <0.001). Such unexpected results may be partly explained by the pessimistic picture of the writing instruction of the target sample as informed by the participants' interviews. Similar to Jiang et al. (2023), it is found that writing instructions in China have not yet fulfilled the demand for the writing development of university students. Instead of experiencing effective writing pedagogies in classroom or any other tutoring institutions, the participants under investigation were more likely to develop writing skills via self-learning practices. Limited teaching resources and approaches possibly pose a constraint on the mastery of effective regulation and cause a balanced but unmatured level of metacognitive skills. Therefore, learners are still struggling with composing a quality text efficiently after years of language education regardless of their disciplinary majors, thereby offering a possible explanation for the lack of moderation of academic major found in this

thesis.

Taken together, the above findings provide strong empirical evidence for the vital role of metacognitive strategies in L1 and L2 writing. Theoretically, they also offer some support for Cummins' LIH and the common underlying proficiency supporting L1 and L2 literacy skills. Learners' ability to regulate and control their thoughts and behaviors is shared and intertwined between L1 and L2 writing. Although this study failed to find significant moderation effects of L2 proficiency and academic major on such transfer, it identified stronger path coefficients for the higher L2 proficiency group and the English major group respectively. The small dispersion of L2 proficiency statistics and the limited writing instruction for students of both English and non-English majors possibly add a constraint to the moderation effects of the two individual characteristics. In this regard, future research is warranted to provide more enlightened and illuminating insights into the L1-L2 transfer mechanism by including more heterogeneous samples.

6.6 Summary

Theories and research that are most relevant to this thesis are cited and discussed in this chapter to explain why findings diverge from or remain consistent with prior ones. More specifically, it helps logically clarify and critically analyze the conceptual meaning and labelling differences in the identified and extracted metacognitive strategy factors, the superordinate and subordinates of these strategy factors, the strong, weak, or missing effects of metacognitive strategies in multiple levels, the L1-L2 transfer mechanism and cross-language facilitation, and the absence of statistically significant moderation role of L2 proficiency and academic major on the transfer.

Chapter 7 Conclusions

Chapter 7, Conclusions, is written to summarize major findings in terms of the proposed research questions, offer implications based on the obtained results, point out limitations of this thesis and suggest directions for future research to progress further.

7.1 Major findings

This thesis was an innovative attempt to investigate Chinese EFL learners' metacognitive strategy use in writing with a cross-linguistic perspective. Phase 1 examined the main categories of metacognitive strategies that the students employed to complete L1 and L2 writing tasks and the internal structure among these categories of metacognitive strategies used in the two writing tasks. Drawing on the valid questionnaire tool, Phase 2 moves forward to explore the possible effects of metacognitive strategies on students' final writing performance, the L1-L2 transfer of writing metacognitive strategies, and the moderating role of L2 proficiency and academic major in such L1-L2 transfer. Major findings are summarized in terms of the four proposed research questions.

The first research question is proposed to address the main categories of metacognitive strategies that the participants employed to complete L1 and L2 writing tasks. EFA results extracted five categories of metacognitive strategies: task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating strategies when composing in L1 and L2. Simply put, the students utilized the five main types of metacognitive strategies during their writing process, which was consistent across L1 and L2 contexts. The conceptual meaning of these metacognitive strategies was tailored clearly by coupling EFA results with interview reports. More specifically, task interpreting strategies tapped into whether and how writers carefully approach the task nature and specifications, including instruction reading, topic determination, genre identification, interpretation of scoring criteria, question type judgment,

purpose identification, and task difficulty evaluation. Planning strategies were a cluster of strategic operations to form ahead plans for the subsequent composing, which consisted of brainstorming content, outlining the structure, pre-thinking language use, formulating argumentation techniques, and time allocation. On-time monitoring strategies fell into two subcategories with different foci: linguistic monitoring and non-linguistic monitoring. Linguistic monitoring focused on real-time observation and inspection of the retrieval and use of linguistic resources containing lexis-, clause-, and discourse-level monitoring. Non-linguistic monitoring measured writers' efforts in managing and controlling the processing of non-linguistic factors involved in writing, including staying focused, emotion regulation, and time management. The last type of metacognitive strategies, evaluating strategies, referred to reconsidering and reassessing what they had composed and experienced during the writing process. Evaluating strategies were mainly executed when writers reviewed and assessed the written text, modified unsatisfactory parts, and reflected on their writing process.

The second research question further investigates the factorial structure of the five types of metacognitive strategies in both writing contexts. CFA was performed to test the first-order five-factor correlated and second-order hierarchical models in terms of the L1 and L2 questionnaire datasets respectively. Results showed that both the two hypothesized models had an acceptable fit into the two questionnaire datasets, and the second-order hierarchical model could explain more than 95 per cent of the variances of the first-order correlated one. These results jointly pointed to the interdependence of the different types of metacognitive strategies and the hierarchical construct of metacognitive regulation, which kept the same in both L1 and L2 writing contexts. In other words, metacognitive regulation is a multidimensional concept that can be subsumed by intricate interactions among five unique but correlated types of metacognitive strategies, i.e., task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating strategies, which is applicable across L1 and L2 writing.

