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Metacognitive Perspectives on Learning to Write in English as a Foreign Language (EFL) in Multimedia Environments at the Tertiary Level in China

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A thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy in Education (Applied Linguistics)
The University of Auckland
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Abstract

This study examined Chinese university students’ metacognitive knowledge systems of EFL writing in multimedia environments and analysed the effects of strategy-based pedagogical instruction on their metacognitive awareness and development of EFL writing. It used a mixed-methods design involving quantitative and qualitative data.

Two phases were involved in the study. The first was an exploratory stage in investigating student writers’ metacognitive systems. Data were collected from undergraduate non-English-major students (n = 367) at a Chinese university using the Metacognitive Awareness Inventory of EFL Writing in Multimedia-mediated Environments (MAIME) to establish their metacognitive awareness about EFL writing in multimedia environments. Findings indicated that these Chinese university student EFL writers’ metacognitive systems appeared to be consistent with Flavell’s initial definition of metacognition with some variability. The metacognitive fundamental components included metacognitive knowledge (person, task, and strategy), metacognitive experiences (positive and negative), and metacognitive regulations (planning, monitoring, and evaluating). Multiple regression analyses of these patterns revealed that metacognitive strategies (planning, monitoring, and evaluating) made significant, independent contributions to predicting the participants’ English language achievement.

The second phase was a quasi-experimental intervention study using a matched experimental-control group design. It evaluated the impact of a metacognitive strategies-focused instruction on university students’ achievement in EFL writing in multimedia environments. 64 EFL student writers, selected from two classes who participated in phase one, were assigned to the control group and the experimental group using random assignment. The participants in the experimental group (n = 32) attended a 16-week EFL writing instructional
programme, using a metacognitive awareness-raising guide, in multimedia environments. The control group (n = 32) did not receive metacognitive instruction.

Participants in both groups completed essay-writing tests at pre-, post-, and delayed post-intervention stages so that their changes in writing performance in multimedia environments were examined. Meanwhile, the Metacognitive Strategy Use in Multimedia Environments Questionnaire (MSUQ-ME) was administered to investigate their perceived use of metacognitive strategies immediately after the pre- and post- writing tests. A case study was also conducted with two participants invited from the experimental group. Data were collected via pre- and post-intervention through semi-structured interviews and journals documenting their learning of EFL writing throughout the programme.

Findings indicated that participants from the experimental group reported a significantly higher frequency of using metacognitive strategies than the participants from the control group. The results also suggested that the metacognitive strategy-based instructional intervention contributed to the experimental group participants’ improved performance in EFL writing. The writing achievement and metacognitive awareness about writing in multimedia environments was also evident for the two case-study participants. Findings suggest an intervention focused on metacognitive strategies can cultivate self-reflective and active writers with better academic performance in multimedia-mediated learning environments.
DEDICATION

To Lily and Harry
Acknowledgements

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<th>Full Form</th>
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<tbody>
<tr>
<td>BA</td>
<td>Bachelor of Arts</td>
</tr>
<tr>
<td>CAI</td>
<td>Computer-assisted Instructions</td>
</tr>
<tr>
<td>CET</td>
<td>College English Test</td>
</tr>
<tr>
<td>CET-SET</td>
<td>College English Test – Spoken English Test</td>
</tr>
<tr>
<td>CFA</td>
<td>Confirmatory Factor Analyses</td>
</tr>
<tr>
<td>CG</td>
<td>Control Group</td>
</tr>
<tr>
<td>CLT</td>
<td>Cognitive Load Theory</td>
</tr>
<tr>
<td>CTML</td>
<td>Cognitive Theory of Multimedia Learning</td>
</tr>
<tr>
<td>DV</td>
<td>Dependent Variable</td>
</tr>
<tr>
<td>EFL</td>
<td>English as a Foreign Language</td>
</tr>
<tr>
<td>EG</td>
<td>Experimental Group</td>
</tr>
<tr>
<td>ELT</td>
<td>English Language Teaching</td>
</tr>
<tr>
<td>IVs</td>
<td>Independent Variables</td>
</tr>
<tr>
<td>L1</td>
<td>The First Language</td>
</tr>
<tr>
<td>L2</td>
<td>The Second Language/Language Other than One’s First Language</td>
</tr>
<tr>
<td>MAIME</td>
<td>Metacognitive Awareness Inventory of Chinese University EFL Writers in Multimedia Environments</td>
</tr>
<tr>
<td>MSUQ-ME</td>
<td>Metacognitive Strategy Use Questionnaire in Multimedia Environments</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NCEE</td>
<td>National College Entrance Examination</td>
</tr>
<tr>
<td>SBI</td>
<td>Strategy Based Instruction</td>
</tr>
<tr>
<td>SEM</td>
<td>Structural Equation Models</td>
</tr>
<tr>
<td>SLA</td>
<td>Second Language Acquisition</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Science</td>
</tr>
<tr>
<td>SRSD</td>
<td>Self-Regulated Strategy Development Model</td>
</tr>
<tr>
<td>TEM</td>
<td>Test for English Majors</td>
</tr>
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CHAPTER ONE
INTRODUCTION

No matter how exciting new technologies for language learning may seem, they can become nothing more than entertainment unless their design, use, and evaluation are guided by viable educational and language development rationales.

— González-Lloret and Ortega (2014, p. 2)

1.1 CHAPTER OVERVIEW

The study was conducted in a Chinese university setting. To frame the research, a brief summary of the present Chinese tertiary educational background is first presented. The chapter then briefly describes the *College English Language Curriculum System* — the fundamental synopsis of university English teaching in China. This is followed by an operational definition of terms with particular reference to a better understanding of the unique research context. In the next section, a statement of the salient problems will ensure the justification of the importance of the study. The chapter then moves on to the purpose and the significance for the study. Finally, an outline of the thesis is provided.

1.2 BACKGROUND TO THE STUDY

1.2.1 The Chinese Tertiary Educational Context

Since the 1990s, along with deepening the process of China’s economic reform and further enhancing the level of opening up, China’s social and economic development has gained unprecedented rapid development, “becoming recognized as one of the fastest-growing economies in the world” (Gu, 2010, p. 1). Meanwhile, more and more educators have realized that higher education can hardly keep abreast of the times and cannot meet the needs of college-aged population (See e.g., Mok & Wu, 2016). Strongly influenced by Martin Trow’s (1972)
classification of three stages of higher education development — elite, mass and universal higher education, China’s central government decided to enroll more college and university students in 1999. Since then, higher education in China has been experiencing massive rate of changes. The consolidations of new colleges and universities and the scale of higher education of new entering university students keep increasing. Many institutions have doubled, or even tripled their size. Up until 2016, there were altogether 2,560 regular higher education institutions in China with a new enrollment of regular undergraduate students of 7.37 million, a number more than six times as many as that of 1998 (MOE, China Education Statistical Year Book, 2017). On the extent and unprecedented speedy expansion of the university enrollments, tertiary education in China has undergone a drastic transition from elite education to mass education.

On the one hand, “China’s higher education has been characterized as a wide, pervasive massification process” (Mok & Wu, 2016, p. 77). More and more youth can enjoy the opportunity of receiving higher education, which is undoubtedly beneficial for their life-long development. And in the long run, the improvement of the entire nation’s educational level will ensure China’s international competitive power in the trends towards globalization and the knowledge-based economy in the 21st century (Mok & Wu, 2016). On the other hand, the governments’ educational administrative departments, researchers and practitioners generally feel great pressure from the large-scale expansion of increasing college and university enrollment. For example, it is now becoming a regular feature that the “normal” numbers of students in each administrative class (the main organizational form in Chinese universities) are between 50 and 70, and sometimes even much greater (Jin & Cortazzi, 2013). The student-teacher ratio is seriously unbalanced, which is probably a big threat to education quality. As is observed by Zhang (2014), “it is getting more and more challenging to create safe learning

---

2 Student-teacher ratio is the number of students who attend a school or university divided by the number of teachers in the institution. For example, a student-teacher ratio of 10:1 indicates that there are 10 students for every one teacher. Smaller class sizes are widely believed in the West to help all students benefit from teachers’ individual-difference attention.
environments, motivate and engage students, interact with students, provide stimulating assessment tasks and give prompt feedback” (p. 757). Therefore, how to enhance quality teaching in a sustainable way has become another concern that every institution has to consider and confront.

Facing such dilemmas in the inevitable continuing growth of higher education, I think that the rapid development of multimedia teaching has become necessary. Along with China’s increasingly strengthened economic power, returns to education has increased steadily with various measures being implemented by the government. More money has been spent on the improvement of schools’ infrastructure and learning English in multimedia environments is no longer a novelty for English as a foreign language (EFL) learners.

In this context, multimedia teaching and learning has gained momentum in China and college English teaching has made remarkable achievements in the process of information construction.

1.2.2 College English Language Teaching and Learning

College English teaching is the main and the most important channel for Chinese university students to obtain language training. English is taught under the guidance of a nationally unified syllabus and examination systems in mainland Chinese universities. Textbooks are widely used by Chinese teachers to teach writing. Writing in reality is seldom used for real communication. It is these characteristics that constitute the general context of college English teaching and learning in Chinese tertiary language education. In order to have a better understanding of EFL teaching and learning in Chinese tertiary institutions, especially those learners who struggle for academic success at their universities, some insider perspectives of China’s tertiary educational system are provided here.

First and foremost, the nationally unified syllabus of college English teaching functions as the most authoritative foundation for educational teaching practice in colleges and
universities of all types and at all levels. The Ministry of Education (MOE) is responsible for formulating, amending and consummating the national college English curriculum. As Wen (2010) reports, a professional advisory Committee, called the Higher Institution Foreign Language Teaching and Learning Steering Committee, is nominated to implement the work of the MOE in English teaching at the tertiary level under the guidance of the ministry. Because English language teaching in China is divided into English-major teaching and non-English major teaching, the committee is subdivided into two branches: The Teaching Advisory Committee for Bachelor of Arts (BA) Programmes in English for English majors and the College Foreign Language Teaching Advisory Committee for non-English majors. As far as this study is concerned, the latter is of special relevance insomuch as it is responsible for formulating and amending the syllabus for non-English-major college students, guided by the MOE.

The most recent version for non-English majors was written and released in 2007, authorized by the MOE. In accordance with the national curriculum, College English is compulsory for all university students in all programmes for the first two years in their college life (except English majors in the foreign language faculty who specialize in English language and literature or English for specific purposes, like Business English and last for the full four years). Students attend English classes four hours a week with two hours allocated to the

---

3 According to the statistics issued by MOE, there are generally four types of institutions of tertiary education in mainland China: (i) Institutions providing postgraduate programs, usually called “comprehensive universities” which offer a bachelor’s degree as well as run master’s, doctoral, post-doctoral degree programs; (ii) Regular HEIs, including HEIs offering degree program which usually offer four-year programs (medical universities usually run five-year programs) leading to a bachelor’s degree, higher vocational colleges which are qualified to run only three-year diploma programs and other institutions. Of regular HEIs, independent institutions are growing rapidly in recent years, which is particularly captivating; (iii) Adult HEIs, which offer further continuing education for adults and are an important component of higher education; (iv) Other non-government HEIs. In addition, all the colleges and universities are further divided into several different levels: universities affiliated to a ministry, universities affiliated to a province, universities affiliated to a city, independent colleges, private-owned colleges, etc.

4 According to Richards, Platt & Platt’s definition (1992), curriculum can be considered as another term for syllabus, although sometimes they have different meanings in academic settings. For the sake of convenience, I use “curriculum” and “syllabus” interchangeably.
listening and speaking class (usually run in the language lab) and the other two hours to the intensive reading class, a comprehensive class that covers speaking, reading, writing and translation practice (usually run in the traditional classroom or multimedia classroom).

According to the curriculum, college English teaching aims at “keeping up with the new developments of higher education in China, deepening teaching reform, improving teaching quality, and meeting the needs of the army, the country and society for qualified personnel and officers in the new era” (College English Teaching Syllabus, 2007, p. 1) and college English teachers should help students “enhance their ability to study independently and improve their cultural quality” (ibid). The syllabus prescribes the requirements for the application and improvement of college English learning in three different stages: basic, intermediate and higher.

All non-English majors are required to attain to one of the three levels of requirements after studying and practicing English at school. The basic requirements is a goal that all college graduates must achieve; Intermediate and higher requirements are respectively set for those who, having laid a good foundation of English, can afford time to learn more of the language (ibid).

Then, the descriptors/skills are prescribed in detail from six different aspects concerning the language acquisition — listening, speaking, reading, writing, vocabulary and translation. As a revolutionary step forward in the process of College English curriculum reform, the new 2007 version gives particular emphasis on developing college students’ ability to use English in a well-round way in order to meet the needs of China’s social development and international exchanges. Developing students’ communicative competence and cultural awareness are particularly stressed, and accordingly, listening and speaking abilities are put in priority but writing is still not seen as a priority skill. When it comes to writing skill in particular in this study, the three-level requirements are shown as in Table 1.1:
### Three-level Requirements about Writing

<table>
<thead>
<tr>
<th>Level</th>
<th>Requirements</th>
</tr>
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<tbody>
<tr>
<td><strong>Basic Requirements</strong></td>
<td>Students should be able to complete writing tasks for general purposes, e.g., describing personal experiences, impressions, feelings, or some events, and to undertake practical writing. They should be able to write within 30 minutes a short composition of 120 words on a general topic or an outline. The composition should be basically complete in content, appropriate in diction and coherent in discourse. Students are expected to be able to have a command of basic writing strategies.</td>
</tr>
<tr>
<td><strong>Intermediate Requirements</strong></td>
<td>Students should be able to express personal views on general topics, compose English abstracts of theses in their own specialization, and write short English papers on topics of their specialty. They should be able to describe charts and graphs, and to complete within 30 minutes a short composition of 160 words. The composition should be complete in content, clear in organization and coherent in discourse.</td>
</tr>
<tr>
<td><strong>Higher Requirements</strong></td>
<td>Students should be able to express their opinions freely on general topics with clear structure, rich content and good logic. They should be able to write brief reports and papers of their areas of specialty, and to write within 30 minutes expository or argumentative essays of 200 words on a given topic. The text has complete content, logical thinking, and clear expression of ideas.</td>
</tr>
</tbody>
</table>

Source: College English Teaching Syllabus, 2007, issued by MOE, P. R. China

In addition, with the rapid economic growth in China, the popularization of using computers has become a reality for students who study in Chinese university campuses. The use of the
Internet by students for all kinds of information searching has become commonplace and widespread. In accordance with this trend, “Computer-and-Classroom-Based English Teaching Mode” has been proposed in the syllabus to adapt to the needs of the development of this situation in the new era. Computer networks are “for the first time taken seriously” and are taken “as an indispensable part of foreign language teaching” (Chen, 2011, p. 12). The newly-designed syllabus put a very strong emphasis on the use of multimedia technology in classroom, indicating the future directions to enhance the use of multimedia in college English teaching and learning. In the present general background of College English Reform, Chen (2011) posits that China’s foreign language teaching should explore the integration of computers and computer networks into English teaching in order to meet the needs of the development of a modern economy and society.

1.2.3 Teaching English Writing in the Chinese College Context: Related Terms

1.2.3.1 Foreign Language vs. Second Language

To learn English in Mainland China has its own characteristics. Although English is the most studied foreign language in China with the largest number of students around the world (Wen, 2012), it is generally believed that Chinese students’ English proficiency is inferior to those from other Asian countries, such as Singapore, Malaysia, the Philippines, India and Pakistan (Wen, 2012). According to Wen (2012), one of the main reasons might be found in the use of “second” or “foreign” language. In those countries, English is the second language, which has become commonly used as an official language. In contrast, English is only one of the many foreign languages which are offered to students from primary schools until colleges and universities in Mainland China and it has never been adopted as an official language. In British usage, a distinction is often made between the two. One of the classical distinctions was made by Kachru (1985). In his study, he distinguished three circles of English: (a) The Inner Circle, referring to the traditionally English-speaking countries, including the US, the UK, Canada,
Australia, and New Zealand; (b) *The Outer Circle*, which is often a former colony of inner circle countries, and English is still a major official or second language for daily communication, including countries such as Singapore, Malaysia, the Philippines, India, and Pakistan; and (c) *The Expanding Circle*, where English is usually a foreign language, such as China, Korea, and Japan. This view was supported by Richards, Platt and Platt (1992) who had attempted to draw fine distinctions between the two constructs:

A foreign language is a language which is taught in schools as a subject but which is not used for communication within a country; a second language is one which is not a native language in a country but which is widely used as a medium of communication, usually in education and government administration, and which is usually used alongside another language or languages. (Richards, Platt, & Platt, 1992, pp. 142-143)

Stern (1983) summarized the differences between second language and foreign language in terms of social status, purpose, environment, and the way of language acquisition (see Table 1.2). As is shown in Table 1.2, two main characteristics may contribute to making college English education in China a unique research area. First, what is remarkable is that English has always been taught as a subject in schools and universities, which means language input mainly comes from the textbooks and teachers. In a country where most communication is in Chinese, exposure to English is quite limited. This is clearly distinct from those who speak English as a second language in the countries and regions where the use of the target language environment is quite widespread and learners can naturally acquire the target language. Second, although more Chinese people are eager to learn English and English language learning has often been attached to the academic pursuit of undergraduate and postgraduate students in Chinese university institutions, learning English is widely considered to be “time-consuming, low-efficient and test-oriented” (Wang & Li, 2014, p. 14). Such a test-oriented learning motivation...
differs markedly from that of second language learners who will use English in real communication in education and in society.

Table 1.2

*Differences between Second Language and Foreign Language by Category*

<table>
<thead>
<tr>
<th>Category</th>
<th>Second Language (SL)</th>
<th>Foreign Language (FL)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Status</strong></td>
<td>usually has official status or a recognized function within a country</td>
<td>inferior to the mother tongue but is gaining extensive attention</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>for full participation in the political and economic life of the nation or needed for education</td>
<td>is often undertaken with different purposes in mind, e.g. travel abroad, communication with native speakers, reading of a foreign literature, or reading of foreign scientific and technical works</td>
</tr>
<tr>
<td><strong>Environment Support</strong></td>
<td>is usually learnt with much-more-environmental support</td>
<td>lack of environmental support and the speech community may be thousands of miles away</td>
</tr>
<tr>
<td><strong>The Way of Language Acquisition</strong></td>
<td>is often learnt informally (“pick up”) because its widespread use within the environment</td>
<td>usually requires more formal instruction and other measures compensating for the lack of environmental support</td>
</tr>
</tbody>
</table>

1.2.3.2 The National College Entrance Examination

The National College Entrance Examination (NCEE) in China, commonly known as *Gaokao*, is a standardized academic examination which is administered by the Ministry of Education (MOE) annually at the same time for the whole country. Millions of participants across the entire country sit the NCEE on June 6, 7 and 8 every year. Those who succeed in passing the minimum required scores of the NCEE will then be admitted into different universities based on their respective test scores while those who failed might not be able to enter the college of their choice or may even lose the chance to attend university. The NCEE has occupied a crucial
role and been a prerequisite for those who are applying to almost all the universities, colleges and other higher educational institutions since 1978, when the country resumed the exam system. Thus, to study China’s university education, the NCEE is a critical component that cannot be avoided. Due to the large disparity in school quality, “getting a high NCEE score and entering the national key universities are the dreams of almost every high school student and families” (Yu & Suen, 2005, p. 26). Succeeding in entering the national key universities means that it will secure a bright future for their job-seeking and further career development. This leads to fierce competition in the exams and this mode of state-orchestrated systems of extremely-competitive exam-driven education has created serious negative consequences, i.e., putting too heavy a burden on the students and killing their imagination, creativity and critical thinking skills (Yang, 2011).

Because of the side effects of the unified NCEE, appeals for the NCEE’s reform have gathered momentum, drawing attention from all walks of life. Educators, scholars and government policymakers gradually realize the thorny issues and educational system reform have been proposed. Particularly worth mentioning is the reform concerning English in the NCEE. Since the NCEE was restored in the late 1970s, English scores has been one of the three-core subjects together with Chinese and Math and English learning obtains unprecedented attention under the conducting of the NCEE baton. However, “Chinese students have invested the most time and efforts in learning English; it has not yielded positive results” (Wang & Li, 2014, p. 4). As part of the plan to reform the exam system, English is excluded from the unified NCEE and the power of organizing English examination is delivered to third-party social institutions, starting in 2017 on a trial basis. Meanwhile, English language exams

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5 Most of the universities are public institutions and are financed by the central government, the provincial government, and the local government respectively. Because of the hierarchical structure of management, the quality of higher education varies tremendously from the top universities to the local colleges. Moreover, compared with the public universities and academically-oriented education, there are a large number of private universities, most of which are for profit and are relatively new. Because of the lack of investment, their teaching quality cannot be ascertained (Yang, 2011).
will be held multiple times a year, and students can choose when and how often they take the examination and only the highest score they obtain will be counted. A new examination and an admission system will be established in 2020.

As is known, the NCEE serves as the baton of primary, secondary as well as higher education in China. The proposed new changes in the NCEE may lead to increasing the complexity of the reform of college English teaching and learning when English is emphasized to be used as a real-world communicative tool rather than studying for exams. The influence would be certainly pervasive in the long run.

1.2.3.3 The College English Test Batteries

The most salient feature in EFL Learners in China may concern the examinations that play a vital role in checking their language achievements in the process of their pursuing academic success. Colleges and universities are no exception. There are two strands in EFL teaching in Chinese higher education: one for a relatively small number of English majors who study English for four consecutive years; the other for the overwhelming majority of non-English majors who study English as a compulsory course in their first two years, whatever their specialty. Accordingly, two kinds of tests are administrated by the Ministry of Education: Test for English Majors (Band IV and Band VIII) and College English Tests (CET) for Non-English Majors (Band IV and Band VI). All English majors are expected to sit the TEM (Band IV) after they have studied English for two years and TEM (Band VIII) for four years on the presupposition that they have passed TEM (Band IV). Similarly, all non-English majors are expected to sit the CET (Band IV) who have studied English for two years and Band VI after they have passed Band IV. As the subjects of this study are undergraduate non-English majors, in what follows, CET Band IV/VI is depicted in some detail.

The CET is a large-scale standardized test administered nationwide by the National College English Testing Committee on behalf of the Higher Education Department of the
Ministry of Education (MOE) in the P. R. China. It aims at measuring the English proficiency of college/university undergraduate students in accordance with the College English Teaching Syllabus (the CET Committee, 2007). The CET is a test battery, which is comprised of the CET Band IV (CET-4), the CET Band VI (CET-6), and the CET – Spoken English Test (CET-SET). The CET-4 and CET-6 are administered twice a year at the end of each semester, usually in January and June. Each test takes 130 minutes to complete. Those who can get 550 scores or above in CET-4 or who can get 520 scores or higher in CET-6 can apply for the CET-SET, which is also held twice a year. The test lasts approximately 20 minutes. This designed-test battery is to examine the English proficiency of undergraduate students in listening, reading, writing in English and translation (English into Chinese and vice versa) with a consideration of catering for testing the speaking ability for the comparatively high-level learners. The score gained out of a total of 710 points will be reported in the CET report cards and delivered to each examinee with four sub-scores: listening comprehension (249 points, 35%), reading comprehension (249 points, 35%), writing (106 points, 15%), and translation (106 points, 15%). The CET-SET results are reported in a graded scale, ranking from A (the highest level), B, C, to D (the lowest level).

With the expansion of college enrolment in recent years, CET has become the largest English as a foreign language test in the world and one of the language tests that has attracted most public attention in China (Bolton & Graddol, 2012). The test has been standardized and validated on very large-scale examinees for almost 30 years since it started in 1986 and the reliability has been established (Jin & Cortazzi, 2013). CET Certificate holders have been preferred for purposes of going to graduate schools for further study or finding better jobs in the job market after graduation.
Table 1.3

Break-down of CET Band IV/VI by Category

<table>
<thead>
<tr>
<th>PART</th>
<th>CONTENT</th>
<th>TYPE</th>
<th>PERCENT</th>
<th>TIME (Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Writing</td>
<td>Writing</td>
<td>Passage Writing</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td>II. Listening</td>
<td>Conversation</td>
<td>Multiple Choice</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Passage</td>
<td>Dictation</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>III. Reading</td>
<td>Vocabulary</td>
<td>Gap Filling</td>
<td>5%</td>
<td>40</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Fast-reading</td>
<td>Matching</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reading in Depth</td>
<td>Multiple Choice</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>IV. Translation</td>
<td>Chinese into English</td>
<td>Paragraph Translation</td>
<td>15%</td>
<td>30</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>100%</td>
<td>130</td>
</tr>
</tbody>
</table>

Source: The CET Committee’s New CET Format, 2013.

1.3 STATEMENT OF THE PROBLEMS

With the advent of computers and the advance of the Internet-based technology, recent years have witnessed an explosion of interest in using multimedia computers for language teaching and learning since computers were introduced into education in the 1960s. According to Hsu (2013), students nowadays have been known as the “net generation” (Oblinger, 2003, p. 38) or “digital natives” (Oxford & Lin, 2011, p. 157), which is the new generation that teachers should face in the new era. Thus, the traditional paper-based educational idea has been under great challenge. By drawing on the concept of “New Literary Study” or “Multi-literacies”, a considerable amount of literature has been published on the use of multimedia computers and a great many advantages have been cited (see, e.g., Azevedo & Aleven, 2013; Jiang, Renandya, & Zhang, 2017; Wei, Chen, & Adawu, 2014).

As far as Chinese EFL students are concerned, writing in English is often perceived as one of the weakest links in students’ language proficiency (Wang, 2004; Wang, 2010; Wang, 2013).
2013) and even with constant training and repeated demanding practice, improvement is still limited and unsatisfactory (Qin, 2009). Due to multimedia computers’ effectiveness as an educational medium (Felix, 2008) and the benefits the students get from using software for writing in particular, computer-based English writing has been introduced into writing class and is prevalent. Moreover, given the current increase in class size due to changes in recent Chinese educational policies and procedures, the proliferation of computer networks has made multimedia teaching a viable solution to the problem of classes with excessive students. Affected and guided by the new research trend for “New Literary Study”, many colleges and universities have begun using multimedia computers in writing classrooms in the hope that student writing will be significantly improved with the help of modern technology.

However, the outcomes do not match these expectations. Although there is dramatic growth in the availability of computers and multimedia devices to Chinese universities, there is a great deal of evidence that teachers do not use the advanced technology in class as expected (see, e.g., Huang, Teo, & Zhou, 2017; Mei, Brown, & Teo, 2017). There is no doubt that the development of multimedia teaching and learning has obviously become a subject of controversy. Computers, in practice, are being used as a tool to focus on spelling and grammar checkers in sentence level and are assumed to become an assistant for editing in the final writing products. Such very basic drill-and-practice software programs have resulted in a huge waste of resources. As for network supporting, teachers are often confused as to how to offer appropriate guidance for those who failed to concentrate on what they should learn while lingering around on web surfing, personal trifles or online games when computers are connected to the Internet in multimedia classrooms. Due to limited time constraints which could be available for writing practice, distraction from schoolwork may easily lead to dangers of digital cheating, such as plagiarism and copying, hacking into online quizzes, and machine translation (Levy & Stockwell, 2013). The problem arises that there is usually a mismatch
between over expansion of information explosion and students’ dilemma in what to choose to learn from diverse online contents. An urgent critical question which comes to mind is how best we should present these supportive devices in order to take full advantage of the multimedia technology to promote students’ initiative and teachers’ instruction efficiently and effectively in our writing classrooms. As Barr (2008) points out, “the value of the technology is not necessarily measured on its technological excellence or astounding quality but rather on how well the technology is integrated into the teaching and learning experience” (p. 105).

1.4 THE SCOPE, PURPOSE AND RESEARCH QUESTIONS OF THE STUDY

English has been a core subject from primary schools until tertiary levels of education in China. According to the requirement of College English Syllabus (2007), in universities, every student must learn a foreign language in the first two years as a compulsory course. Taking the importance of English into consideration, most non-English majors choose English as their foreign language to study, receiving about 4 hours’ weekly class input which is divided into a 2 hour listening and speaking class and a 2 hour reading and writing class, respectively. As far as English writing is concerned, for non-English-major students, there is no separate dedicated writing class. Writing is taught as part of an “Intensive Reading” course, which is the premier English course in tertiary institutions. Nevertheless, this course is not primarily designed to be a simple reading course for reading practice. Instead, as Jin and Cortazzi (2013) have noted, it is the core foundation course in EFL that integrates all skills to emphasize the meaning and use of words, knowledge of grammar, the reading comprehension, the writing skills and activities, and with some translation skills and practice. In recent years, along with the development of technology and the growth of Chinese economy, most courses are offered in multimedia classrooms. However, the current teachers’ professional development is hard to keep up with pace of times (Chen, 2011). Traditional teaching approaches still prevail in the new multimedia writing class. Based on Chinese central and local governments’ increasing initiatives to
encourage the use of information technology in university classrooms and with a view to the exiting issues, it is crucial that we should change the teaching principles and explore effective pedagogies that can maximize university students’ writing success to fit to the demand of current times.

When it comes to students’ writing success in the multimedia environment, it is very often the result of the combination between students’ own efforts and teachers’ correct guidance (Chen & Liu, 2012). Up to now, although the advent of the computers and multimedia technologies have promoted language teaching and learning in many aspects, little has focused on the new technologies with instructional strategies which may promote English writing effectively and efficiently in a Chinese tertiary context.

In light of previous discussions, I assume that one of the primary reasons for university students not making significant progress may lie in EFL writers’ metacognitive deficiencies in such a powerful learning environment, which have largely escaped the attention of researchers and practitioners. Students’ writing attitudes and learning to write in the brand-new learning environment actually involve “the use of numerous self-regulatory processes such as planning, knowledge activation, metacognitive monitoring and regulation, and reflection” (Azevedo, 2009, p. 87). Metacognition, in the complex multimedia learning environment, “seemed to offer a concept in which the learners took the sort of active role” (Darch, 2001, p. 4). To be specific, students’ metacognitive practices, such as gaining a level of awareness about themselves as writers, thinking about the writing task demands and utilizing writing strategies, play a critical role in their writing processes. Admittedly, we should not ignore the fact that some students indeed develop a propensity to have some metacognitive awareness during the process of writing and that some teachers do give students some guidance in overcoming distractions from their assignments at hand. However, the evaluation of the effect of writing is still focused mainly on writing products. My extensive review of the literature also shows that
except for a few studies focusing on other skill areas such as listening (e.g., Goh, 1998, 2008) or reading (e.g., Zhang, 2008, 2010), Chinese university students’ actual use of metacognition process in writing has never been made explicit to researchers and practitioners, despite its significance in foreign language learning, teaching and research (Zhang & Zhang, 2013).

With these issues in mind, this study investigates EFL writers’ perceptions and strategies in writing in English in a Chinese tertiary multimedia environment and then conducts an empirical training with teacher’s intervention to examine the metacognitive strategies-based instructional approach. This, in turn, is hoped to allow student writers to generate metacognitive processes when they engage in writing tasks, which will help shed some light on how to meet the new generations’ needs in terms of pedagogical practice towards maximizing university students’ English writing success. Strategic processing and metacognitive knowledge of writers with different writing abilities will be also compared.

Specifically, the study addresses three overarching questions:

● Main Research Question 1:

Under the umbrella of Flavell’s initial efforts to coin the term of metacognition in examining learning processes, what is the nature of Chinese EFL writers’ metacognitive system in their writing processes in multimedia environments? In particular, three sub-questions have always been a haunt for us as follows:

1) What metacognitive knowledge systems do Chinese EFL writers have while writing in multimedia environments?

2) What metacognitive experiences do Chinese EFL writers have while writing in multimedia environments?

3) What metacognitive strategies do Chinese EFL writers use while writing in multimedia environments?
Main Research Question 2:

What are the impacts of the instructional programme in terms of the student writers’ EFL writing proficiency as well as their metacognitive strategy development? That is, are there any differences between the experimental group and the control group? If yes, how did they differ? Specifically,

1) How did the two groups differ in their actual writing performance assessed by Jacobs et al. (1981)’s marking rubric in terms of content, organization, vocabulary, language use, and mechanics?

2) How did the two groups differ in their reported use of metacognitive strategies in multimedia environments after the intervention?

Main Research Question 3:

In Phase 2 in the study, two participants from the experimental group were invited to attend a follow-up case study to provide in-depth information. Qualitative data collected from semi-structured interviews and journals addressed an overarching question:

How did the metacognitive strategy-based writing instruction influence the two participants from the experimental group? Specifically,

1) How did the two participants view the regular writing courses and the intervention course?

2) How did the intervention influence the two participants’ use of metacognitive strategies?

3) How did the intervention influence the two participants’ use of multimedia tools?

Research question 1 was administered by the quantitative questionnaire (MAIME) gleaned from the valid process data provided by 367 student EFL writers from a Chinese university. Research questions 2 and 3 were addressed by mixed methods.
1.5 SIGNIFICANCE OF THE STUDY

Thornbury (1996) posits that “cultivation of metacognition into English writing is undoubtedly essential to successful writing” (p. 18). As one of the first comprehensive and integrated studies of the writing processes and strategies of Chinese EFL writers from metacognitive perspectives in multimedia environments, this study intends to show an obvious interdisciplinary trait that several research fields, most notably second/foreign language writing, multimedia learning, and cognitive psychology, are connected. The findings are expected to make an important contribution to further promoting interdisciplinary integration in mainstream research. By in-depth investigation into the selected metacognitive variables of EFL learners’ writing processes and performance in multimedia environments, this study has a number of theoretical, methodological and pedagogical implications for the field of applied linguistics.

First, in the field of second language acquisition (SLA), my extensive review of existing research shows that there is a large volume of published studies describing the role of metacognition in listening comprehension (Goh, 1998, 2008; Goh & Hu, 2014; Zhang & Goh, 2006), speaking activities (Lam, 2011) and reading comprehension (Ismail, 2014; Shamsini & Mousavi, 2014; Zhang, 2010, 2013). However, there has been little interest in the role of metacognitive processes in EFL writing, or their effects on EFL writing in multimedia environments, and research on Chinese tertiary writers is especially scanty. Thus, two aspects of this study stand out in relation to the demands of the new age. One is that with the flourishing development of computers and network technology, our working and living styles are changing almost on a daily basis. The present exploratory study intends to cater to the needs of the university students who grow up in a new era and use computers much more frequently than ever before. The other noteworthy aspect is that given that this study was conducted in the key period of tertiary educational reform in mainland China, it is expected to contribute to the country’s profound College English Teaching Reform in order to keep up with the trends of
development around the world.

Second, by investigating and gaining insights into the metacognitive knowledge the Chinese tertiary students have and their experiences in English writing in the multimedia environments, this study provides valuable information to shed some light on the problems and difficulties that EFL writers encounter when trying to write using computers. From this viewpoint, this study provides an exciting opportunity to advance our knowledge of appropriate measures and explicit guidelines on learners’ writing behaviors towards writing success as well as language proficiency development in the Chinese EFL context.

Third, this study can also expand teachers’/instructors’ views concerning the perennial writing problems existing in foreign language teaching. For one thing, given the present situation that product-oriented writing instruction still prevails among tertiary English teaching in Chinese universities (Hou, 2007; Zhang, 2017; Zhao, 2011), by redesigning the multimedia-supported learning environment in which tutorial writing lessons are tied with metacognitive guidance, this study intends to shift teachers’ attention to students’ writing processes. To some extent, modern technologies, such as word processors with vocabulary and grammar checkers, online bilingual dictionaries, and abundant online resources for writers to refer to, will be quite helpful in writers’ writing processes. Thus, possible pedagogic implications are highlighted. For another thing, by provoking teachers’ awareness of how to integrate modern technology into teaching activities with great expectations of “putting the computer in its place” (Miller & Olson, 1994, p. 121), to do research anew in the new context will set up a supportive platform for reforming and exploration into an English teaching model in the new era in China.