The third research question is raised to explore the effects of metacognitive strategies on L1 and L2 writing performance respectively. Correlation results revealed strong associations between all five categories of metacognitive strategies and writing performance in both L1 and L2 contexts. However, regression results showed that only evaluating strategies had significantly predictive effects on writing performance in L1, and task interpreting strategies, planning strategies, and evaluating strategies were strong contributors to writing performance in L2. SEM results further underscored the importance of metacognitive regulation in L1 and L2 writing. At the same time, metacognitive regulation afforded a more important role in L2 writing for the more powerful predictive effect, possibly indicating an urgent need for metacognitive skills in writing tasks of a higher complexity. Effective use of metacognitive strategies can be a compensatory tool for writers to partly overcome the insufficiency of linguistic knowledge and skills in L2 writing. However, there appears to be a ceiling effect of using metacognitive strategies in L1 writing since college students in this thesis have already reached a somewhat mature stage of linguistic foundation in their mother tongue. Taken together, this thesis highlighted the substantial value of metacognitive regulation in both L1 and L2 writing task performance, and the predictive power is somewhat influenced by the L1/L2 context.

The fourth research question examines whether there is an L1-L2 transfer of metacognitive strategies in writing and whether such transfer is enhanced or constrained by learners' L2 proficiency and academic major background. SEM was performed to investigate the relationship among L1 writing metacognitive strategies, L2 writing metacognitive strategies, L1 writing performance, and L2 writing performance simultaneously. The results revealed that L1 writing metacognitive strategies and performance were significant and positive predictors of their L2 counterparts. There was also a cross-language effect of L1 writing metacognitive strategies on L2 writing performance with the mediation of L2 writing

metacognitive strategies. These results provide empirical support for Cummins' LIH and extend the common underlying proficiency shared by L1 and L2 literacy skills to writers' metacognitive regulation. Two multigroup analyses were performed to test the possible moderation effect of L2 proficiency and academic major on the L1-L2 transfer of metacognitive strategies. Although the transfer strength did not vary significantly between lower and higher L2 proficiency groups or between English and non-English major groups, the path coefficients differed among these groups. The higher L2 proficiency group and the English major group had a larger regression coefficient on the path from L1 to L2 writing metacognitive strategies in this thesis.

Taken together, the combination of quantitative questionnaire data and qualitative interview responses provides triangulated and illuminating information to address the research questions adequately. The findings of Phase 1 revealed the main types of metacognitive strategies and the internal structure among these different metacognitive strategies, which also afforded the psychometric quality of the questionnaire instrument statistically. The findings of Phase 2 provide empirical support for the predictive role of metacognitive strategies in writing from a cross-linguistic perspective and the interdependence relationship between L1 and L2 writing metacognitive strategies. They suggest that metacognitive strategies deserve a position in L1 and L2 writing, and writers draw on a shared pool of metacognitive skills to compose in the two language contexts. To my surprise, this study failed to identify the role of L2 proficiency and academic major in moderating L1-L2 transfer of metacognitive strategies, and further research is warranted to test and enhance the findings by incorporating multiple proficiency thresholds across a broader range of sample groups.

7.2 Implications

Findings of this thesis have a few theoretically and practically meaningful implications

for teachers, learners, researchers, and other practitioners in the domain of writing across L1 and L2 settings.

A careful review of the rich body of studies conducted on learners' strategic processes indicates that few, if any, of them have specifically focused on the meta level of regulation in writing task settings. Nevertheless, as highlighted by Chamot (2005), writing presents a largely formidable challenge for learners in acquiring communicative competence when compared to other language modalities. Furthermore, acquiring writing skills necessitates deliberate learning and conscious cultivation, contrasting with the acquisition of speaking which mainly relies on sufficient input and exposure (Forbes, 2020). Consequently, employing these strategies may be more conducive to learners when they confront cognitively demanding writing tasks. As a response to addressing this gap, this thesis affords more enlightened insights into learners' metacognitive strategies across L1 and L2 writing tasks by considering the soundness of methods (i.e., the multi- and mixed-methods design) and the integrity of theoretical conceptualizations (i.e., metacognition and language learning strategy theories with particular attention to writing). Given the five extracted factors in EFA, this study revealed the major types of metacognitive strategies employed by Chinese EFL learners to accomplish the L1 (i.e., Chinese) and L2 (i.e., English) writing tasks. Furthermore, CFA results demonstrated the good model fit of the first-order correlated model and the second-order hierarchical model for writing metacognitive strategies in both L1 and L2. These results further delineate the conceptualization of metacognitive regulation, which is a hierarchical and multi-dimensional construct subsumed by five correlated but distinct types of strategic processes: task interpreting, planning, linguistic monitoring, non-linguistic monitoring, and evaluating. In addition, the questionnaire of metacognitive strategies was proven to be a valid and reliable instrument to measure students' active management of their cognitive efforts and actions during the L1 and L2 writing processes. It can be used as a diagnostic tool in classroom teaching and assessment