1.6 ORGANIZATION OF THE THESIS

This thesis consists of 9 chapters. Following this introductory chapter, Chapter Two presents a systematic overview of previous research relevant to the current study by examining the following relevant research areas: research on L1 writing, research on L2 writing, and the
importance of metacognition in writing processes in multimedia environments. This literature contributes to establish a basis on related research carried out later by providing theoretical context and the conceptual framework.

Chapter Three addresses the methodology and the research design of the study. It deals with the implementation of the study by providing a detailed description of the actual procedure involved in teacher intervention process.

Chapter Four presents an explicit description of the instrument development and validation process, ensuring that the newly-developed questionnaire 1 (see Appendix E) could be applied as a reliable self-evaluation instrument for Chinese university students to appraise the degree of metacognitive awareness in their EFL writing in multimedia environments.

Chapters Five to Seven report the results of the study. Chapter Five presents the findings arising from the administration of the large-cohort questionnaire. Chapter Six presents the findings of the 16-week metacognitive strategy-based writing instruction programme. Chapter Seven focuses on the results of a case study.

Chapter Eight offers an overall discussion of how the findings from the study contribute to the central theme of the research; and

Chapter Nine summarizes research findings as a whole. The conclusions we can draw from the study, the theoretical and pedagogical implications for EFL writing instructions in the new multimedia environments, and the limitations suggested for further research are presented.
CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 CHAPTER OVERVIEW

As stated above, the aims of the study are to investigate metacognitive awareness and strategies used when EFL students are writing in multimedia environments, and to examine the effect of a teacher’s intervention in a Chinese tertiary context. This chapter presents an overview of relevant research and provides a background to the focus of the present study. The review consists of four main parts, each discussing one related research area.

The literature review begins by describing models used for L1 writing research that have contributed to an understanding of the writing process. This is followed by a brief account of research on writing in a second/foreign language at home and abroad. These two parts intend to provide an overview of the development of the writing process as a basis for a further discussion of my research questions. The third section draws on research literature on metacognition from the fields of cognitive psychology and second language education. In addition to discussing a range of views on metacognition, and providing a broad understanding of metacognition, I focus on metacognition in writing processes in education with particular reference to metacognitive strategy use in EFL writing. The final section includes research on the pertinent topics in multimedia contexts and a background to the theoretical constructs that inform the study. Finally, I discuss the research that is particularly relevant to the application of metacognitive strategies to promote students’ metacognitive awareness during EFL writing in multimedia environments. The chapter concludes with a summary of the reviewed literature to form the theoretical background for the study.
2.2 FIRST LANGUAGE WRITING RESEARCH

2.2.1 Key Models of L1 Writing

Flower and Hayes (1981) demonstrate that if we intend to look carefully at a process in psychology and linguistics, a traditional and efficient way is to “build a model of what you see” (p. 365). The comparatively long history of writing research in English as a first language (L1) has witnessed the development of writing research from linear stage models to cognitive process models and more recently cognitive, developmental, and neuropsychological integration models. In this section, I describe early models of writing that are relevant to writing in English as a foreign language (EFL). The following three models warrant attention due to their close relationship to the construct of metacognition and the role of metacognition in writing.


The Hayes and Flower model of the L1 writing process is regarded as one of the “most influential” (Zimmerman, 2000, p. 74) models in language writing research and has been widely referred to in psychological research on the composing process. Whereas previous studies (e.g. Emig, 1971) viewed writing as linear rather than a recursive multilevel cognitive interactive process, Hayes and Flower (1980) argued that writing is a form of problem solving and “each of these mental acts may occur at any time in the composing process” (p. 367). They developed a cognitive model of the writing process based on their analysis of the writing process of competent writers in 1980.

According to the model, a writer’s composing process consists of three major aspects: cognitive process, the task environment, and the writer’s long-term memory. The cognitive process is the main component, divides further into three operational sub-processes: planning, translating, and reviewing. Hayes and Flower identified the planning process as the first and primary of the three writing processes because of its decisive status in the selection and order
of presentation of ideas. The planning process has three cognitive subparts: generating ideas concerned with writing activities, organizing ideas to help the writer establish a meaningful structure, and goal setting that guides the whole writing process. The next process, translating, is “essentially the process of putting ideas into visible language” (ibid, p. 373). Reviewing, the third phase, is similarly divided into two subparts: evaluating and revising text; managing appropriate composed text editing. As Sun and Xiao (2002) posit, a unique feature of the model is that Hayes and Flower assumes that there is a monitor that supervises and controls the three general writing processes. The model is “emphasizing the recursive, reciprocal nature of the writing process overall” (Harris, Graham, Brindle, & Sandmel, 2009, p. 136). The sub-processes of planning, translating, and reviewing, as an organic entity, form a cognitive system and interact with the monitoring system. The monitoring system supervises and regulates the three general sub-processes. The coordination and interaction of the two systems ensures the smooth progress of the writing activities.

The task environment and the writer’s long-term memory are external factors that influence the internal writing process while influencing and restricting each other to provide conditions on which the writing task develops. In addition, the general three sub-processes extracted information from all these elements. Hayes and Flower (1980) stressed that the interaction between the procedures enables the accomplishment the intended writing tasks. The outline of the Hayes and Flower’s model is depicted in Figure 2.1.

Hayes and Flower’s model of the writing process integrates several tenets of writing. Graham, Brindle, and Sandmel (2009) summarize four main characteristics based on their review of Hayes and Flower’s work: (a) Writing is a goal-directed activity. Writers have both major goals and sub-goals before they are engaged in their writing activities; (b) in order to reach those goals, authors need to do a variety of mental operations to make their writing
effectively; (c) writing is not a linear process. It involves the complex interplay of interwoven or nested activities; and (d) writers must deal with a great many demands skilfully at once.

Figure 2.1

_Hayes and Flower’s Model of the Writing Process_

After ten years or so, with the development of cognitive psychology, there was a new understanding of writing process in the field of cognitive psychology. Both external and internal factors were considered to influence individual writing activities, with an emphasis on motivation to generate mental activities and communication for social needs. The output of writing tasks was viewed as an integrated process involving cognition, motivation, emotion,
working memory, and long-term memory. In a response to this trend, in 1996, Hayes revamped the original model (1980) and proposed a new revised version with several major modifications to cover a wider range of writing process.

As shown in Figure 2.2, the new model includes two main components: The task environment and the individual. The task environment was subdivided into the social environment and the physical environment. In this regard, the social and physical elements were given more attention than in the previous model. Writing activities, the revised model, are not only viewed as a series of self-cognitive processes but also as social activity with the purpose for communication with potential readers. In the social context, the differences of social conventions, individual experiences, and social and cultural diversities were bound to have a great influence on the writers’ writing styles as well as the personal representation on writing outcome (Hyland, 2015).

The most prominent change of the revised model was the individual element, which was composed of four major subparts: the writers’ cognitive processes, their long-term memory, the motivation or affect, and the working memory in the centre. In this revised model, working memory is considered as central and “the writers’ motivation was given an equal role alongside the cognitive elements” (Ewing, 2004, p. 2). In this new model, writing is considered as a complex mental activity, including multiple tasks, such as planning, text generation, reviewing, and revising, during which the writers’ intrinsic motivation is very important in the process of writers’ producing a written product while little attention was paid on previous studies.
Figure 2.2

*Hayes’ Revised Version of the Writing Model*
Another model that continues to have strong influence on research and writing instruction today is based on the work of Bereiter and Scardamalia. By realizing that writers may follow different processing models at developmental stages of writing, they developed two models of writing: The knowledge-telling model (describing the features of novice learners) and the knowledge-transforming model (elaborating the features of expert learners). This two-model description, for perhaps the first time, differentiates less-skilled writers from mature writers. This model acknowledges there can be marked differences in writing goals and processes between novice and expert writers (Graham, 2006; Zhao, 2011).

The knowledge-telling model, comprised of seven stages as shown in Figure 2.3, is regarded as an attempt to describe novice writers’ writing processes. According to this model, less-skilled writers need to search ideas from their long-term memory drawn from already-generated knowledge to compose a piece of relevant written text. Bereiter and Scardamalia (1987) suggested two types of knowledge that were available for novice writers to retrieve: Content knowledge (knowledge about the topic) and discourse knowledge (knowledge about how to write). If the probed information were relevant to the topic and the genre familiar, they would be used in the writing activities to help develop new writing. If not, the writer would need further support to make use of external cues to ensure the process until the task was completed.

The knowledge-transforming model describes the mature or expert writers’ writing processes, which is more complex as it is embedded in a problem-solving process. In this model, complex reciprocal activities operate between the mental presentation of the assignment and the knowledge-telling process (Bereiter & Scardamalia, 1987).
The two types of knowledge are still present in the model but their function is different. The essential difference may lie in the dialectical process that “problems encountered in either space could become tasks to be undertaken in the other” (Ewing, 2004, p. 71). It has been argued that there is strong evidence to support the hypothesis that expert writers appear to have a more effective process than novice writers have in the resolution for the content and rhetorical problems which led to successful writing (see, examples, Bereiter & Scardamalia, 1988; Scardamalia & Bereiter, 1985). This streamlined set of processes is depicted in Figure 2.4.
Bereiter and Scardamalia’s two models of the writing process have provided insights into the writing process in several aspects, as Zhao (2011) summarized, including:

- There exists a developmental dimension in the writing process between novice writers and expert writers and via intermediate strategies; a progressive change can be achieved from knowledge telling to knowledge transforming.

- It is vital for writers to hold pragmatic, rhetorical, and communicative knowledge in the struggling for producing a successful written text.

- While keeping track on their own writing processes, the writers do need an operating system to translate smoothly in between the content and rhetorical problem solving.

(p. 150)
**c. Zimmerman and Reisemberg (1997)**

Zimmerman and Reisemberg’s model, another frequently cited model, has been influential in the psychological and educational field, particularly in relation to writing. Zimmerman and Reisemberg introduced a model of writing, building on models proposed by Hayes and Flower (1980) and Bereiter and Scardamalia (1987), consisting of triadic forms of self-regulation: Environmental, behavioural, and covert or personal from social-cognitive perspectives. “Each of these triadic forms of self-regulation interacts reciprocally via a cyclic feedback loop through which writers self-monitor and self-react to feedback about the effectiveness of specific self-regulatory techniques or processes” (Zimmerman & Reisemberg, 1997, p. 73).

Self-regulation, a complex system of interdependent processes (as shown in Table 2.1) is central to this model. As Zimmerman and Reisemberg (1997) argued, “self-planned, self-initiated, and self-sustained” (p. 73) writing activities were always involved in the composing process linked to successful written products. Furthermore, self-efficacy was identified as important to the writers’ intrinsic motivation to complete written texts. Zimmerman and Reisemberg (1997) suggested that there had to be an interaction between writers’ self-efficacy and their perceived use of self-regulatory strategies. Self-efficacious writers know how to regulate their writing behaviours successfully in difficult writing environments; and, reciprocally, successful use of self-regulatory strategies motivates writers to control their complex writing activities and thoughts to create successful products that enhance the writers’ self-efficacy.
### Table 2.1

*Triadic Self-regulatory Processes in Writing Classes and Processes*

<table>
<thead>
<tr>
<th>I. Environmental Processes</th>
<th>II. Behavioural Processes</th>
<th>III. Personal (Covert) Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Environmental structuring</strong> involves selecting, organizing, and creating effective writing settings, such as a soundproof room.</td>
<td>3. Self-monitoring pertains to overt tracking of one’s own performance, such as keeping a record of pages of written text.</td>
<td>6. Time planning and management pertain to estimating and budgeting time for writing, such as reserving a three-hour block of time to write early each morning.</td>
</tr>
<tr>
<td>2. Self-selected models, tutors, or books refer to social sources of writing knowledge and skill, such as learning to use metaphors by imitating a gifted novelist.</td>
<td>4. Self-consequences refer to making a reward or punishment contingent on one’s writing accomplishment, such as going out for dinner after completing the first draft of a report.</td>
<td>7. Goal setting involves specifying the intended outcomes of writing efforts, such as finishing a chapter of a novel within 2 weeks.</td>
</tr>
<tr>
<td></td>
<td>5. Self-verbalization pertains to personal articulation to enhance the process of writing, such as saying dialogue for a play aloud as one composes.</td>
<td>8. Self-evaluative standards involve setting and adhering to specific standards of personal satisfaction regarding one’s writing, such as criteria for judging the quality of a concluding paragraph.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Cognitive strategies refer to rule governed methods for organizing, producing, and transforming written text, such as formulating an outline to guide writing or revising a first draft of paper by varying the structure of adjacent sentences.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Mental imagery refers to recalling or creating a vivid mental image of a setting, activity, or character to facilitate written descriptions of it, such as when tennis instructors imagine a service motion as they attempt to describe it in written form.</td>
</tr>
</tbody>
</table>

*Source: Zimmerman and Risemberg (1997, p. 79)*
2.2.2 Relevance to This Study

Although research on writing has existed for only the past few decades, beginning with the empirical research on writing as the early 1970s (Nystrand, 2006), theoretical models of writing have proliferated. Comparison of models is not intended here but some have limitations because of the researchers’ philosophical positions and personal constraints during the period in which they lived (Zhang, 2016). In this section, instead I focus on their implications for this study.

First and foremost, an integrated perspective of writing process models is relevant to the current study in that each has identified cognitive interactive key processes of writing, such as planning, translating, reviewing, and monitoring. In addition, all of the models suggest ways to conceptualize the construct of metacognitive awareness, which is essential to better understand writing (Kellogg, 1999). As Conner (2007) observes, students will produce better written products when they are engaged in planning and monitoring their writing processes, suggesting there is a strong link “between using metacognitive strategies and obtaining good scholastic outcomes” (Dunlosky & Metcalfe, 2009, p. 226). Hence, the inclusion of a focus on metacognition should be in the pedagogical intervention in the study.

The current study draws on theoretical as well as instructional insights from these three models; each emphasises different aspects of writing and makes a unique and viable contribution. Hayes and Flower’s model, as well as Hayes’ revised version, provides a framework with which to examine metacognition in second/foreign language writing activities. This is despite the criticism that the models have a narrow understanding and representation of context in writing performance (Nystrand, 2006; Prior, 2006). The revised model includes planning for the topic in advance of writing, translating the organized ideas into literary outcomes, and reviewing or revising for further improvement. Bereiter and Scardamalia’s model has been criticised for limiting the focus to the role of cognitive processes of students’
writing competence while ignoring the external environments where they performed their writing activities (Sasaki, 2002; Zimmerman & Reisemberg, 1997). Their “dual” model, however, has led us to a better understanding of the differences between novice and expert writers, such as novice writers’ difficulties due to lack of metacognitive awareness (Harris, Graham, Brindle, & Sandmel, 2009). As they are still learning how to write, novice writers need support from their instructors or peers to develop competency. This model can provide valuable insights into the instructional writing for novice or incompetent second/foreign language writers. Zimmerman and Reisemberg’s model provides a cogent description of cognitive and metacognitive factors involved in writing processes, including the link of self-regulatory processes to self-efficacy.

Thirdly, recent studies have focused on the role of the writing process, seeing it as an important and integral part of the writing environment (Levy, 2013; Mayer, 2014; Mei, Brown, & Teo, 2017; Warschauer, 2010; Wei, Chen, & Adawu, 2014). By reviewing these models and relevant studies, it is apparent that writing research has experienced a “paradigm shift” from a focus on literary products to writing processes and from static analysis to dynamic investigation (Hyland, 2015). Developmental processes have provided insights into social, contextual and writing medium (changes from traditional pen-and-paper writing to computers) that influences on the processes of writing in a constantly changing modern society. Hyland (2015), for example, posits that the different operational requirements, of pens and computers may also exert influence on writers’ writing performance. In a similar vein, Zimmerman and Reisemberg (1997) argue that, “during this era of cyberspace and microcomputers, skill in developing ideas and expressing them in written form has become essential to success…” (p. 73).

The three models provide an appropriate background to the present study, as it involves not only the writers’ mental writing processes, but also a wide range of contexts. These include social and technological perspectives and, in particular, the multimedia environments.
2.3 RESEARCH ON WRITING AND WRITING INSTRUCTION IN A SECOND/FOREIGN LANGUAGE

2.3.1 Studies on ESL/EFL Writing and Writing Instruction

This section reviews studies pertinent to this study on writing and writing instruction in EFL contexts in China. Although it is argued that there is no comprehensive model or coherent theory of L2 writing (Polio & Williams, 2009), theoretical and empirical research on the L2 writing process has led to a growing body of literature since the early 1980s. As Tricomi (1986) observes, it began with Krashen’s theory of second language acquisition (SLA), in which he differentiated between language learning and language acquisition (Krashen, 1982). Many studies in the EFL Chinese context have been conducted since then encompassing a range of topics, together with other related disciplines (e.g., cognitive science, neuro-psychology, and information theory). Research based literature in the EFL also includes implications for instructions (e.g., language-specific mechanism, cognitive aspects, the roles of the input, social and environmental factors), writing assessment practices (e.g. teacher’s corrective feedback, peer evaluation, computer automatic grading), and new technologies used for writing (e.g. word processors, computer-assisted language learning, e-learning). These accounts of research programmes undoubtedly add to “the robustness and vitality of the field” (Pica, 2005, p. 263). Recent studies have suggested a trend that studies on ESL or EFL writing have evolved into an interdisciplinary field (Cumming, 2016).

As the present study focuses on learning to write in English as a foreign language, relevant to the topic will be reviewed in the following section.

Firstly, the issue of the relationship between the first and the second language acquisition processes has been a major focus during the past decades. One perspective is that L2 writers’ writing processes and the use of strategies are similar to those used in L1 writing.

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6 L2 writing: A term for second language writing, referring to writing done in a language other than one’s mother tongue. The term ‘second language’ here will encompass both second (writing in a context in which the target language is dominant) and foreign languages when we refer to L2 writing.
with a number of researchers and scholars in L2 writing influenced by L1 composition process studies. Among the components, most often studied were specific composing behaviours, writing difficulties, generating contents, and text features. From these, L2 researchers built L2 theory or designed L2 writing classroom activities. Zamel (1983), for example, compared a group of six L2 students divided into skilled and unskilled writers. Using a case study approach, she observed that the skilled L2 writers first planned their ideas, spent more time on the writing process, revised more often, and were recursive at the final stage, indicating a similar writing process and use of strategies as skilled L1 writers. Likewise, the unskilled L2 writers tended to plan and revise less, similar to their L1 counterparts. She concluded that both L1 and L2 writers shared the same sets of composing processes. Raimes (1985) also noted the similarities between L1 and L2 composing processes. Jones and Tetroe’s (1987) analysis of protocols used by six Spanish-speaking L2 writers produced similar findings, noting that “certain features in one’s first language writing process could be transferable to those same features in one’s second language writing process” (Jones & Tetroe, 1987, cited in Krapels, 1990, p. 46) and used “cognitive capacity” when engaged in writing. A number of researchers have come to the same conclusion (e.g. Arndt, 1987; Gaskill, 1986; Silva, 1989; Skibniewski, 1988).

While early L2 researchers acknowledged the similarities between L1 and L2 writing processes, research in the 1980s and early 1990s shifted attention from the similarities to the differences between L1 and L2 writing. L2 writing research moved from the margins of applied linguistics into a more matured research context.

One of the noteworthy studies was in Alister Cumming’s (2001) summarization (see Table 2.2). Cumming identified three fundamental dimensions of second language writing based on previous studies, each having a micro- and a macro-perspective. These were: (a) text features — the qualities of texts that writers produce; (b) composing processes — how L2
writers compose their written products in each step; and (c) contexts of writing — the specific sociocultural contexts in which the writing occurs, as shown in Table 2.2.

Table 2.2

*Three Dimensions of Second Language Writing*

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Level</th>
<th>Contents</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text Features</td>
<td>micro</td>
<td>To improve the complexity and accuracy of the syntax and morphology in L2 learners’ written texts as well as to use a greater range of vocabulary in their writing</td>
<td>Archibald, 1994; Bardovi-Harlig, 1995, 1997; Cumming &amp; Mellow, 1996; Engber, 1995; Grant &amp; Ginther, 2000; Weissberg, 2000</td>
</tr>
<tr>
<td></td>
<td>macro</td>
<td>To become more adept at signalling a hierarchy of related ideas at the beginning, end, or throughout a text, specifically by using cohesive, functional-semantic, or various stylistic devices in their second-language texts</td>
<td>Allison, 1995; Connor, 1996; Jacobs, 1982; Hyland &amp; Milton, 1997; Reid, 1992; Reynolds, 1995; Schleppegrel, 1996</td>
</tr>
<tr>
<td>Composing Process</td>
<td>micro</td>
<td>Learners’ ongoing thinking episodes or decision-making</td>
<td>Bell, 1995; Chenoweth &amp; Hayes, 2001; Swain &amp; Lapkin, 1995</td>
</tr>
<tr>
<td></td>
<td>macro</td>
<td>Strategies that learners use to prepare for, draft, revise and complete writing tasks</td>
<td>Akyel, 1994; Hall, 1990; Walters &amp; Wolf, 1996; Zimmerman, 2000</td>
</tr>
<tr>
<td>Contexts of Writing</td>
<td>micro</td>
<td>A process of individual development in particular social contexts</td>
<td>Angelova &amp; Riazantseva, 1999; Currie, 1993; Long, 1998; Parks, 2000; Thatcher, 2000</td>
</tr>
<tr>
<td></td>
<td>macro</td>
<td>The administrative polices, structures and practices</td>
<td>Auerbach, 1992; Freire, 1970; Moll, 1989; Powers &amp; Nelson, 1995</td>
</tr>
</tbody>
</table>

Cumming’s three dimensions of L2 writing integrated a large body of research on L2 writing. It has been argued that Cumming’s summarization demonstrates that successful L2 writing is related to the three fundamental features, which should be kept in mind by L2 writers (Polio & Williams, 2009). It also provides many recommendations for instructors teaching in second or
foreign language learning contexts, as Cumming (2001), for example, explained, “Instructional modelling of second-language writing probably should include not just modelling of text forms but also modelling of composing processes and of the socio-cultural purposes and functions that writing in the second language serves” (p. 8).

An expanding volume of published studies on L2 writing continues to elucidate a broader range of research in this field (Atkinson, 2010; Hedgcock, 2010, 2012; Weigle, 2014). To date, as Hinkel (2011) has asserted, “A vast body of published studies has investigated discoursal, rhetorical, cohesive, lexical, and syntactic properties of L1 and L2 writing. Research into L2 discourse and text has identified the important and systematic differences in how L1 and L2 writing are constructed” (p. 525). A growing body of literature has examined how, and to what extent, L2 writing differs from L1 writing with researchers focusing on a range of perspectives to account for the differences that make L2 writing “more constrained, more difficult and less effective” (Akincilar, 2010, p. 3). These have included discourse (macro) and morphosyntactic and lexical (micro) properties (Flowerdew, 2002; Hinkel, 2009; Schleppegrell, 2004), error analyses (Ferris & Roberts, 2001; Ferris, 2002; Nesselhauf, 2005), and macro discourse and ideation features (Hedgcock, 2012; Leki, Cumming & Silva, 2008; Paltridge, 2004; Troia, 2007; Weigle, 2002).

Secondly, new techniques in science and technology, particularly computer programmes, have become mainstream in school education. Meanwhile, a parallel trend in L2 writing research moves beyond traditional writing processes to allow for the effects of the changes in writing media, such as using computers to teach L2 writing, becoming prevalent (Hinkel, 2011). It is clear that computers have been an important and useful connection between the student writers and instructors in today’s electronic writing environments. Over past decades, a large growing body of research has investigated whether the use of computers, such as word processors, compositors, and electrical bilingual or multilingual dictionaries as
well as the Internet, promotes or restricts the L2 writing processes (e.g., Dudeney & Hockly, 2007; Figueredo & Varnhagen, 2006; Liou, 1992; Potter & Fuller, 2008; Rodicio & Sánchez, 2011; Tang, 2012). The findings have been inconclusive.

As far as L2 writers are concerned, many studies have demonstrated the positive benefits of introducing computers into L2 writing classrooms. For example, Bean (1983), in his study of beginning writers, concludes that the computer is beneficial in helping beginning writers learn to revise, reduce their apprehension of writing, and motivate them to become conscious of writing as a process. “Students are better able to practice the composing processes used by experienced writers.” (Bean, 1983, p. 146). Many other studies (e.g., Collier, 1983; Feldman, 1984; Larson, 1984; Sadler & Greene, 1986) produced similar findings. These early studies indicate computers have a role in education, in particular in writing. Warschauer (1998) traces the use of computers in the language classroom and points out two main directions in its development in the next 30 years: (a) An increased emphasis on electronic literacy, and (b) an increased incorporation of intelligent computer-assisted language learning (CALL) into the classroom. He argues for further research into the role of computers in literacy education as well as in other areas, which will be “essential for success in almost every sphere of life” (p. 64).

More recently, in his seminal work, Hinkel (2011) points out the instructional potential of computers for writing to meet the needs of L2 writers in a new era. The computer-aided writing instruction has opened up a broad prospect for language education. Zheng and Warschauer (2017) summarize a range of potential ways in which computers and digital technologies could aid L2 student writers as well as language teachers in light of other recent research. They conclude that digital technologies can facilitate interaction and collaboration in writing, enhance the meaning-making process of L2 writers, and reshape teachers’ awareness of technological affordances.
However, this issue is still controversial as writers turn away from writing on paper and pen to computer-based writing. The potential negative impact on the writers using computers for writing have been investigated by other studies, such as: drawing writers’ attention away from processing the writing content by flagging errors (Figueroedo & Varnhagen, 2006), weakening a writer’s ability to spell and edit text (Bangert-Drowns, 1993), and the controversial grammar support (Ken Beatty, 2013). As Hyland (2003) has noted, “Research has produced mixed results” (p. 147). In terms of the use of word processor alone, Hyland (2003) has summarized some of the major findings of L2 word-processed writing, comparing the pros and cons when it is used in writing, as is shown in Table 2.3.

Table 2.3

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• More revisions</td>
<td>• Increased experimentation with language</td>
</tr>
<tr>
<td>• Greater development of content</td>
<td>• Increased focus on surface features</td>
</tr>
<tr>
<td>• Improvements in quality</td>
<td>• Increased anxiety</td>
</tr>
<tr>
<td>• Removal of handwriting barriers</td>
<td>• Local revisions rather the global</td>
</tr>
<tr>
<td>• Awareness of writing as a process</td>
<td>• Premature completion of work</td>
</tr>
<tr>
<td>• Greater fluency and accuracy</td>
<td>• Decreased writer collaboration</td>
</tr>
<tr>
<td>• Longer compositions</td>
<td>• Increased plagiarism and cheating</td>
</tr>
<tr>
<td></td>
<td>• Quantity at the expense of quality</td>
</tr>
<tr>
<td></td>
<td>• Preoccupation with physical appearance</td>
</tr>
<tr>
<td></td>
<td>• Isolation of student writers</td>
</tr>
</tbody>
</table>

Sources: Word Processing and Writing Teaching (Hyland, 2003, p. 147)

From the existing literature, it seems that relying on computers to solve all the problems in student compositions is unrealistic and impossible. Although there has been optimistic

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7 Hyland (2003) posits the word processor is “the most immediately obvious feature of computer-based writing” (p. 146).
advocacy for the use of multimedia in language education, educators have been advised to consider its role with caution. As Gündüz (2005) points out, “how effective computers are in the language classroom depends on the way the teacher and students use them” (p. 199). Multimedia environments will require the inclusion of active learning strategies, and changes in pedagogical contexts, in students’ writing education to “effectively facilitate the social processes of L2 new literacy development” (Zheng & Warschauer, 2017, p. 65). It will also force instructors to think more carefully about the needs of the students in the multimedia-based milieu for second/foreign language acquisition (Ortega, 2014). To use Hyland’s (2003) words, “As with most arguments about technology, the important issue is not whether we should use it, but rather how it can best be used” (p. 147).

2.3.2 Writers and Writing Instruction in Current Chinese Tertiary Institutions

Studies with a variety of heuristic values in relation to learning of ESL and EFL settings have been generally recognised and widely adopted in the EFL writing class. China is an EFL setting where English is taught as a foreign language. English is not used as a language for daily communication but is taught widely in formal school settings due to the importance of English language in the students’ academic success and in the global communication. In mainland China, English is taught mainly in formal educational settings (Zhang, 2016). A description of learning and teaching college English writing in Chinese universities follows in the next paragraph.

In the Chinese tertiary educational system, all university students are required to take a foreign language for at least two years in addition to the basic requirements of their professional training and in their future careers. English is usually the priority choice. Thus, college-level English teaching and learning has been a focus for the majority of students and society as a whole. The standard unified national curricula for foreign language learning divides the English curricula into two courses with each lasting two hours in a week — an intensive reading and
writing course and a listening and speaking course. The intensive reading and writing course is a core foundation course, which integrates reading and writing skills. There is no separate writing course for university non-English majors. On average, during the two-hour intensive reading and writing course, students usually receive one hour of instruction in writing per week during the 16-week-long semester in half a year. The main pedagogical framework for writing instruction usually consists of three stages: First, in the class, the teacher presents sentence, paragraph or text level knowledge as well as some useful writing skills to the students while the students take notes quietly. The teacher may also organize class activities, such as a debate or brainstorms, encouraging students to develop critical thinking about a given topic. Out of class, students then use this knowledge and the skills to write their own texts, paragraphs, or short passages, normally with a word limit from 100 to 250 words and a deadline for completion. Finally, the teacher evaluates the student written products in the next lecture (Miao, Badger, & Zhen, 2006). The cycle repeats during the consecutive semesters. Implementation is influenced and controlled by many factors, such as administrative and time constraints, large class size, and different levels of learners’ English proficiency. This teaching method is often known as the “jug-and-mug” teaching (Tang & Wang, 2014), in which the students’ writing process has been largely ignored. As Ruan (2005) puts it, “In the Chinese EFL writing context, writing process approach is still a relatively new writing pedagogy” (p. 43). There is still a long way to go in the implementation of a process approach in the writing classroom in China.

In recent years, college-level English learning and teaching has been reformed considerably. Against the backdrop of the rapid development of China’s economy and the improvement of people’s living standards over the past two decades or so, multimedia computers are being used widely in mainland China, and are increasingly prevalent in English teaching and learning programmes. Schools and universities have experienced a growing interest in the integration of radios, videos, projectors, computers, multimedia systems, and the
Internet into their English classes (Jin & Cortazzi, 2013), and it is expected that pedagogic innovations will follow in tertiary campuses. There is growing recognition by educators and scholars that traditional teaching approaches do not conform, however, to the new directions in higher education (Cai, 2012; Chen, 2011; Wang, 2011; Zhang, 2014; Zhao & Xu, 2011). Students are expected to benefit from the use of computers and network technologies oriented towards language skills’ training and communicative competence, and enhance their interest, initiative, and efficiency of language learning. A broad range of relevant professional development will be offered to the teachers by means of extensive digital resources accessible at any time or in any place (Wu, Gao, & Zhang, 2014). These innovations will help meet China’s economic development and global communication needs (Chen, 2011).

The introduction of computers and technology into the writing classroom has increased the need for new curricula and instructional materials for the learning and teaching English, as well as teaching methods, as a part of College English Reform in China. Over recent years, the incorporation of multimedia teaching into college English instruction has led to much discussion (Chen, 2005, 2006, 2009, 2010, 2014; Hu, 2013; Ma, 2012). In his seminal work, for example, Chen (2010) argues for the integration of the computers and the network into foreign language teaching, particularly in writing classes. Moreover, Chen (2010) identifies some issues and limitations that need our attention. He notes four aspects, which are: 1) a lack of guidance and systematic training for teachers; 2) inefficient use of teaching materials because teachers do not know how to use them effectively; 3) teachers’ behavioural changes have not kept up with changes in educational philosophy so that the function of computers in teaching has not been optimised; 4) students’ independent learning has been constrained because the classroom teaching content and online learning materials often overlap and do not support students’ learning needs outside the classroom.
Studies on ESL/EFL writing research, in particular on the integration of the computers and the network into foreign language teaching and learning, as Cumming (2001) has noted, is of particular importance to the present study, as well as the need to focus on the global contexts of English writing. The foregoing review of studies suggests a need for a systematic study of China’s tertiary students’ views and perceptions about English writing and their pragmatic use of strategies in writing as computers play an increasingly important role in the everyday lives of the students and their English language learning today. To make full use of advanced science and technology in the Chinese cultural and educational context, there should be, as Muangsamai (2003) states, “both in-breadth and in-depth research is in great need” (p. 1).

2.4 IMPORTANCE OF METACOGNITION IN WRITING PROCESSES

2.4.1 An Overview of Metacognition

The study of metacognitive perspectives on English writing is an important aspect of metacognition in specific cognitive activities (Zhang, 2016a). To understand the role of metacognition in writing processes, a brief introduction of metacognition is necessary.

Metacognition, as one of the main fields of cognitive developmental psychology, has gained attention in research over the last 40 years. John Flavell is considered the “father of the field” since when the role of metacognition in practice has attracted the attention of many scholars (Papaleontiou-Louca, 2008). Educators and scholars have been working on the integration of metacognitive strategies into practical teaching and learning, as well as theoretical studies, with Wenden (1987, cited in Zhang, 2008) considered being the first researcher to have successfully integrated metacognition into the field of foreign language teaching and learning. You and Joe (2001) posit, however, that in the early stages most empirical and theoretical research, as well as the application of metacognition in language teaching and learning, concentrated on L1 and L2 reading. It was not applied to learning in L1 and L2 writing until researchers realized, in the early 1990s, that “writing as well as reading
are [sic] complicated cognitive enterprises that both involve the process of meaning discovery” (You & Joe, 2001, p. 3). More recently, an increasing amount of literature highlighting the optimum use of metacognition in multimedia-based teaching and learning has been published. Research evidence, for example, suggests that, “students must be able to think out their cognitive processes…to be aware of what they know and how they understand [in multimedia learning environments]” (Kim, Kim, & Whang, 2013, p. 81). The effective cultivation of metacognition in the web-based environment has become a focus of L2 writing in education and research. It has been claimed that recent research on metacognition and learning technologies represents “the best cutting-edge interdisciplinary [the cognitive, educational, and computational sciences on learning with educational technologies] research from leading scholars across the globe” (Azevedo & Aleven, 2013, p. v).

2.4.1.1 Definitions of Metacognition

The construct of metacognition has its origin in the field of cognitive psychology, but to find a clear inclusive operational definition of the construct is not easy (Tarricone, 2011). There has been no clear definition of metacognition according to scholars in the field (Efklides, 2008; Tobias & Everson, 2009) and its definition is “multifarious” (Zhang, 2001, p. 270), “perplexing, mystifying and complex” (Tarricone, 2011, p. 3) and even “fuzzy” (Wellman, 1985, p. 1). Here, a review of the literature concerning the definition is expected to provide us with a theoretical foundation for understanding metacognition to support the construction of the framework in the present study.

A survey of the literature shows that there is a consensus that the term is attributed to Flavell (1976, 1979, 1982, 1987, and 2004). He first coined the term to describe the psychological phenomenon of cognition about cognition and provides us with an example to describe a typical metacognitive process to identify what metacognition means.
Metacognition refers to one’s knowledge concerning one’s own cognitive processes and products or anything related to them, e.g. the learning-relevant properties of information or data… Metacognition refers, among other things, to 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 goal or objective. For example, I am engaging in metacognition(meta-memory, meta-learning, meta-learning, meta-attention, metalanguage, or whatever) if I notice that I am having more trouble learning A than B; if it strikes to me that I should double-check C before accepting it as a fact; if it occurs to me that I had better scrutinize each and every alternative in any multiple-choice type task situation before deciding which is the best one; if I become aware that I had better make a note of D because I may forget it; if I think to ask someone about E to see if I have it right. Such examples could be multiplied endlessly. In any kind of cognitive translation with the human or nonhuman environment, a variety of information processing activities may go.