to explore possible pedagogical activities to enhance learners' awareness and reflection of their metacognitive skills and cultivate independent and autonomous writers. Having students accomplish this questionnaire can also help teachers obtain valuable information about how to implement metacognitive instruction in writing classrooms. Questionnaire completion also possibly empowers students to gain a deeper understanding of the metacognitive strategies they utilize more frequently during the writing process and those they do not. Accordingly, they can explore ways to deliberately broaden their repertoire of metacognitive strategies in writing task completion.

Secondly, this thesis has several methodological implications for researchers in this field, which can be exemplified in the multi-methods approach to developing and validating the questionnaire instrument and the mixed-methods approach to investigating the effects and the cross-linguistic comparison of university students' metacognitive strategy use in L1 and L2 writings. Previous strategy studies mostly use verbatim or adapt the established questionnaire instrument, while the specificity of the educational settings and learning activities seems to be somewhat ignored. Few of these studies presented the whole procedure of questionnaire construction situated in a particular context. In this thesis, multiple sources of data and information, i.e., literature consultation, researcher judgement, teacher comment and student feedback in the pilot session, were collected to generate the initial item pool of the metacognitive strategy questionnaire to make it suitable for the target context and accurately elicit participants' responses about metacognitive strategy use in writing processes. The newly developed questionnaire also undertook statistical validation by administering it to a large sample of student participants in both L1 and L2 writing contexts to ensure its psychometric quality. The questionnaire construction procedure in this thesis is hoped to offer adequate references for researchers to self-design and self-develop a valid questionnaire instrument suitable for their target participants and educational programs. Noticeably, the questionnaire

was administered immediately after the task completion; thus, the participants could refer to the writing process to recall how they performed metacognitive regulation strategically. The recorded task-completion videos and the written text were provided for the participants to report in post-task stimulated-recall interviews as a strategy to avoid information loss due to memory constraints. How the questionnaire and interview were administered in this thesis also offers valuable information for researchers to operationalise the mixed-methods design in future research. Besides, SEM and multi-group analyses were innovatively employed in this thesis to test the associations between L1 and L2 writing metacognitive strategy use and the moderation effect of L2 proficiency and disciplinary major on such associations, which also informs researchers in selecting statistical techniques.

Thirdly, the predictive effects of metacognitive strategies on writing performance found in this thesis also have several pedagogical implications. As argued by Sato (2022), metacognition is a malleable individual trait. Considering the malleability of metacognition and its positive role in enhancing writing performance, it is recommended for writing educators to incorporate the training of metacognitive strategies as a pedagogical option to enable students to know their writing process better, obtain control over their endeavours, progress smoothly toward higher writing abilities, and finally incur a propensity of learner autonomy (Lee & Mak, 2018). To do this, some instruction activities can be adopted in the writing classroom to facilitate the development of metacognitive skills. As Lee and Mak (2018) recommended, explicit guidance is the focus of metacognitive instruction to help students form accurate task representations, generate logical pre-plans, execute effective monitoring, and perform meaningful evaluations. The provision of explicit guidance can be operationalized by exemplifying the nature, categories, purposes, and functions of metacognitive strategies in the writing process. As students have grasped basic knowledge of these metacognitive skills, scaffolding tools such as the metacognitive process sheet, which breaks down the writing

process into different stages, graphic schemas and leading questions concerning how, when, and where to perform metacognitive skills, can be delivered to aid students internalize the knowledge and apply these strategies effectively in actual writing. Gradually reducing such scaffolding is also recommended so that learners can eventually become spontaneous and independent users of a wide range of metacognitive strategies during all stages of the writing process. Besides, the training of metacognitive strategies should be embedded in classrooms as learners sit in writing tasks and other writing activities instead of being decontextualized. Breaking down the writing process into different stages and telling students what they are expected to do in the actual writing procedure will help them execute certain metacognitive activities such as interpreting the task, planning, self-monitoring, and self-evaluating. Manipulating the task difficulty in terms of genres and topics can also enhance students' understanding of metacognitive strategies in sustainable ways (Negretti & McGrath, 2018; Ong, 2014). Also, teachers should provide more resources and opportunities, such as think-aloud protocols and self-reflection activities, for students to become more aware of the covert metacognitive processes as they work on a writing task. Only when students have a basic awareness of these strategies will they make use of them spontaneously and actively. Feedback is one of the primary resources for language development supported by the cognitive-interactionist approach (Loewen & Sato, 2018). More recently, Zhang and Zhang (2022) examined the effects of different types of feedback on using metacognitive strategies in writing and found that teacher feedback and peer feedback promoted the use of all metacognitive strategies. Thus, writing teachers are also encouraged to prioritize peer feedback and teacher feedback to enhance the development of metacognitive strategies.