(Flavell, 1976, p. 232)

His definition, refined in his subsequent publications (1979, 1982, 1987), provides a foundation for future research by identifying knowledge of cognition, and regulation of cognition, as the two main categories of the construct. Although a plethora of definitions of metacognition developed soon afterwards in the field of cognitive psychology and educational psychology (Baylor, 2002; McCormick, 2003; Papaleontiou-Louca, 2008; Samuel & Betts, 2007), there is general agreement that Flavell’s framework should be the starting point (Zhang, 2010).

In his early research, Flavell (1979) demonstrated two main categories of metacognition: Metacognitive knowledge and metacognitive regulation or experiences. Metacognitive knowledge involves knowledge of one’s own cognitive processing that can affect the mental
cognitive outcomes. Flavell has identified three subcategories of this knowledge: “(a) knowledge of person variables which refers to general knowledge about one’s learning process; (b) knowledge of task variables that consists of knowledge about the nature of the task and the type of processing demands which will be placed on the individual; and (c) knowledge about strategy variables, which includes knowledge about cognitive and metacognitive strategies as well as conditional knowledge about the appropriate time and place to use such strategies” (Rahimirad & Shams, 2014, p. 164).

The second aspect is metacognitive regulation. It refers to “all the actions the learners take so as to control their own learning and involves skills in planning, monitoring, and evaluation” (Fahim & Alamdari, 2014, p. 5). These processes, including planning activities prior to undertaking a problem, monitoring activities during learning and checking outcomes at the end (Papaleontiou-Louca, 2008, as cited by Brown et al. 1983), are used to regulate and oversee learning that is essential for successful problem solving (Brown, 1979, 1982, 1987).

Moreover, Flavell (1982) makes a further distinction between metacognitive knowledge and metacognitive experiences. Metacognitive knowledge consists of our beliefs and knowledge about learning. Metacognitive experiences, on the other hand, according to Flavell, are “any conscious cognitive or affective experiences that accompany and pertain to any intellectual enterprise” (p. 908). For example, when we are involved in a communication task, we may feel that we do, or do not, understand the communication, or we may feel hesitant to make a decision. Both of these kinds of conscious feelings can be interpreted as the involvement of metacognitive experiences (Efklides, 2009; Papaleontiou-Louca, 2008).

To sum up, Flavell’s definition (1979, 1981, 1987) captures the three essential features of metacognition: Metacognitive knowledge, metacognitive experiences and strategy deployment (Zhang, 2010). It has a number of implications for understanding and carrying out research into analysing learners’ strategies, and their metacognitive knowledge of strategy use.
in various disciplines, including the L2 field (Zhang, 2010). Most research that has successfully analysed L2 learners’ language learning (see, e.g. Goh, 1998; Goh & Taib, 2006; Lam, 2009; Ruan, 2005, 2014; Zhang, 1999, 2001, 2010; Zhang & Zhang, 2013), is based on Flavell’s theoretical framework.

2.4.1.2 Models of Metacognition: Towards Application

The development of the construct of metacognition has provide a new perspective on research into human cognition. Various researchers in psychological research in general, and in education in particular, who have incorporated the concept into their own frameworks, have made important contributions to metacognition. Of pertinence to this study, are studies describing the relationship between metacognition and academic success. Some key models of relevance to second or foreign language writing are to be reviewed as follows:

a. **John H. Flavell (1979, 1982)**

Based on Flavell and Wellman’s (1977) metamemory taxonomy, Flavell (1979, 1982) developed the model of metacognition and cognitive monitoring that has been generally recognized as one of the most influential frameworks of metacognition so far, as discussed above. This model consists of four conceptualized components of metacognition: Metacognitive knowledge, metacognitive experiences, goals, (or tasks), and actions (or strategies). Flavell maintains that these components are interactive and are central to the monitoring and regulation of various human cognitive enterprises. Of these four components, metacognitive knowledge is “the primary component that anchors the overall cognitive monitoring system” (Kim, 2013, p. 6). In Flavell’s view, it can be subcategorized into variables of person, task, and strategy knowledge that interact to have important effects on “the selection, evaluation, and termination of cognitive actions or strategies and cognitive goals” (Tarricone,

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8 For a comprehensive review of the metacognition models in terms of their particular relevance to the application, please see Peña-Ayala and Cárdenas (2015).
He further explains that metacognitive knowledge is informed by metacognitive experiences. Metacognitive experiences, as defined by Tarricone (2011), are “conscious cognitive and affective states which involve awareness, unexpected awareness, thoughts, intuitions, perceptions, feelings and self-judgements of oneself as a cognisor during problem solving and task completion” (p. 130). Metacognitive experiences are likely to occur in situations that stimulate a range of careful, highly conscious thinking that “can be brief or lengthy in duration, simple or complex in content” (Flavell, 1979, p. 908). Papaleontiou-Louca (2008) has identified several attributes of metacognitive experiences, they:

- can lead somebody to establish new goals or revise old ones
- can affect one’s metacognitive knowledge store by adding to it, deleting from it, or revising it
- can activate strategies aimed at either cognitive or metacognitive goals (p. 14)

In relation to the last two components, Flavell (1979) states that “goals (or tasks) refer to the objectives of a cognitive enterprise, [whereas] actions (or strategies) refer to the cognitions or other behaviours employed to achieve them” (p. 907). Figure 2.5 depicts the four fundamental components of the model.

Figure 2.5

*A Model of Cognitive Monitoring as Depicted by Flavell*
A simplified model of metacognition is also widely cited and presented in educational research as shown in Figure 2.6. As Flavell (1979) states, this model directs our attention to the nature and functions of metacognitive knowledge, metacognitive experiences and metacognitive strategies. An in-depth analysis and utilization of these elements of metacognition have implications for language teaching and learning about metacognition.

Although Flavell’s model of metacognition did not involve language learning, he realized the importance of applying metacognition to language learning field. Metacognition, he argues, “plays an important role 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” (Flavell, 1979, p. 906).

Figure 2.6

A Simplified Model of Metacognition


Drawing on Flavell’s theoretical framework as a general organizing system, Anita Wenden was among the first in the field of second or foreign language learning and teaching

Influenced by Flavell, Wenden (1998) identified language learners’ knowledge and beliefs from a metacognitive perspective. She defined metacognitive knowledge as, “relatively stable information human thinkers have about their own cognitive processes and those of others” (p. 516), which includes “beliefs, insights, and concepts that they have acquired about language and the language learning process” (Wenden, 1999, p. 34) in terms of language learning. Following Flavell (1979), she classifies language learners’ metacognitive knowledge in terms of person, task, and strategy knowledge. Table 2.4 below illustrates the components of metacognitive knowledge types in the learning of a second or foreign language.

In her later publications, Wenden (1999, 2002) further emphasizes the importance of metacognitive knowledge in second language learning, pointing out that it is a prerequisite to the deployment of the self-regulatory processes in the self-regulation of language learning. As she states, “while metacognitive strategies, such as planning, monitoring, and evaluating are essential to self-regulation, if these strategies fail to make contact with a rich knowledge base, they are weak” (Wenden, 2002, p. 50).

Wenden considers beliefs as separate from metacognitive knowledge. According to Wenden (1998), knowledge is “factual, objective information that can be acquired by formal learning”, whereas learners’ explicit beliefs are “value-related and tend to be held more tenaciously” (p. 436).
In sum, Wenden’s work successfully applied metacognition theory to the field of second or foreign language teaching and learning. Her framework provides an important and useful theoretical underpinning for many future studies (Ruan, 2005; Zhang, 2010).

Table 2.4

_Wenden’s Classification of Metacognitive Knowledge about Language Learning_

<table>
<thead>
<tr>
<th>Categories</th>
<th>Definitions</th>
<th>Examples</th>
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<tr>
<td>Person Knowledge</td>
<td>This consists of general knowledge learners have about how learning takes place and how different factors like age, aptitude, and learning styles can influence language learning. It also includes what learners know about themselves as learners and the beliefs they have about what leads to their success or failure in learning a language.</td>
<td>▪ <em>I always concentrate.</em>&lt;br&gt;▪ <em>I was afraid to speak.</em></td>
</tr>
<tr>
<td>Task Knowledge</td>
<td>This refers to what learners know about the purpose, the demands, and the nature of learning tasks. It also includes their knowledge of the procedures that constitute these tasks.</td>
<td>▪ <em>The word is not isolated.</em>&lt;br&gt;<em>It is in the environment of other words.</em>&lt;br&gt;▪ <em>It (Watching TV) was very difficult and boring. The sound was difficult. It was too fast.</em></td>
</tr>
<tr>
<td>Strategic Knowledge</td>
<td>This is what learners know about strategies. More specifically, it is knowing about which strategies are likely to be effective in achieving learning goals. In addition, it is understanding how best to approach language learning. Wenden also notes that there might sometimes be overlaps between task knowledge and strategic knowledge because learners often needed to know what strategies to apply in order to accomplish a learning task.</td>
<td>▪ <em>Whenever I didn’t understand anything, I asked, I enquired.</em>&lt;br&gt;▪ <em>Using is better than memorizing only.</em></td>
</tr>
</tbody>
</table>


While Wenden’s framework mainly focuses on the language learner beliefs and knowledge, Anderson’s research focuses on language learner strategies and strategy use from
metacognitive perspectives. According to Anderson (2002), not only should learners use metacognitive strategies to improve their learning performance, but teachers should also model the strategies for the learners to follow.

In Anderson’s (2002) model, metacognitive strategies are divided into five main components: 1) preparing and planning for learning; 2) selecting and using learning strategies; 3) monitoring strategy use; 4) orchestrating various strategies; and 5) evaluating strategy use and learning. Each of the five metacognitive strategies interacts with the others. Individuals need to think about how they combine various strategies in order to facilitate the language learning improvement. As Anderson (2002) points out, “strong metacognitive skills empower second language learners” (p. 6). Coskun (2010) has further delineated that there are three explicable components, which may help us understand Anderson’s model and the interactions between the five main components.

Coskun (2010) similarly groups metacognitive strategies into three stages: 1) preparing and planning; 2) monitoring; and 3) evaluating. In the first, he maintains that students are thinking about their learning goals and making conscious decisions as to how, and when, to use the strategies to achieve the goals. Secondly, when monitoring, students are learning how to coordinate, organise and make associations between the strategies, or as Coskun (2010) says, they will be “orchestrating the strategies” (p. 38). At this stage, they will be monitoring themselves as to whether they are using the strategies as planned. Finally, in the evaluating stage, they will be reflecting on whether their learning has been effective through self-questioning, debriefing discussions or possibly referring to a check list of strategies (see also Zhang, 2008, 2010; Zhang & Zhang, 2013).

2.4.2 Metacognition in Second or Foreign Language Writing

There is a large body of published studies describing the role of metacognition, highlighting the link between metacognition and academic performance in various disciplines (Goh, 2008;
Zhang & Zhang, 2013, 2018). From the then widely accepted models initiated by Flavell (1979), Wenden (1998, 1999) and Anderson (2002), we can see clearly a gradual shift from the metacognition theory to the application of metacognition in second and foreign language research and education. It is surprising, however, that none of the three metacognitive models has been related to specifically to second or foreign language skills. To my knowledge, for example, the systematic discussion linking metacognition theory to L2 writing is scarce. Studies addressing metacognitive issues in the field of L2 writing teaching and learning tend to focus on only one aspect of metacognition — metacognitive knowledge while the other two dimensions of metacognition, metacognitive experiences and metacognitive regulations, have been largely ignored. A possible explanation may lie in the complex nature of the writing experience, consisting of “textual, cognitive, and social dimensions” (Hacker, Keener, & Kircher, 2009, p. 155), which researchers tend to interpret from different perspectives. This may be a reason for the apparent omission of an explicit understanding of the linkage between the availability of metacognition and the L2 writing performance, as Negretti (2012) explains.

In theorising L2, writers’ metacognitive knowledge domains, early studies mainly focused on the components of metacognitive knowledge in L2 writing within their exploratory and descriptive approaches (Kim, 2013). For example, using Flavell’s metacognitive knowledge framework, Victori (1999) investigated the differences between two successful and two unsuccessful EFL writers in terms of their metacognitive knowledge about person, task, and strategy through think-aloud protocols and oral interviews. Data suggested that the two successful writers had more elaborate metacognitive knowledge in each of the three categories, whereas the two unsuccessful writers appeared to have limited and inadequate metacognitive knowledge. The evidence from this study suggests that L2 writing problems may arise from lack of metacognitive knowledge (Devine, Railey, & Boshoff, 1993). Based on this, Victori
(1999) posits that the students’ metacognitive awareness should be raised to enable them to accomplish writing tasks successfully.

Similarly, Cotterall and Murray (2009) examined the effect of enhancing students’ metacognitive knowledge by immersing L2 writers in a self-directed learning environment in a longitudinal study. About 400 Japanese EFL learners, enrolled in a self-directed language-learning course, were investigated by eliciting data from a range of sources: Language belief questionnaires, language learning histories, learner portfolios, a course evaluation, interviews, and focus group discussions. One of the main findings of the study was that the students were better able to plan, monitor, and evaluate their self-directed learning following the course. As Cotterall and Murray (2009) argue, “this study adds to our current knowledge by providing empirical evidence of one set of conditions under which metacognition can develop” (p. 43).

Hacker, Keener, and Kircher (2009, p. 160) assert that, “writing is applied metacognition”. According to Hacker, Keener, and Kircher (2009), there are four meaningful parts in the writing processes: (a) production of thought; (b) communicating with others; (c) goal-directed metacognitive monitoring and control; and (d) translation of thought into an external symbolic representation. In addressing the essential importance of metacognitive monitoring and control in the process of L2 writing, they propose that writing is, in fact, *applied* metacognitive monitoring and control, that is, as Negretti (2012) explains, “metacognitive dynamics permeate the writing experience at every level” (p. 145). They emphasize that the reconceptualization of writing as primarily a metacognitive process bridges the gaps between textual, cognitive, and social dimensions of writing. In their view, writing processes constitute a cluster of essential skills and behaviours that underlie successful writing. These include the monitoring strategies of the writers’ own thoughts, such as reading, rereading, reflecting, and reviewing, and control strategies, such as editing, drafting, idea generation, word production, translation, diagnosing, and revision (Hacker, Keener, & Kircher, 2009). Therefore, strategy
awareness and appropriate strategy application enable writers to become more independent and autonomous.

To sum up, it is reasonable to hold the view that only by investigating the integration of metacognitive knowledge with dynamic metacognitive experiences and regulations can we obtain a full understanding of an individual’s holistic metacognitive development (Jiang, 2003; Ruan, 2011).

2.4.3 Relevance to This Study

In 2004, Georghiades argued that there has been a trend in the literature from general metacognition to situated metacognition⁹. His research forecast that future research and educational innovation in this field would embed the theory within various specific disciplines. In this literature review, I have focused first on theoretical perspectives on metacognition, and how cognitive processes pertinent to L2 writing can be conceptualised and contextualised. Secondly, from pedagogical perspectives, I have indicated that metacognition can “find its way into ordinary classrooms and be realistically applicable in practice” (Georghiades, 2004, p. 88) as proposed by Georghiades (2004). In China, there appears to be scarce research on the metacognitive behaviours of Chinese EFL writers at the tertiary level. To understand second/foreign language learners’ writing behaviours from a metacognitive perspective would appear to be critical in being able to help language writers become more aware about themselves as writers and their writing processes. Research on students’ metacognitive knowledge and experience, from the literature reviewed, should provide us with useful insights.

⁹ According to Georghiades (2004), general metacognition is the kind of metacognition practised in most of the studies aimed at improving children’s general thinking skills. Such improvement was often “context free” or accommodated in an artificial context unrelated to ongoing teaching, hence the anticipation of transfer of any improved cognitive ability to other contexts. Metacognition was explicitly taught and in most cases, special time was allocated for this purpose. Situated metacognition, on the other hand, is defined as metacognition practised in the current context of normal lessons and within the time allocated for the teaching of curriculum subject matter, aimed at improving learners’ performance in the specific content taught by facilitating better understanding (pp. 86-87). Based on the distinction, he develops the metacognitive instances approach to be incorporated into the primary school children, according to which the teacher implants brief metacognitive activities such as classroom discussions, annotated drawing, concept mapping, and keeping diary-like notes at selected points of the teaching sequence.
to help learners improve their writing proficiency. I argue that to apply metacognitive strategy-based instruction in Chinese classrooms may provide an alternative solution to the difficulties and problems faced in EFL writing classes in China.

In China, despite the rapid development of modern technology and introduction of new teaching approaches, outcomes for student writing in EFL are still low (Jiang, 2003; Wu, 2006; Xiao, 2007; Ruan, 2014). Although research has suggested a lack of linguistic skills (vocabulary, grammar) may be compensated by the modern technology, more appropriate approach may be to focus on writers’ metacognition deficiency: Their lack of the metacognitive knowledge about themselves as writers, their experiences about the writing processes and their strategy use in completing their writing tasks. In this respect, it would appear that a knowledge of metacognition is crucial for the writers who are struggling for academic success. Metacognition, therefore, in such a context, is clearly pertinent to the present situation. That is, when L2 writers’ writing processes are examined as a metacognitive process, in a number of projects it has been suggested, may lead learners’ improved language proficiency.

There is a consensus among scholars and researchers in the fields of psychology and language education that it has been suggested on a distinction between the three key constructs of metacognition: (1) metacognitive knowledge of cognition, or metacognitive awareness, (2) metacognitive regulations or strategy use, and (3) metacognitive experiences (e.g., Goh, 2008; Zhang, 2010, 2016; Zhang & Zhang, 2013, 2018).

Early scholars, such as Schraw (1998), have described the metacognitive knowledge system as having three aspects: (1) declarative knowledge, or awareness of what strategies and concepts are important in relation to a specific task; (2) procedural knowledge, or awareness of how to apply concepts and strategies (how to perform the task); and (3) conditional knowledge, or awareness of when and why to apply certain knowledge and strategies (see also Jacob & Paris, 1987; McCormick, 2003; Paris & Winograd, 1990; Schraw & Dennison, 1994).
The second aspect is metacognitive regulations or strategy uses. Based on their discussion on the difference between metacognitive strategies and cognitive strategies, O’Malley and Chamot (1990, as cited in Zhang, 1999) reiterated the role of metacognition in L2 learning and teaching and suggested a repertoire of metacognitive strategies, including thinking about the learning process, planning for learning, monitoring the learning task, and evaluating how well one has learned. Successful language learners know how to prioritise the elements of these strategies. In fact, in the field of language teaching and learning, the use of metacognitive strategies to enhance aspects of second/foreign language skills have been identified by many researchers over recent years. These include listening (Goh, 1998, 2008), reading (Zhang, 1999, 2001, 2010), speaking (Lam, 2009, 2010), and writing (Ruan, 2005, 2014). As for metacognitive experiences, according to Efklides (2001, 2002, 2006, 2009), they consist of metacognitive feelings, metacognitive judgments/estimates, and online task specific knowledge, and are “manifestations of the online monitoring of cognition as the person comes across a task and processes the information related to it” (Efklides, 2009, p. 78). They are assumed to play an important role in short-term and long-term learning processes through their effect on control decisions (Efklides & Vlachopoulos, 2012), causal attributions (Metallidou & Efklides, 2001), and self-concept (Efklides, 2009). However, because of their affective nature, in the case of metacognitive feelings, they can lead to both pleasant and unpleasant experiences, which have both positive and negative implications for learning (Frijda, 1986; Efklides, 2009). Thus, to assessing learners’ metacognitive experiences is required when dealing with language learning tasks.

A review of literature on metacognition has pedagogical implications, particularly in relation to using metacognitive strategies, providing useful insights into ways to improve L2 learners’ writing proficiency. To use Rahimirad and Shams’ (2014) words, “the pedagogical implications of such strategies for instructional interventions cannot be denied. Providing
students with appropriate metacognitive instruction makes them more aware of their learning processes and products as well as how to regulate those processes for further effective learning” (p. 164). Xiao (2007) also argues that it is timely and necessary for teachers to train students to become independent and self-regulated learners by using their repertoire of metacognitive strategies. A focus on metacognition would appear to be particularly need in China given that the students make little progress in EFL writing.

The research literature has described metacognitive instruction and its effectiveness in enhancing learners’ writing ability in both first and second language contexts, with a range of writing instructional models for teaching metacognition proposed to meet the diverse needs of writers. These metacognitive strategy training models include: Cognitive Self-Regulation Instruction (CSRI) Model (Torrance, Fidalgo, & García, 2007), Integrated Model (IM) approach (Leavitt-Noble, 2008), and Strategy Based Instruction (SBI) programme (McMullen, 2009). The Self-Regulated Strategy Development (SRSD) approach, perhaps one of the most influential instructional models for teaching composing and self-regulation strategies, has linked cognitive, metacognitive, motivational, and emotional strategies in the context (Azevedo, 2009). The SRSD model was developed by researchers Karen Harris, Steve Graham and their colleagues, as well as numerous classroom teachers and their students. The “robust and versatile” (Harris, Santangelo, & Graham, 2010, p. 239) SRSD instructional approach has been commended in several meta-analyses for its effectiveness in helping students become more effective writers with positive attitudes towards writing and themselves as writers (see e.g., Graham & Harris, 2003, 2009, 2013; Graham & Perin, 2007; Harris, Santangelo, & Graham, 2010). The SRSD approach has been used in the elementary through to high school grades, demonstrating improvement in four aspects of student writing performance: Knowledge of writing, approach to writing (e.g. use of planning and revising strategies), quality
of writing (i.e. the quality, length, and completeness), and writing self-efficacy (Harris, Graham, Mason, & Friedlander, 2008).

Other recent models include the eclectic approach of the *Cycle of Strategy Instruction* developed by De Silva (2015) and *the Academic Writing-course Design* in an online writing context developed by Yeh (2015). These two models have been shown appropriate for student writers to accomplish specific writing tasks using explicit and systematic strategies in multimedia environments. These models are particularly relevant to the students in China who are struggling for academic language study success by means of multimedia-mediated study, and are pertinent to my study.

In the Chinese context, Wu’s (2006) and Xiao’s (2007) studies have yielded relevant pedagogical implications for researchers and practitioners. Wu (2006) used the concepts of metacognitive knowledge and metacognitive experiences, based on Flavell’s theoretical framework, to propose a series of teaching principles for EFL writing in the Chinese tertiary English teaching, such as emphasizing the importance of writing tasks, promoting students to have a positive language transfer, inspiring students to reflect and evaluate their writing activities, among others. Similarly, given the large class size as the instructors in China face, Xiao (2007) pointed out that training Chinese students to become independent language learners who possess metacognitive strategic knowledge would be helpful to improve their writing proficiency. Based on Hartman’s (2001) theory of teaching *with* and *for* metacognition, he further proposed three guidelines for EFL writing instructors: (1) explicit instruction; (2) scaffolded instruction; and (3) a school year’s training with positive outcomes, aiming to make metacognitive teaching “an integral part” (p. 19) in teaching writing in EFL classrooms.

To sum up, metacognition is essential for successful writing and to “equip students with a repertoire of cognitive and metacognitive strategies to become more effective learners who are able to self-regulate their learning” (Baas, Castelijns, Vermeulen, Martens, & Segers, 2014,
p. 1). It can be achieved with a variety of instructional practices that include metacognitive strategy instruction. For the purpose of the current study, Flavell’s framework is modified for use as a model when observing and investigating the Chinese EFL writers’ monitoring of strategy use in the multimedia context. Studies on metacognitive strategy training models in the field of second or foreign language teaching and writing are of particular significance insofar as EFL writing strategies are concerned. Also, the SRSD approach will be adopted as an intervention for teachers to introduce classroom-teaching activities to encourage the students to take charge of their own learning.

2.5 EFL WRITING IN MULTIMEDIA ENVIRONMENTS

2.5.1 Multimedia: The New Learning Environments

The rapid development of science and technology has promoted the unending changes and improvements of the media, especially during the last 60 years, of multimedia in people’s daily life (Jahromi & Salimi, 2013). Accordingly, the study of teaching and learning in multimedia environments in education is increasingly an area of interest for many researchers and scholars worldwide (Warschauer, 2010). In the field of applied linguistics, or second/foreign language education, in regard to language teaching and learning, contemporary researchers and teachers have investigated the use of multimedia both in L1 and L2 writing not only the writing mental processes involved but also taking account of the changing writing milieu, which has “dramatically reshaped the forms, genres, and purposes of writing both inside and outside the classroom” (Zheng & Warschauer, 2017, p. 61).

The definition of multimedia varies. Nevertheless, the existing literature shares Mayer’s view that multimedia refers to the flexible combination of more than one content format or external representation in a single document or in computer applications (Mayer, 2009). Various formats such as images, graphics, videos, texts, animations, and sounds are typical examples. With the rise in the popularity of multimedia learning in the second language
composition classes, Mayer (2014) moves a further step to make clear distinctions among the
definitions of multimedia, multimedia learning, and multimedia instruction, as Table 2.5 shows.

Table 2.5

Summarization of the Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Multimedia</td>
<td>Presenting words (such as printed text or spoken text) and pictures (such as illustrations, photos, animation, or video)</td>
</tr>
<tr>
<td>Multimedia Learning</td>
<td>Building mental representations from words and pictures</td>
</tr>
<tr>
<td>Multimedia Instruction (a multimedia learning environment)</td>
<td>Presenting words and pictures that are intended to promote learning. In short, it refers to designing environments in ways that help people build mental representations</td>
</tr>
</tbody>
</table>

Sources: The Cambridge Handbook of Multimedia Learning (Mayer, 2014, p. 2)

The booming socio-economic development in China has promoted the rapid
development of science and technology. An increasing number of universities have begun using multimedia in English classrooms and some even invest heavily in the digital hardware in the hope that it will improve student learning. The equipment in a multimedia classroom generally includes desktop computers, video display, liquid crystal display projector, electric screen, DVD, audio power amplifiers, microphones, and speakers. Realizing the potential of computer technology, educators and instructors have become more interested in its use as a tool for foreign language teaching. Chen (2011) observes that most English language teachers in China’s universities have shown great interest in the use of computers in class due to its advantages. He cites two reasons: First, compared to the traditional chalk-and-talk approach, multimedia equipment expands teachers’ choices of pedagogical approaches. Multimedia environments can create a relaxing and pleasant learning atmosphere, reducing the students’
learning anxiety so that learning of the target language can be in a natural context; Second, multimedia can be an excellent tool for cultivating multidimensional information texts with pictures and vivid images providing the information that is more stimulating, increasing the input of information, and stimulating students’ interest in learning, which can greatly improve the effectiveness of the teaching.

2.5.2 Multimedia Learning: The Principles

The 21st century is a highly informational, knowledgeable, networking, and global age, during which information explodes (Mei, Brown, & Teo, 2017). The wide range of mass communications such as radio, TV, newspapers, magazines and the Internet, has led to the world today being a pervasive information society (Sun, 2014), of knowledge and information in all human activities. In addressing the major trends in the English language teaching (ELT) field, in the opening plenary at the 10th Annual CamTESOL Conference\(^\text{10}\), Sun (2014) argued that teachers and educators are expected to be keenly aware of the rapid development and integration of information technology in ELT in the new era. Coincidently, in the opening plenary at the 13th Annual CamTESOL Conference, Zhang (2017) reiterated the importance of encouraging EFL learners to use modern technology, guided by their clear metacognitive knowledge of its use, relevance, appropriateness, and effectiveness.

However, as many scholars (Kim, Kim, & Whang, 2013; Mayer, 2001; Sweller, 1998, 1999) argue, humans are limited in the amount of information that can be processed by visual and auditory information at one time. In an age of rapid knowledge expansion, although it is much easier for external knowledge sources to be available in abundance, a series of new problems arise, such as how to create more accurate judgements of mental construction, or how to monitor cognitive processing in such new environments. This situation has created more,

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\(^{10}\) According to http://www.camtesol.org/home-1, this is a conference for professionals in the field of English Language Teaching and related issues. The 14th Annual CamTESOL Conference on English Language Teaching will be held on 10-11 February 2018. The theme for the 2018 conference is English Language Teaching in the Digital Era.
higher, and newer requirements for the educators and researchers in educational research. “[The students] need proper guidance from their teachers on how to select, analyse, and utilize the right information to achieve their learning goals” (Sun, 2014, p.14). Investigating how language learners make full use of the learning environments has become an important dimension in recent research field of education. Fraser and Goh (2003) summarized discernible lines of research in this field from a range of studies: (1) cognitive and affective associations between the classroom environment and the learning effects; (2) evaluation of educational programmes by the use of classroom environment; (3) gender differences in the learning environments; (4) use of learning environment questionnaires in cross-cultural studies; and (5) translation and validation of teaching and learning environment questionnaires in local languages and their use for research purposes.

Furthermore, since the introduction of multimedia into classroom learning, enthusiasm for implementing multimedia instruction has developed within the changing learning environments. In the field of multimedia learning, several lines of research have identified principles for the design and implementation of effective multimedia instruction for meaningful learning11. With the growing popularity of multimedia learning, it is widely acknowledged that, providing appropriate learning environments has become a major concern in educational research, in particular higher education. To understand better the cognitive processes in new learning environments, various principles have been proposed to optimise active engagement in learning. The development of such principles has the potential to impact future educational directions for multimedia design, relying on theories, including working memory theory (Baddeley, 1986; Baddeley & Hitch, 1974), dual-coding theory (Clark & Paivio, 1991), and Gilly Salmon’s Five-Stage Model (2000, 2004). These theories provide evidence for the design

11 Meaningful learning is defined by Mayer and Moreno (2003) as deep understanding of the material, which includes attending to important aspects of the presented material, mentally organizing it into a coherent cognitive structure, and integrating it with relevant existing knowledge.

a. John Sweller’s Cognitive Load Theory

In the 1990s, John Sweller developed the *Cognitive Load Theory* (CLT) with his associates to “integrate our knowledge of human cognitive structures and instructional design principles” (Pass & Sweller, 2014, p. 27). His theory was based on the assumption that there are multiple memory stores in human cognitive structures. When evaluating humans’ cognitive processing the following must be considered: Limited working memory, unlimited long-term memory, schema acquisition in learning, and the reduction of unnecessary load by automating cognitive processes (Mousavi, Low, & Sweller, 1995). According to Sweller (1999), CLT is a capacity theory that depicts how information processing and knowledge construction interact under the constraints of limited working memory resources. The theory posits that redundant or extraneous memory load should be minimized in the design of multimedia instruction to achieve optimal cognitive processing. Sweller identifies three categories of cognitive load in the theory: Intrinsic, extraneous, and germane cognitive load. Table 2.6 summarizes each category of cognitive load. The three types of cognitive load must achieve a balance to ensure multimedia design is effective. The instructional designers need to be careful to confirm that the extraneous load does not exceed the limits of working memory when dealing with multimedia activities in classroom learning (Dousay, 2013). Specifically, Because of the nature of intrinsic cognitive load, it can be difficult to reduce through instructional design. Well-designed instruction, therefore, should focus on controlling and reducing extraneous cognitive load, especially if the germane cognitive load is high (Ngoc, 2014). In addition, from
another perspective, teachers should prime or activate supportive and relevant prior knowledge to maximize the impact of activities that contribute to germane load.

In short, cognitive load theory provides a general framework and empirically based guidelines that enables instructional designers to control conditions for learning within a particular environment. Cognitive load theory has “profound implications for instructional design in general and multimedia instruction in particular” (Paas & Sweller, 2014, p. 39).

Table 2.6
Categories of Cognitive Load

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Source</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic</td>
<td>The natural complexity of the information</td>
<td>Caused by interacting elements that are intrinsic to the task and must be processed simultaneously. Cannot be altered other than by changing the nature of the task or by increasing knowledge</td>
<td>A novice solving a mathematical problem, such as $a/b=c$, solve for a. Because the elements interact, no problem-solving move can be made without all of the other elements being affected.</td>
</tr>
<tr>
<td>Extraneous</td>
<td>The cognitive demand resulting from how information is presented and can interfere with learning</td>
<td>Caused by interacting elements introduced by an instructional design. This cognitive load should be reduced by altering the instructional design</td>
<td>Requiring learners to learn by solving a problem rather than studying a worked example. Searching for a problem solution unnecessarily introduces a large number of interacting elements that are eliminated by the study of a worked example.</td>
</tr>
<tr>
<td>Germane</td>
<td>The mental effort invested by learners to comprehend the material</td>
<td>Refers to working memory resources dealing with intrinsic rather than extraneous cognitive load, thus facilitating learning</td>
<td>Instructional designs that decrease extraneous load associated with problem-solving search increase working memory resources devoted to intrinsic rather than extraneous elements and so increase germane load.</td>
</tr>
</tbody>
</table>

Source: Adapted from *Implications of Cognitive Load Theory* (Paas & Sweller, 2014, p. 39)

In the 21st century, the rapid development of the Internet and an increasing use of images and other media, has provided opportunities to explore further cognitive processing (Dousay, 2013). Mayer (2001, 2005, 2009, 2014), endeavouring to use more of the learners’ cognitive capacity to promote meaningful learning, developed the *Cognitive Theory of Multimedia Learning* (CTML), which “represents the culmination of decades of cognitive processing research with consideration towards the effect of multimedia as a means of presenting information” (Dousay, 2013, p. 25). His theory is based on an assumption of three cognitive process of learning: Dual channels, limited capacity, and active processing, as summarized in Table 2.7.

### Table 2.7

*Three Assumptions of a Cognitive Theory of Multimedia Learning*

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Description</th>
<th>Related Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dual channels</strong></td>
<td>Humans possess separate channels for processing visual and auditory information</td>
<td>Baddeley (1992), Paivo (1986)</td>
</tr>
<tr>
<td><strong>Limited capacity</strong></td>
<td>Humans are limited in the amount of information that can be processed in each channel at one time</td>
<td>Baddeley (1992), Chandler &amp; Sweller (1991)</td>
</tr>
<tr>
<td><strong>Active processing</strong></td>
<td>Humans engage in active learning by attending to relevant incoming information, organizing selected information into coherent mental representations, and integrating mental representations with other knowledge</td>
<td>Mayer (1999), Wittrock (1989)</td>
</tr>
</tbody>
</table>

Synthesizing the groundwork laid by Baddeley (1986), Clark and Paivio (1991), Salmon (2004), and Sweller (1998), Mayer further proposed that, for multimedia learning, a series of processes are required. Learners must select relevant information, and organize and integrate it, together with relevant prior knowledge, into coherent verbal and pictorial representations to make learning meaningful (Mayer, 2001, 2005, 2009, 2014). To optimise learning potential in multimedia environments, he specifies principles for multimedia instructional design to “reduce extraneous processing, manage essential processing, and foster generative processing” (Mayer, 2014, p. 63), as classified in Table 2.8.