Fourth, it was found that not all the five types of metacognitive strategies had a contribution to L1 and L2 writing performance among the participating Chinese EFL learners. Evaluating strategies were observed as a significant predictor of L1 writing performance. This

result indicated that teaching writing metacognitively in L1 classrooms should pay due attention to evaluating. At the initial stage of writing, human feedback and automatic evaluation systems can be combined to help student writers identify areas for improvement and make revisions accordingly. Once basic evaluating abilities are developed, evaluation rubrics or checklists can be provided for students to critically assess the written texts in both surface-level and higher-level textual features and reasonably reflect on their writing process. In addition to evaluating strategies, task interpreting and planning strategies predicted L2 writing performance significantly in this thesis. Thus, scaffolding activities that assist the writers to generate task representation and plan effectively are also of great value in L2 writing classrooms. Pre-task analysis and clarification can be adopted to guide students in carefully analyzing the task requirements and address any uncertainties or misconceptions of task expectations. Extra time and task breakdown possibly allow student writers to formulate ahead plans steadily and arrange resources to pre-think different writing aspects efficiently (Ong, 2014).

Fifth, it is necessary to address several noteworthy considerations when cultivating students' competence in metacognitive regulation regarding unique features of different types of metacognitive strategies derived from questionnaire and interview responses. Regarding task interpreting strategies, student writers may often misconstrue and misinterpret the intended requirements of a given writing task, thereby necessitating classroom instruction in which teachers guide students to engage in a thorough analysis of the task prompt or assignment instructions with close attention to the specific requirements, expectations, and evaluation criteria. Students are also encouraged to seek clarification or pose inquiries in class to refine their understanding of the writing task as well as to revisit the task prompt continuously during the writing process to operationalize these requirements into their writing texts. As for planning strategies, it is found that cognitive demands imposed on student writers may vary depending

on the type of planning strategies. In this way, time and instructional resources are assumed to be distributed to different planning strategies selectively in the metacognitive strategy training. To illustrate, participants in this thesis were observed to face more difficulties in content planning, warranting a more substantial investment of instructional effort in the development and refinement of their pre-thoughts pertaining to this aspect in comparison to other types of planning strategies. Pedagogical activities regarding the use of linguistic monitoring strategies should proceed in an orderly way across lexis-, clause-, and discourse- levels. Student writers ought to be sensitive to both lower- and higher- levels of linguistic processing during online writing. Additionally, non-linguistic monitoring can be facilitated by fostering a supportive task-completion environment that aids writers in avoiding and mitigating negative influential factors such as distractions and anxiety. Given that blank evaluation occurs in the writing process, teachers are inspired to enhance students' comprehension of evaluative criteria and expedite their development into mindful and critical reviewers of their own writing performance.

Finally, this thesis also noted strong associations between L1 and L2 writing metacognitive strategies and the cross-language effect of L1 writing metacognitive strategies on L2 writing performance. Theoretically, it partly supports Cummins' (1979, 2016) LIH from a metacognitive angle by revealing the significant correlation and regression coefficients of L1 and L2 writing metacognitive strategies and extends the common underlying proficiency shared by L1 and L2 writing from knowledge and skills to writers' metacognitive regulation. As for the L1-L2 transfer of metacognitive strategies, it is reasonable to recommend cross-language collaborations such as joint talks and curriculum co-design between L1 and L2 writing educators and practitioners to promote the effective use of these strategies in writing and better address the obstacles faced by students on their way to proficient writers. Moreover, the cross-language effect further directs our attention to acknowledging the importance of L1

writing metacognitive skills in shaping L2 writing development. Given the indirect but positive impact of L1 writing metacognitive strategies on L2 writing performance, teachers can take the asset of the metacognitive skills that students have already acquired in L1 writing to scaffold the acquisition of L2 writing and guide them to develop effective strategies to achieve self-regulation in both writing contexts. Although L2 proficiency and academic major were not found to moderate the L1-L2 transfer of metacognitive strategies significantly, there was still a gap between the higher- and lower- L2 proficiency learners and between English and non-English majors to utilize and transfer metacognitive skills that they have possessed in L1 writing into L2 writing. In this way, teachers should devote balanced efforts to cultivate the cross-linguistic transfer abilities of these different groups of students, which in turn bridges the possible gap (Pae, 2018).

7.3 Limitations and suggestions for future research

Results obtained by this thesis offer promising implications in both theories and practices. However, it is noteworthy that these results should be interpreted cautiously for the following limitations. Along with these limitations, some directions are proposed for future inquiries to add breadth and depth to extant theories and research in this field. First, data were collected from somewhat homogeneous participants regarding their age, learning experience, and educational settings despite their heterogeneous disciplinary backgrounds and L2 proficiency levels. Future research is advised to replicate the results with learners from more diverse educational institutions and cultural backgrounds, further enhancing the generalizability of the obtained results. Apart from that, female students outnumbered male students in this thesis, particularly within the English major sample. Previous studies have noted the close link between learners' gender and their employment and transfer of strategic processes (El-Dib, 2004; Leutwyler, 2009; Liyanage & Bartlett, 2012; Mitits & Gavriilidou, 2016). In this respect,

researchers should invest efforts to avoid extremely unbalanced gender distribution in future studies.

It is empirically supported that metacognitive regulation is a crucial skill greatly conducive to L1 and L2 writing performance, but not all types of metacognitive strategies had predictive effects on final writing performance. It merits attention that questionnaire items in this thesis were more likely to measure the quantity of strategy use, possibly drawing a partial portrayal of students' metacognitive skills in writing processes. How often the participants employ metacognitive strategies does not mean how well they do. In this regard, future research is warranted to spare more efforts to evaluate the quality of metacognitive strategy use. It is also worth noting the predictive power of metacognitive strategies on writing performance varied across L1 and L2 contexts. Therefore, researchers should pay special attention to the differential aspects of the two language settings in individual and contextual domains to better demonstrate the role played by metacognitive skills in writing. Previous research has revealed the possible impact of individual factors and contextual settings on the use of metacognitive strategies such as self-efficacy (Golparvar & Khafi, 2021) and prompt design (Ong, 2014). Although investigating how these factors influence the deployment of metacognitive strategies is not included in the scope of this thesis, future research could test the effects of these factors to explain better the complexity embodied within writers' active regulation. Data in this thesis were collected from the large-scale questionnaire and post-task stimulated-recall interview based on the participants' self-reports. There are possible disparities between what the participants report to do and what they do during the writing process. Thus, other methods such as objective observation, eye-tracking, keystroke logging and screen recording are recommended to complement questionnaire and interview reports to generate more valid data sources for tapping into the participants' metacognitive regulation in writing. Another limitation is the cross-sectional research design, which fails to identify the changing pattern

and developmental route of learners' metacognitive skills during a long study period.

The findings of this thesis provided empirical support for the L1-L2 transfer of metacognitive regulation and the cross-language facilitation effect of L1 writing metacognitive strategies on L2 writing performance. Nonetheless, the significant moderating effects of L2 proficiency and academic major on the relationship between L1 and L2 writing metacognitive strategies were not identified. The lack of moderation of the two individual difference factors may result from the slight discrepancy of gaokao English test scores between the higher- and lower- L2 proficiency groups and the homogeneity of limited writing instruction of the English and non-English major groups. In this regard, future research is warranted to test these results by including varied learner populations with multiple L2 threshold levels. Besides, the participants were operationally divided into the higher and lower groups via the median split, which seems to be too simplistic. Future research can adopt more advanced grouping methods like cluster analysis to identify different profiles of learners' L2 proficiency. L2 proficiency and academic major are two individual difference factors, while task characteristics such as writing genre and topic tied to students' metacognitive strategy use are not taken into the research design. It is worth noting that these task characteristics may have an impact on how writers perform metacognitive regulation in the writing process. Therefore, I expect future research to include narrative and expository genres, familiar and unfamiliar topics, and different task types as to offer more insightful information about the dynamic L1-L2 transfer mechanism. Finally, learners' self-awareness and self-control of cognitive activities are initially pertinent to specific steps and particular subject content in the learning process. Metacognitive knowledge and experience gradually increase with these learning steps and subjects, possibly expanding self-awareness and self-control over the entire learning process and different subject contents. Therefore, future research can explore the transferability of metacognitive strategies in various learning activities, which in turn leads to more sophisticated and profound theories

of metacognition.

7.4 Summary

The chapter is the concluding part of the present thesis, which offers a summary of major findings, theoretical and pedagogical implications in terms of these findings, and directions for future research to move this field forward.

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Appendices

Appendix A Focus-group Interview Guide

<div align="center">中英文写作元认知策略研究之焦点小组访谈</div>

1. 中英文写作过程回顾

a) 请大家花 5 分钟回忆一下自己以前完成的一项中文写作任务的过程并作分享。

b) 请大家花 5 分钟回忆以下自己以前完成的一项英文写作任务的过程并作分享。

2. 请大家阅读以下的中文写作任务，如果是你，你会怎样完成它？（10 分钟）

湖南留守女孩钟芳蓉因高分报考北京大学考古专业而引发网友热议。有人说大学专业选择追随个人兴趣才能绽放独特色彩，找到自己的存在价值；也有人说就业前景才是理智的明灯，指引我们通往璀璨未来。读大学选择专业，是个人兴趣重要还是就业前景重要？对此，你怎么看？为什么？

● 题目自拟，该写作任务时间为 45 分钟，字数不少于 600 字。

● 老师将从任务完成度，内容相关性和丰富性，篇章结构和语言质量等方面给分。

接下来，请大家根据自身实际回答并讨论下面的问题：

a) 拿到这个写作任务，我首先会做什么？想到什么？

b) 知道了任务要求，接下来我会做什么？想到什么？

c) 在撰写过程中，我会做什么？想到什么？

d) 落笔成文后，我会做什么？想到什么？

3. 请大家阅读以下的英文写作任务，如果是你，你会怎样完成它？（10 分钟）

The growing use of foreign words in our country has become a controversial issue. Some view this phenomenon as a threat to our mother tongue, while others regard it as a promotion of culture. Which point of view do you agree with? Why?