For Chinese EFL writers in multimedia environments, Mayer’s Cognitive Theory of Multimedia Learning (CTML) can be used to support and optimize instructional design (see e.g., Jiang, Renandya, & Zhang, 2017). As Azevedo (2014) advocated, “The [instructional] system should be designed on the basis of multimedia learning principles” (p. 666).
## Table 2.8

*Cognitive Theory of Multimedia Learning Design Principles*

<table>
<thead>
<tr>
<th>Principles for reducing extraneous processing in multimedia learning</th>
<th>Principles for managing essential processing in multimedia learning</th>
<th>Principles based on social cues in multimedia learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coherence Principle</strong></td>
<td><strong>Modality Principle</strong></td>
<td><strong>Embodiment Principle</strong></td>
</tr>
<tr>
<td>Students learn more deeply from a multimedia message when extraneous material is excluded rather than included.</td>
<td>Students learn more deeply from multimedia presentations when words are spoken rather than printed.</td>
<td>Students learn more deeply when on-screen agents display humanlike gesturing, movement, eye contact, and facial expressions.</td>
</tr>
<tr>
<td><strong>Signalling Principle</strong></td>
<td><strong>Pre-training Principle</strong></td>
<td><strong>Image Principles</strong></td>
</tr>
<tr>
<td>Students learn more deeply from a multimedia message when cues are added that highlight the organization of the essential material.</td>
<td>Students learn more deeply from a multimedia message when they know the names and characteristics of the main concepts.</td>
<td>Students do not necessarily learn more deeply from a multimedia presentation when the speaker’s image is on the screen rather than not on the screen.</td>
</tr>
<tr>
<td><strong>Redundancy Principle</strong></td>
<td><strong>Segmenting Principle</strong></td>
<td><strong>Personalization Principle</strong></td>
</tr>
<tr>
<td>Students learn more deeply from graphics and narration than from graphics, narration, and on-screen text.</td>
<td>Students learn more deeply when a multimedia message is presented in learner-paced segments rather than as a continuous unit.</td>
<td>Students learn more deeply when the words in a multimedia presentation are in conversational style rather than formal style.</td>
</tr>
<tr>
<td><strong>Spatial Contiguity Principle</strong></td>
<td><strong>Temporal Contiguity Principle</strong></td>
<td><strong>Voice Principle</strong></td>
</tr>
<tr>
<td>Students learn more deeply from a multimedia message when corresponding words and pictures are presented near than far from each other on the page or screen.</td>
<td>Students learn more deeply when corresponding animation and narration are presented simultaneously rather than successively.</td>
<td>Students learn more deeply when the words in a multimedia message are spoken in a human voice with a standard accent rather than in a machine voice or a foreign-accented human voice.</td>
</tr>
</tbody>
</table>

Extracted from *The Cambridge Handbook of Multimedia Learning* (Mayer, 2014)
2.5.3 Metacognition in EFL Learning/Writing in Multimedia Environments

Researchers and teachers have been interested in metacognition throughout the past four decades (as discussed in Section 2.4), but only in recent years has there been strong interest in metacognition in multimedia environments because of advances in computer and communication technologies. A growing body of literature has focused on the importance of enhancing metacognitive awareness in learners of writing in second or foreign languages in multimedia environments (Azevedo, 2009, 2013, 2014; Burkett & Azevedo, 2012; Behnagh, 2014; Mayer, 2014). For example, Mayer (2014) posits, “metacognition plays a crucial role in multimedia learning” (p. 66). In his overview of the evolution of cognitive theories of multimedia learning, Mayer (2014) highlights the need to incorporate metacognition in multimedia learning so that learners engage in appropriate cognitive processing to “promote meaningful learning outcomes” (p. 21). Azevedo’s (2014) latest review of the empirical literature on multimedia learning of metacognitive strategies also proposes that “learners can benefit from multimedia learning when they use key cognitive and metacognitive self-regulatory processes” (p. 647). Therefore, a focus on metacognition in second or foreign language learning, especially in learning EFL writing in multimedia environments needs to be included.

In China’s EFL teaching and learning contexts, minimal literature is available to support instruction for writing in a multimedia environment. According to Outline of China’s National Plan for Medium and Long-term Education Reform and Development (2010-2020 years)13, “attention shall be given to the revolutionary impact of information technology on education development. Education informatization should be put into the state strategy for

12 According to Mayer (2014), there are three kinds of multimedia learning outcomes: No learning, Rote learning, and Meaningful learning. Meaningful learning refers to learning with understanding, as indicated by good performance on retention and transfer tests.

13 China announced its National Plan for Medium and Long-term Education Reform and Development for 2010-2020 in July 2010. The plan outlines China’s commitment to give priority to education and to turn China into a country rich in human resources.
comprehensive informatization” (p. 41). As such, a focus on metacognition when writing in English as a foreign language, in multimedia learning environments, is bound to be embraced by students and teachers to enable successful multimedia-based writing (Mei, Brown, & Teo, 2017).

2.5.4 Relevance to This Study

In the education field, undoubtedly multimedia offers rich learning opportunities to meet student needs. Recent years have also seen an increase in the number of students in Chinese universities with access to laptops and other digital devices for practising EFL writing. Teachers have shown their enthusiasm for incorporating multimedia elements into their instructional practices in the classroom and beyond. However, despite digital media having been widely adopted as a tool for language teaching and learning, research in China has documented students’ unfavourable perceptions of, and attitudes towards, multimedia contexts for learning EFL writing. Mind wandering (Xiao, 2011), intense cognitive overloading and a lack of technological skills (Xiong, 2011) have been identified as aspects which hinder students developing EFL writing proficiency (Yang, 2016). In another study, Qin and Rau (2009) reported that Chinese students were disoriented, and experienced cognitive overload, often, when engaged in multimedia activities, because of uncontrollability of the multimedia environment. As they argue, “disoriented users do not know where they are, where to go for the next step, or how to reach a specific node” (p. 656).

The teaching of EFL in higher education in China has had strong investment and is supported with a wide variety of equipment in language classrooms. The reported “uncontrollability” of the multimedia environment must be addressed, however, to avoid the waste of valuable educational resources, time, and effort. To benefit from the advanced technology available for teaching EFL, these issues must be addressed, because, “how we make use of computer potentials with our L2 learners and how we resolve the issues surrounding the
use of electronic media are matters of great interest and concern” (Pennington, 2003, p. 306; see also Zhang & Zhang, 2018). Research literature on multimedia learning theories, the development of digital learning environments, and the field of cognitive psychology, in particular metacognition on learners’ perceptions of multimedia activities, could provide a theoretical and practical solution to such a dilemma.

2.6 THEORETICAL FRAMEWORK

Metacognition is knowing about knowing, or cognition about cognition. It is often referred to as “a range of beliefs, understandings, behaviours, and strategies for current and future actions that are most often dynamic and systematic” (Zhang, 2010, p. 322). Based on Flavell’s theoretical framework, the interpretation of metacognition is expanded by Zhang (2010), as having three fundamental elements: “Metacognitive knowledge, metacognitive experiences, and strategy deployment” (p. 322). As research in the L2 field has confirmed the pivotal role that metacognition has in language teaching and learning (see e.g., Wenden, 1998, 2002; Zhang, 2010, 2016; Zhang & Zhang, 2013), metacognition is central to this study in guiding both the data collection and the intervention.

As writing increasingly is completed on computers in modern Chinese universities, how students use writing strategies in multimedia environments need to be investigated. In this study, I decided to investigate Chinese EFL learners’ reported writing strategies in accordance with Zhang’s (2010) metacognitive tripartite framework in the field of SLA, which is particularly pertinent to EFL teaching and learning in China. The first component, metacognitive knowledge, refers to aspects of writers’ metacognitive awareness about L2 writing. These include perceptions of the nature of writing, conceptualisations of writing goals, views of writing tasks and L2 writing courses, and perceptions of learners as writers in multimedia environments. The second aspect of metacognition is metacognitive experiences.
Because of their affective nature, metacognitive experiences can be positive or negative and associated with progress, or anxiety and fear of writing.

The third component of metacognition, the regulatory or executive aspect, refers to “the deliberate, conscious control of one’s own cognitive actions” (Brown, 1980, p. 453). According to Zhang and Zhang (2013), the control of metacognitive actions, such as selection, evaluation, and termination of cognitive activities, are apparent through students’ behaviours and deployment of strategies for problem solving in different social and learning contexts. The executive processes are carried out through the planning, monitoring, and evaluating activities to facilitate the attainment of the cognitive actions. Such executive functioning as planning, monitoring, and evaluating together comprise the use of metacognitive strategies, which are essential for successful problem solving (Zhang & Zhang, 2013).

In L2 research, many scholars and researchers have emphasized the use of metacognitive strategies to enhance second/foreign language skills, including listening (Goh, 1998, 2008), reading (Zhang, 1999, 2001, 2010), speaking (Lam, 2009, 2010), and writing (Ruan, 2005, 2014). Metacognitive strategies are self-regulatory strategies in which learners are aware of their own learning processes. They are assumed to play a critical role to successful learning through their effect on higher-level control decisions (Wenden, 1998, 2002; Zhang, 2001, 2010). In Phase 2 in this study, I focus on metacognitive strategies, as it is a significant component of the theoretical framework of the study. The reasons for this focus are two-fold: First, a student with strong metacognitive awareness consciously undertakes planning and monitoring processes. He or she also reflects on the writing process, following a general chronological sequence when performing a writing task, whether in a traditional pen-and-paper or a computer context. Such metacognitive awareness necessarily includes “the complex interaction of mediating cognitive, metacognitive, and social processes involved in students’ learning of complex topics and domains” (Azevedo, 2010, p. 193); Second, such a theoretical
framework is necessary to consider not only variables of metacognitive language learning strategies (LLS), but also variables of the classroom learning environment and the interaction between writers and multimedia tools.

More specifically, there are three writing stages in which the EFL learner-writer writes in the multimedia environment. First, before writing, a writer with strong metacognitive awareness may make some necessary preparations, such as planning the structure of the writing task, setting meaningful goals, or allocating appropriate writing time (Ong & Zhang, 2013). Second, during writing, the writer may monitor the writing process, assess particular strategies to ensure that the writing goals will be achieved, or make necessary adjustments. Third, the writer may evaluate his or her writing strategies, or rethink other aspects of the writing context that could impact the quality of his/her written product. Built upon Flavell’s (1979, 1987) metacognitive strategy framework, and Azevedo’s (2010) emphasis on of metacognition in multimedia learning environments, my study aims to establish theory-practice connections drawing on empirical data to inform teaching EFL writing in Chinese ELT multimedia contexts.

2.7 SUMMARY

In this chapter, I have presented an overview of the research relevant to the present study. The review has mainly covered three research areas: General writing theories in both L1 and L2 circumstances, metacognition research in EFL writing, and the multimedia learning environment. Following the cognitive psychological perspective, I have set the broader context for the present study and described the theoretical framework, which informs the study. Such a conceptualisation is relevant to understanding the student writers’ writing behaviours in the Chinese ELT context that have shaped the theoretical basis for implementing the writing intervention implemented in the present study. I describe the research design and methodology of this study in the next chapter.
CHAPTER THREE

METHODOLOGY AND RESEARCH DESIGN

3.1 CHAPTER OVERVIEW

Educational research is concerned with developing understanding of teaching and learning activities (Wellington, 2015) with a range of research designs and methodologies developed, or adopted, to gather and analyse data. The current study focuses on gathering empirical evidence that is trustworthy, consistent with previous research in the second language and EFL learning field (Starbuck, 2016).

This chapter describes the research design and how this study ensured the selection of participants and the methods and techniques employed for data collection and analysis were reliable and valid. The chapter first describes the research design to achieve the aims of the study. This is followed by the detailed information on participants and how they were selected; a description of the instruments for collecting the data; an overview of the intervention; and finally, the data collection and data analysis procedures.

3.2 RESEARCH DESIGN

3.2.1 Aims of the Study

Despite the prevalence of studies on L2 writing as reviewed in Chapter 2, there are few studies that describe the teaching and learning of EFL writing in multimedia environments in current Chinese tertiary contexts. Studies identified, Li (2005), discussed issues relating to EFL writing in multimedia environments and more recently, Shang (2013) attempted to construct an Elaborate English Writing Class with English majors as the participants.

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14 Construction of elaborate course is an all-around three-level systematic project, ranging from the university, the province and the nation in mainland China. It is an important part of “Quality Projects” oriented by the Chinese Ministry of Education in 2003, aiming to improve reform of higher education and realize great-leap-forward development of higher education by building first-class teaching team, teaching methods and teaching materials as well as first-class teaching management with the focal point of innovative spirit being cultivated.
My study has two aims. The first aim is to investigate the metacognitive knowledge systems of non-English major EFL writers in a Chinese university and their perceived use of metacognitive strategies to facilitate writing proficiency. The second aim is to evaluate a metacognitive strategies-based instructional intervention to improve the performance of students’ EFL writing, and their metacognitive knowledge, in the multimedia-mediated classroom. It is anticipated that the metacognitive strategies-based writing course will result in practical implications for how to improve EFL writers’ writing proficiency in multimedia environments.

3.2.2 The Study: Two Phases

The study is divided into two phases, Phase 1 and Phase 2. These two phases are described in detail below.

*Phase 1*

Phase 1 was an exploratory stage to establish university students’ attitudes to writing and their metacognitive experiences in multimedia environments.

In order to assess Chinese students’ level of metacognition in their EFL writing process in multimedia environments, a questionnaire (MAIME) was developed and validated (see Chapter 4 for detailed information). The MAIME was first piloted with 44 year-two students, in two classes, who were not participants for the research but were students at the participating university. After completing the questionnaire, they were allocated to another city for practicum. The piloting was conducted in an attempt to evaluate feasibility and help improve the reliability and validity of the MAIME for the formal investigation.

Data were finally gathered on a large cohort of non-English-major students in a Chinese university using a questionnaire, *The Metacognitive Awareness Inventory of Chinese University EFL Writers in Multimedia Environments* (MAIME) (see Appendix E). The MAIME was distributed to 400 year-two university students with the assistance of the school...
administrator; 384 students responded, a rate of 96%. The repeated siftings to “clean” the data brought the number of valid respondents for analysis to 367.

Analysis of the questionnaire led to the development of an instructional intervention to build on and enhance the students’ metacognitive awareness and knowledge identified through the questionnaire. In Phase 2, this intervention was implemented, and evaluated, to assess the impact of a metacognitive strategies-focused instruction on university students’ achievement in EFL writing in multimedia environments.

Phase 2

Phase 2 was a treatment stage evaluating the impact of the instructional intervention. A total of 64 year-two non-English majors in the participating university (in the same pool as the cohort used in Phase 1) volunteered as the participants of the study. They were randomly assigned into two groups by assigning random numbers to them: One class of 32 even numbers consisted of an experimental group (ExpG); while the other class of 32 odd numbers comprised a control group (ConG). During the 16 weeks, the same instructor taught both groups to avoid any effect of different teaching styles or different materials used in class. The experimental group received metacognitive strategies-focused training while the control group received regular instruction based on the university’s established teaching syllabus and requirements. The study designed a quasi-experimental pre-test, post-test, and delayed post-test writing achievements with the two treatment groups. Both groups of participants were required to sit for the writing tests in the multimedia classroom in the university (see Appendix I for the writing topics). In addition to writing achievement tests, participants’ responses to the instruction were elicited using qualitative methods such as interviews and journals. The

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15 Note: The students have been registered into different administrative classes with a rough balance of class size based on their scores in National College Entrance Examinations (NCEE) when they are enrolled in the universities. And once the class has been formed, the students stay in the same class for the continuous four-year study in the university to facilitate the management. As mentioned before, the class size is usually big with almost 80 students in a class in the participant university. However, based on the principles of voluntariness and convenience, I have chosen the student participants in the experiment from two intact classes.
Metacognitive Strategy Use Questionnaire in Multimedia Environments (MSUQ-ME) (see Appendix G) was also administered to the two groups immediately after pre-test and post-test. Triangulation using all data sources was then employed for data analysis.

To sum up, an overview of the data collection in Phase 1 and Phase 2 as the number of participants in the study is given in Table 3.1.

Table 3.1

Overview of Participant Information in Different Phases

<table>
<thead>
<tr>
<th>Phases</th>
<th>Procedures</th>
<th>Instruments</th>
<th>Participants</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>The pilot study</td>
<td>Questionnaire I (MAIME)</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Phase 1</td>
<td>The main study</td>
<td>Questionnaire I (revised) (MAIME)</td>
<td>367</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td>The treatment</td>
<td>Pre-interview</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Pre-test Writing</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Immediate Questionnaire II (MSUQ-ME)</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Post-test Writing</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Immediate Questionnaire II (MSUQ-ME)</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Delayed Post-test Writing</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Post-interview</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td></td>
<td>Journal</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Triangulation of instruments and data sources

A summary of the data collection procedures for the study is presented in Figure 3.1.
3.2.3 The Mixed Methods Approach

Ruan (2004) posits that “researchers in applied linguistics, as people in other academic fields, often have their own definitions of research, and adopt varied approaches to addressing their
research questions” (p. 51). Studies in the field of applied linguistics have used both quantitative and qualitative paradigms (Angouri, 2010), which have different worldviews (see, for example, Creswell, 2013; Davies, 1995; Nunan, 1992; Richards, 2009; Tashakkori & Teddlie, 2010). Quantitative research is described typically as numerical research while qualitative is described as non-numerical research. The differences are summarised by Dörnyei (2007) as follows:

Quantitative research involves data collection procedures that result primarily in numerical data, which is then analysed primarily by statistical methods. Typical example: survey research using a questionnaire, analysed by statistical software such as SPSS. Alternatively, qualitative research, on the other hand, involves data collection procedures that result primarily in open-ended, non-numerical data, which is then analysed primarily by non-statistical methods. Typical example: interview research, with the transcribed recordings analysed by qualitative content analysis. (p. 24)

These two differing orientations have led to a “paradigm war” (Dörnyei, 2007, p. 25), with some researchers (e.g., Rossman & Wilson, 1994) arguing that they are not compatible. As it is accepted that all methods have limitations, many researchers feel polar distinctions are inappropriate and seek an interface between the two approaches (Dörnyei, 2007), such as “paradigm pluralism” (Teddlie & Tashakkori, 2012, p. 774). From a pragmatist worldview, both quantitative and qualitative studies are equally important and useful in research. The incorporation of the strengths of both quantitative and qualitative research in a single study or across studies, while minimizing their weaknesses, can “fit together the insights … into a workable solution” (Johnson & Onwuegbuzie, 2004, p. 16) and, “will provide the most informative, complete, balanced, and useful research results” (Johnson, Onwuegbuzie, & Turner, 2007, p. 129). The use of mixed methods methodology has gradually gained currency in recent years and is becoming increasingly recognized as the third major research approach
have identified four rationales for conducting such mixed methods research as follows:

- participant enrichment e.g., mixing quantitative and qualitative research to optimize the sample using techniques that include recruiting participants, engaging in activities such as institutional review board debriefings, ensuring that each participant selected is appropriate for inclusion),
- instrument fidelity e.g., assessing the appropriateness and/or utility of existing instruments, creating new instruments, monitoring performance of human instruments
- treatment integrity i.e., assessing fidelity of intervention
- significance enhancement e.g., facilitating thickness and richness of data, augmenting interpretation and usefulness of findings.