- Write your response in about 200 words with a time limit of 45 minutes.

- Marks will be awarded for task achievement, content relevance and sufficiency, organization, and language quality.

接下来，请大家根据自身实际回答并讨论下面的问题：

a) 拿到这个写作任务，我首先会做什么？想到什么？

b) 知道了任务要求，接下来我会做什么？想到什么？

c) 在撰写过程中，我会做什么？想到什么？

d) 落笔成文后，我会做什么？想到什么？

Appendix B Metacognitive Strategy Questionnaire for Chinese Writing

同学您好！本问卷想要了解您在中文写作中元认知策略的使用情况，即您在写作过程对于认知加工的调节和控制。请认真思考并作答。答案没有对错之分，请根据自身真实情况作答。完成本问卷大约需要 10-15 分钟。我们非常希望得到您对于以下问题的个人见解，以保证本研究的数据质量，非常感谢您的支持与配合。问卷结果仅用于学术研究，不会泄露您的任何个人信息。

请判断以下说法在多大程度上符合您实际的写作过程。如您强烈同意中文写作重要，请勾选数字 6=非常同意.

中文写作对我来说是重要的。

1=非常不赞同， 2=不赞同， 3=有点不赞同，4=有点赞同，5=赞同，☑ 6=非常赞同

1. 我会仔细阅读任务指导语。

2. 我清楚写作任务要求我做什么。

3. 我会思考写作任务所给的话题。

4. 我知道写作任务所要求的体裁。

5. 我会关注写作任务的评估标准有哪些。

6. 我会结合任务要求和自身写作能力评估其难度。

7. 写作前我会在脑子里构思提纲。

8. 写作前我会把提纲关键点记下来。

9. 我会事先规划好写作的每个阶段如构思，撰写，和修改所用时间。

10. 我会提前想到一些词汇和短语用于写作。

11. 我会提前计划如何形成和细化主要论点。

12. 我会提前计划文章的整体结构。

13. 我会提前思考文章的主旨句和段落的主题句。

14. 我会留意所剩时间以确保按时完成写作任务。

15. 我会努力专注在当前写作任务上，防止被其他事情分心。

16. 我试图一直写下去，不想思路被打断。

17. 当遇到困难的时候，我鼓励自己继续写。

18. 我会及时调整自己的消极情绪，保证写作任务的顺利完成。

19. 当意识到走神的时候，我会很快重新集中注意力在写作。

20. 我会积极调动合适的词汇和短语用于写作。

21. 我会时刻注意所用的标点符号的准确性。

22. 我会尽量在写作中使用多样的句式结构。

23. 我会设法在写作中使用一些修辞手法，如比喻和设问。

24. 我会充分使用多种衔接手段有效连接句子。

25. 我会阅读写作文本以评估语言是否准确得体。

26. 我会阅读写作文本以评估内容是否完整全面。

27. 我会阅读写作文本以评估观点的表达是否清楚。

28. 我会阅读写作文本以评估内容是否切题。

29. 我会阅读写作文本以评估结构是否清晰。

30. 我会阅读写作文本以评估段落布局是否合理。

31. 我会检查文中的论点和依据之间逻辑是否紧密。

32. 我会阅读写作文本以确保其符合任务要求。

33. 我会通读全文以检查是否还有什么错误。

Appendix C Metacognitive Strategy Questionnaire for English Writing

The Metacognitive Strategy Questionnaire for English writing is about the metacognitive strategies you used in English writing, i.e., how you regulate and control cognitive processes when completing the given task. The survey is not a test so there are no "right" or "wrong" answers. Please answer these questions honestly, as only this will guarantee the success of the investigation. Thank you very much for your help. It will take your 10-15 minutes to complete this questionnaire. After reading each statement, please think about your own writing experience and then choose how much you agree or disagree with these statements.

For example, if you strongly agree that English writing is important, please choose the number 6=strongly agree for the following item:

English writing is important to me.

1=strongly disagree   2=disagree   3=slightly disagree   4=slightly agree   5=agree   ☑ 6=strongly agree

1. I read the task instructions carefully before writing.

2. I knew what the writing task asked me to do.

3. I thought about the given topic of the writing task.

4. I knew the required genre of the writing task.

5. I paid attention to how my essay would be evaluated.

6. I assessed the difficulty of the writing task after considering the task demands and my writing ability.

7. I made an outline in my mind before writing.

8. I noted down key points before writing.

9. I thought about how much time I should spend on each writing stage (i.e. planning, drafting, and revising).

10. I planned on what words and phrases that I would use in my writing.

11. I planned on how to develop and/or specify my main arguments before writing.

12. I planned on the general organization of my essay before writing.

13. I outlined the thesis statement of the essay and the topic sentence of each paragraph before writing.

14. I kept an eye on the time left to ensure that I completed the task on time.

15. I tried to focus on my writing so that I would not be distracted by other things.

16. I tried to keep writing because I didn't want to break into my thoughts.

17. I encouraged myself to continue writing when I encountered difficulties.

18. I adjusted my negative mood to complete the writing task successfully.

19. I brought it back to my writing immediately once I recognized my mind wandered.

20. I tried to think about appropriate words and phrases for my writing.

21. I tried to think about whether I was using appropriate punctuations.

22. I tried to use various sentence structures in my writing.

23. I tried to use some rhetorical devices in my writing such as analogy and rhetorical question.

24. I tried to use various cohesive devices to link sentences effectively.

25. I reread my essay to see if the language was accurate and appropriate.

26. I reread my essay to see if the content was fully covered.

27. I reread my essay to see if my ideas were clearly expressed.

28. I reread my essay to see if it was closely relevant to the topic.

29. I reread my essay to see if the organization was easy to follow.

30. I reread my essay to see if the paragraphs were appropriately organized.

31. I checked whether my arguments and supporting details were logically connected in my writing.

32. I revisit my essay to make sure that my essay met the task requirements.

33. I read through my essay to see if there were any errors.

Note: The participants rated each item on a scale of 1-6 as shown in the above example when they completed the online questionnaire. Likert scale options were not listed in terms of each item for space constraints.

Appendix D The Background Form

<div align="center">中英写作元认知策略对比研究</div>

同学你好，感谢对本研究的兴趣和支持！在正式数据收集之前，我们非常希望了解你的相关背景信息，请根据自身情况如实作答。所提供的背景信息仅作为本研究数据使用，不会对外泄露，我们会对你提供的信息进行严格保密！

1. 姓名：

2. 学号：

3. 年龄：

4. 性别：

5. 年级：

6. 专业：

7. 您的高考英语成绩为：

8. 您学习英语的年限为：

Appendix E Chinese Writing Task

<div align="center">中文写作任务 （45 分钟）</div>

早教（早期教育）是针对 0-6 岁的婴幼儿进行的教育活动总称。近年来，我国家长对于儿童早期教育的意识和消费水平逐渐提高，在孩子很小的时候就给他们报了一些早教课程，如思维培训类，语言培训类以及兴趣培养类等课程。目前国内对于早教课程的问题仍存在争议，有些人对早教课程持积极态度，有些人则反对让孩子接受早教课程。

● 请以**该不该让孩子接受早教课程**为主题，阐述自己的看法并给出充分依据。

● 题目自拟，字数不少于 600 字。

● 阅卷老师将从任务完成度，内容的相关性和丰富性，篇章结构和语言质量进行打分。

Appendix F English Writing Task

ENGLISH WRITING TASK (45 minutes)

The Covid-19 pandemic brought a dynamic shift in the world education system. Due to the shutdown of physical classrooms, online education is rapidly increasing in popularity. While online education has immensely helped in the continuation of education, there is an ongoing debate between online education and offline education.

- **Is online education better than offline education?** Please show your views with specific reasons and examples.

- Write your response in about 200 words.

- Marks will be awarded for task achievement, content, organization, and language quality. Failure to follow the above instructions may result in a loss of marks.

Appendix G Bilingual (Chinese-English) Version of Scoring Rubrics

等级/ Band	分数/ Score range	评分要求/ Descriptors
优秀（一档）/Band 1 (Excellent)	21-25	观点清晰，论证有力，内容丰富，完全满足任务要求； 结构合理，段落划分得当，有效地使用了语句间的连接成分，使全文逻辑紧凑； 句式结构和词汇丰富、准确，可能有些许错误，但完全不影响文章的理解。 The paper presents a clear point of view with good and sufficient reasons to support it. It contains rich content which completely fulfils all the task requirements. The paper is well-structured and coherent. Sentences within paragraphs are effectively connected to each other with appropriate, well-selected, and varied transition words and other cohesion devices.

		The paper uses accurate and diverse syntactic structures and vocabulary, with occasional errors that do not affect comprehensibility.
良好（二档）/Band 2 (Satisfactory)	16-20	观点明确，论证比较有力，内容比较丰富，较为准确地满足了任务要求； 结构比较合理，段落划分比较得当，比较有效地使用了语句间的连接成分，使全文逻辑紧凑； 句式结构和词汇较为丰富、准确，可能有些许错误，但不影响文章的理解。 The paper presents a reasonably clear point of view and offers relatively good and sufficient reasons to support it. It contains relatively rich content which accurately fulfils the task requirements. The paper is structured and coherent. Sentences within paragraphs are effectively connected to each other with appropriate and varied transition words and other cohesion devices. The paper uses relatively accurate and diverse syntactic structures and vocabulary with a few errors that do not affect comprehensibility.
尚佳（三档）/Band 3 (Above Average)	11-15	观点比较明确，论证合理，写出了若干相关内容，大致满足任务要求； 结构完整，段落划分尚可，使用简单的语句连接成分，使全文连贯； 句式结构和词汇能满足任务要求，虽然有一些错误，但不影响文章的理解。

		The paper presents a point of view with several reasons to support it. It contains some relevant content that roughly fulfils the task requirements.
		The paper is largely structured and coherent. Sentences within paragraphs are connected with simple transition words and other cohesion devices.
		The paper uses a variety of syntactic structures and vocabulary with some errors that do not affect comprehensibility.
问题（四档）/Band 4 (Problematic)	6-10	观点不甚明确，有一些论证，写出了一些有关内容，部分满足任务要求；
		结构不完整，段落划分不明显，较少使用语句间的连接成分，全文缺少连贯性；
		句式结构单调，词汇使用有限，有较多的语言错误，影响了文章的理解。
		The paper presents some sort of the point of view and offers one or two reasons to support it. It develops with limited content, which partially fulfils the task requirements.
		The paper lacks structure and coherence. Sentences within paragraphs use limited transition words and other cohesive devices.
		The paper uses a limited range of syntactic structures and vocabulary with some errors that may affect comprehensibility.

失败（五档）/Band 5 (Unsatisfactory)	1-5	观点模糊，缺乏论证，产出内容太少或完全不相关，无法满足任务要求； 结构混乱，无明显段落划分，缺乏语句间的连接成分，全文不连贯； 句式结构和词汇使用错误很多，严重影响了意义的表达，全文难以理解。 The paper presents a vague point of view with no reasons to support it. It develops with limited or irrelevant content which fails to fulfil the task requirements. The paper is not structured or coherent. Transition words and other cohesion devices are inappropriate or missing. The paper uses a limited range of simple syntactic structures and vocabulary with many errors that affect comprehensibility.

Appendix H Retrospective Interview Guide

Thanks for completing the Chinese/English writing task. Let's start our retrospective interview. Please answer these questions according to your own writing process.

感谢你完成此次的中文/英文写作任务，下面让我们进入回顾式访谈的环节，请根据自身实际的写作过程回答以下问题。

1. What do you think of the Chinese/English writing task? 你觉得此次中文/英文写作任务如何？

2. Did you have any difficulties in completing the Chinese/English writing task? How did you address these difficulties? 你在此次的中文/英文写作任务完成过程中有遇到什么困难吗？你如何解决这些困难呢？

3. Could you please describe your Chinese/English writing process in general? 可以整体描述下完成

中文/英文写作任务的过程吗？主要有哪些步骤呢？

4. Did you read the task prompt carefully? What did you do to interpret the Chinese/English writing task? 你有仔细阅读写作任务指导语吗？你如何解读这个中文/英文写作任务呢？

5. Did you plan before writing? What did you do to plan for your Chinese/English writing task? 你在写作前有提前规划吗？这次中文/英文写作过程中，你做了哪些提前规划呢？

6. Did you monitor your linguistic processing during writing? What did you do to monitor your linguistic processing when completing the Chinese/English writing task? 写作过程中有积极监测自己的语言加工吗？这次的中文/英文写作过程中，你做了哪些语言方面的监测呢？

7. Did you monitor other factors during writing? What did you do to monitor other factors when completing the Chinese/English writing task? 写作过程中有积极监测其他因素吗？这次的中文/英文写作过程中，你做了哪些非语言方面的监测呢？

8. Did you evaluate your writing processes and products? What did you do to evaluate your Chinese/English writing? 你有主动评价自己的写作过程或文本吗？这次的中文/英文写作过程中，你做了哪些方面的评价呢？

9. What other strategies did you use to manage your thoughts and behaviors during Chinese/English writing? 这次的中文/英文写作过程中，你有使用其他策略管理调控自己的思维和行为吗？

10. What do you think of these metacognitive strategies? 你觉得这些策略如何？

11. What strategies influence your Chinese/English writing performance and what doesn't? 你觉得哪些策略会影响你的中文/英文写作？哪些没有影响？

12. Let's compare the metacognitive strategies you used in Chinese and English writing. Are they similar or different? 让我们比较下中英文写作中所使用的元认知策略，你觉得有哪些相似或差异之处？

13. Could you please describe your learning and instruction experience in Chinese/English writing? 可以描述下你以前中文/英文写作方面相关的学习和课堂经历吗？