This is the position I have taken in the current study, by adopting a mixed-methods approach in the research design. Quantitative and qualitative, data from different sources were collected and analysed, to assess university students’ metacognitive knowledge and use of strategies in their EFL writing in multimedia environments, as well as the impact of the instructional intervention. Data derived from both types of approaches were triangulated to strengthen the internal validity of the research through convergence, and corroboration, across both quantitative and qualitative findings (Dörnyei, 2007). Quantitative data were collected from three sources: The large-scale questionnaire (MAIME) completed by a sample of 367 student volunteer participants who participated in Phase 1; the focused two groups’ metacognitive strategies-use questionnaire (MUSQ-ME) completed by the 64 in-depth students who participated in Phase 2; and the scores of the assessed writing of the two groups. Two participants from the experimental group, invited to participate in a case study, generated qualitative data in the form of semi-structured interviews and journals. The purpose of the case
The study was conducted during September 2015 to January 2016. Table 3.2 presents the overview of the detailed research design.

Table 3.2

*Overview of the Detailed Research Design*

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Instruments</th>
<th>Time schedule</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RQ1:</strong> What is the nature of Chinese EFL writers’ metacognitive system in their writing processes in multimedia environments?</td>
<td>Questionnaire I (<em>MAIME</em>)</td>
<td>Sep. 2015 (At the beginning of the first semester of 2015-2016 academic year)</td>
<td>A larger cohort of year-two non-English major university EFL students (<em>n</em> = 367)</td>
</tr>
<tr>
<td><strong>RQ2:</strong> What is the impact of the instructional programme?</td>
<td>Pre-and Post-courses: Interviews; Writing tests; Journals; Questionnaire II (<em>MSUQ-ME</em>)</td>
<td>Sep. 2015 — Janu.2016</td>
<td>The in-depth groups, including the experimental group and the control group (Writing tests for both groups, <em>n</em> = 64; Questionnaire II for both groups, <em>n</em> = 64; Interviews for the experimental group, <em>n</em> = 2)</td>
</tr>
<tr>
<td><strong>RQ3:</strong> How did the metacognitive strategy-based writing instruction influence the two participants from the experimental group?</td>
<td>Pre-and post-Interviews; Journals</td>
<td>Sep. 2015 — Janu.2016</td>
<td>Case study: A high writing-proficiency participant (<em>n</em> = 1) &amp; A low writing-proficiency participant (<em>n</em> = 1) from the experimental group</td>
</tr>
</tbody>
</table>
3.3 PARTICIPANTS

3.3.1 Purposive Sampling

There are two distinct features of current Chinese university students. Firstly, the students are admitted to universities through the strict high-stakes National College Entrance Examinations (NCEE). The NCEE has been used by a huge number of test takers for many years, and is accepted as the sole criterion to select qualified candidates for colleges and universities\(^\text{16}\) (Zhang, 2016). Their study in the university has the same, or similar, national teaching syllabus, with similar or same teaching materials, as in all Chinese contexts. Secondly, they are generations who have grown up in the modern society and they are greatly influenced by digital technologies. “From a very young age, they have been using digital devices in learning, communicating with others, and playing games” (Sun, 2014). As already noted in Chapter 1, the “net generation” is the subject of the current study. The research, therefore, considered the following criteria for the selection of participants: (a) students with proficiency in using the computer and the Internet; (b) students taking English as a foreign language to pass the CET-4 test (see Section 1.2.3.3 for more information); and (c) voluntary participation.

3.3.2 Participants in Phase 1 and Phase 2

Participants were selected through convenience sampling from about 4,000 non-English major year-two students at a university in an Eastern seaside Chinese city with a population of about six million. The university is in an economically developed area in which assures the large-scale use of multimedia in classroom instruction and the popularity of internet among students’ everyday activities. The selection of the university, whose enrolments are nation-wide, is considered representative of tertiary level learners. According to the university’s requirement, sitting the CET-4 examination is not permitted until the students are in their second-year study.

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\(^{16}\) Starting from 1978, the NCEE, commonly known as Gaokao, is held once a year and is a prerequisite for entrance into almost all higher education institutions at the undergraduate level in China. Its extreme importance are also discussed in Zhang (2011, 2016).
Second-year students were selected, as they would have more interest in being involved in the study given that they are under the pressure to pass CET-4. Finally, 400 students were invited to respond to the large-scale questionnaire, distributed to a balance of arts and science students; 384 students returned them; 17 questionnaires were discard because they were incomplete. A final 367 valid questionnaires were confirmed.

Data show that the participants spanned seven major disciplines: Accounting (16%, n = 60), Business Administration (16%, n = 60), Japanese (11%, n = 39), Mechanical Engineering (23%, n = 85), Materials Engineering (20%, n = 73), Electrical Engineering (10%, n = 37), and Software Engineering (4%, n = 13). Of these participants, 57% were males (n = 209), and 43% were females (n = 158). Because all participants were year-two students, they were close in age and so age was not a variable in the design of this study. More than three quarters of the participants (85%, n = 311) reported that they began to learn English when they were in primary schools. They reported a range of 6 to 18 years of English study (M = 11.03, SD = 1.85). Participants’ general English academic performance ranged from poor to excellent, as observed from their scores on NCEE, and confirmed later by their year-one final English examination.

Data from first part of the questionnaire also records students’ behaviours and beliefs about EFL writing. When evaluating their EFL writing ability on a six-level scale from poor (1), relatively poor (2), fair (3), good (4), very good (5) to excellent (6), participants reported themselves as having poor (9%, n = 33) to excellent (2%, n = 9) writing ability. The cumulative percent of the respondents from poor to fair was 89% (n = 325), indicating that a vast majority of the participants might not feel confident of their writing ability. Approximately a third of the participants (35%, n = 127) reported having a weekly regular writing practice in order to improve their writing performance but, less frequently, using digital technologies to learn to writing (30%, n = 110). Over a half (57%, n = 208) of the participants claimed that the most
important aspect of English writing is fluency in expressing one’s own ideas, while approximately a half (49%, n = 178) of the participants reported their experience of classroom-based writing instruction was teacher-student interactive; a positive outcome as a result of recent university English teaching reform in China. When answered the question, “how would you describe your strongest purpose to learn English in general”, just under half (45%, n = 165) of the participants reported, “I like English very much” and 77% (n = 282) reported that they wanted to find a better job in the future. The response rate (77%) suggests that well over half of the participants (n = 282) lacked an “intrinsic motivation” (Ryan & Deci, 2000) for their further language development\(^\text{17}\). Data on participants’ self-evaluation of their perception of English writing difficulty, on a scale of 0 (very easy) to 10 (very difficult) is presented in Table 3.3. It is worth noting that only about 14% (n = 52) of the participants reported that English writing was very difficult to learn.

Table 3.3

<table>
<thead>
<tr>
<th>English Writing Difficulty</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very difficult (8-10)</td>
<td>52</td>
<td>14.2</td>
<td>14.4</td>
<td>14.4</td>
</tr>
<tr>
<td>A little difficult (5-7)</td>
<td>187</td>
<td>51.0</td>
<td>51.9</td>
<td>66.4</td>
</tr>
<tr>
<td>Easy (1-4)</td>
<td>114</td>
<td>31.1</td>
<td>31.7</td>
<td>98.1</td>
</tr>
<tr>
<td>Very easy (0)</td>
<td>7</td>
<td>1.9</td>
<td>1.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>98.1</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>367</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further investigation into the participants’ perspectives on their own problems in writing in English, as well as their perceived teaching methods, suggested that 279 students (valid percent: 76%) felt they had limited vocabulary for expressing their ideas accurately in the writing, while

\(^{17}\) According to Ryan and Deci (2000), intrinsic motivation is the self-desire to seek out new things and new challenges, to analyze one’s capacity, to observe and to gain knowledge. It is driven by an interest or enjoyment in the task itself, and exists within the individual rather than relying on external pressures or a desire for reward.
more than a half of the participants (68%) acknowledged their mother tongues’ influence in English writing. As for the teaching methods, 212 students (valid percent: 58%) said that they received feedback and strategy instruction from their English teachers in class while only a few of the participants (n = 85) had experienced “peer review” in their educational experience in learning to write.

In Phase 2, a quasi-experimental approach was employed. Two groups of EFL student writers with different levels of English proficiency from the participants in Phase 1 were assigned to the control and experimental groups as described in section 3.3.1. Prior to the intervention, all the participants were asked to sit a test to ensure that they had comparable levels in computer use frequency (for example, shopping online, playing computer gaming, Internet chatting, downloading, uploading, etc.) and could type at least 15 English words per minute demonstrating keyboard proficiency. In addition, as all the selected participants were willing to participate in the study, it would appear they realized that, even though they were not English major students\(^\text{18}\), English language learning was closely relevant to their academic success.

Table 3.4

Descriptive Data of Participants’ Characteristics in Phase Two

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Gender</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>ExpG</td>
<td>32</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid percent = 31.25%</td>
<td>Valid percent = 68.75%</td>
</tr>
<tr>
<td>ConG</td>
<td>32</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valid percent = 37.50%</td>
<td>Valid percent = 62.50%</td>
</tr>
</tbody>
</table>

Note. ExpG = Experimental Group; ConG = Control Group

\(^{18}\) When I refer to these potential participants, from the practical perspective, the students who entered their names for CET-4 test will be considered as those who realized the importance of learning English.
As shown in Table 3.4, the two groups consisted of 64 year-two students in their first semester (a total of 16 weeks), with an average age of about 20. At the time of the study, all participants were enrolled in a compulsory English reading-and-writing course. All participants attended classes in the Writing Lab where computer terminals were housed and specialized technical personnel were available to maintain the computers. They were given access to Lenovo (In China, this is a commonly used famous domestic brand that the government authority designated to purchase for the universities) Yangtian M3320 terminals linked to the campus network. All work was completed on a computer: Starting the writing task, editing, composing, revising, and submitting written products. The participants in the experimental group attended a 16-week writing instructional programme, in which they were taught how to write in EFL using a metacognitive guide that raised their awareness of various factors related to writing. The control group received the regular mode of language instruction without the metacognitive component.

3.3.3 Training of the Group Participants

For the study to proceed smoothly and effectively, the participants were trained in the procedures for the study before the implementation of intervention.

Firstly, it was necessary to ensure the conduct of instructional activities in the class proceeded smoothly. Phase 2 in this study investigated the impact of the implementation of an intervention that provided guidance on the use of metacognitive strategies for students within the theoretical framework of Flavell’s metacognitive model. As the instructional programme was conducted in English, based on the university’s requirements, the strategy functions and the explanations needed to be simplified given the range of students’ English language

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19 According to the educational administration code, there are two semesters in an academic year in China’s universities with each semester divided into roughly 16 weeks, including one week suspended as a national statutory holiday. The first semester usually begins in September and the second semester in March.

20 The English Reading-and-Writing course is designed to improve undergraduates’ EFL reading and writing proficiencies with the national unified syllabus and help students prepare for the national CET-4/6. The course is compulsory and generally speaking quite popular among Chinese university non-English-major students.
proficiency. Many researchers in language learning strategies have observed (e.g. Cohen, 2011) that no matter what kind of strategy is implemented, the learner’s level of language proficiency has to be considered as a variable. Therefore, during the Phase 2 orientation meeting with the participants, the teacher was asked to give specific instructions with careful explanations about the pedagogy of the instructional programme. The teacher was told, also, to avoid using jargon to ensure the participants’ understanding of the procedures and requirements. During the orientation, the participants were briefed on the purpose of the study and informed of their rights to withdraw from the research at any time.

Secondly, it is essential that data collection process proceed smoothly. In Phase 2, qualitative data was collected by means of interviews and journals, which required participants to know what was expected of them in a data collection process (see, e.g., Bowles, 2010; Smith, 2014). The interviews were well structured and the participants were required to follow the guidelines in “My Weekly Learning Journal” when completing their journals (see Appendix L). The researcher prepared each of the 32 participants in the programme individually on how to conduct themselves during writing their weekly journals.

Thirdly, as Phase 2 was conducted in a multimedia environment, it was essential that all technology was working. When learning in such an environment, the participants must know how to seek technical help with the computers. Participants, therefore, were made aware of the rules for using the computer facilities and the need to follow rules for appropriate behaviours in the Writing Laboratory to ensure a safe and supportive physical working environment.

3.4 INSTRUMENTS AND SOURCES OF DATA

In language education research, Brown’s (2002, p. 11) general classification of research (as shown in Figure 3.2), research paradigms and methodologies provides an overview which guided the selection of data sources and instruments for this study. In this section, I describe
the research instruments that were adopted, and the rationale for selection, for collecting the data.

Figure 3.2

*Broad Categories of Research*

3.4.1 Questionnaires

The questionnaire is one of the most common survey instruments adopted in second or foreign language research (Dörnyei & Taguchi, 2010; Qin, 2009). A questionnaire usually consists of a series of questions and other prompts for gathering information from respondents (Dörnyei & Taguchi, 2010). The questions and prompts are developed with careful and strict design to optimise the measurement of various aspects of respondents’ characteristics, behaviours, and attitudes, especially their psychological aspects that are difficult to observe. A questionnaire, or survey, also has the advantages of being easy to construct, economical to administer, and efficient in obtaining a large amount of information, which makes it well suited to be conducted in the first stage of my study.

In this study, therefore, two questionnaires were employed. In Phase 1, a large-scale questionnaire concerning university students’ metacognitive knowledge and strategy use about
English writing in multimedia environments, namely, the *Metacognitive Awareness Inventory of EFL Writing in Multimedia-mediated Environments* (MAIME), was used. In Phase 2, another questionnaire that focused on metacognitive strategy use in multimedia environments, namely, the *Metacognitive Strategy Use Questionnaire in Multimedia Environments* (MSUQ-ME), was administered for further data collection.

### 3.4.1.1 Exploring Students’ Metacognitive Awareness through *MAIME*

Phase 1 was a large-scale investigation into Chinese student writers’ metacognition development. A review of the literature shows that in the past 40 years, research has developed a range of instruments for measuring the learners’ metacognition from a variety of perspectives. For example, Devine, Railey and Boshoff (1993) developed two research instruments: *The Cognitive Style Questionnaire* and *The Writing Autobiography* in their investigation of the role of metacognition in second language reading and writing. Kasper (1997) also used them in his assessment of the metacognitive development for English as second language (ESL) student writers. These questionnaires are accepted as valid and reliable measures and have been used in a range of empirical research on metacognition.

For this study, however, I found that these measures were problematic, for two reasons. First, as observed by a number of researchers (e.g., Jiang, 2003; Qin, 2009; Zhang & Xiao, 2006), the questionnaires focus only on some aspects relative to metacognition, and students’ linguistic backgrounds have largely been ignored; Second, these questionnaires were developed 20 years ago and have limitations in contexts in which computers and internet technology are used in language teaching and learning. Later researchers revised and made improvements from different perspectives or concerning particular questions from a wider range of educational studies (Hawthorne, 2008; Ruan, 2005; Sciarra & Seirup, 2008; Vandergrift, Goh, Mareschal, & Tafaghodtari, 2006; Zhang, 1999, 2010, 2008, 2013, 2014;
Zhang & Goh, 2006; Zhao, 2011). Their revisions shed some light on the development of the present questionnaire.

Jiang’s (2003) questionnaire, which has been used to investigate university non-English majors’ metacognitive development in EFL writing in the Chinese context, is, however, more relevant to the present study. The reliability and validity of this questionnaire were established in her doctoral work. The questionnaire used in this study, the *Metacognitive Awareness Inventory of EFL Writing in Multimedia-mediated Environments* (MAIME) (see Appendix E), is based mainly on her questionnaire. To make it more appropriate for a multimedia writing environment, each item concerning the writing was narrowed to focus on writing in a multimedia environment. For example, item 14 concerns the help-seeking strategy use. Jiang’s (2003) original version expressed the statement in generalities. *I make sure I find out support to stimulate my inspiration when I do not know how to do the writing task when I write.* The revised version was specific to multimedia writing environments with support from various multimedia tools: *I make sure I find out from multimedia support to stimulate my inspiration when I do not know how to do the writing task when I write (texts, pictures, audios, videos, online class, etc.).* Furthermore, some new items were added which had a close connection with other metacognitive strategy taxonomies identified in the literature (for example, Tarricone, 2011). For example, item 41 concerns the self-revising strategy use. *As I write, I modify the errors, following the prompts on the computer screen.* To be more relevant to the use of self-revising strategies in multimedia environments, this statement was added: *Following the prompts on the computer screen.*

Closed-response questions are used in the questionnaire to collect more accurate and discriminating responses. As the questionnaire is administered to a large cohort of respondents in the university, closed-response questions “make it [the questionnaire] easier demonstrate the reliability and validity of the instrument as a whole” (Ruan, 2004, p. 56). The participants’
rating of these items is on a six-point Likert-type scale (Brown, 2004), with a value of 1 (Strongly Disagree), 2 (Usually Disagree), 3 (Slightly Disagree), 4 (Moderately Agree), 5 (Usually Agree) and 6 (Strongly Agree). The number of response categories for this study was based on a review of previous literature, which had identified that response patterns to a Likert scale differ according to the cultural background of the respondents (Brown, 2004; Lee et al., 2002). This is particularly relevant to the present study as the participants are all from the Chinese culture. According to Lee et al. (2002), Chinese and Japanese tended to select the midpoint of the Likert scale more frequently on items that items concerned with emotion than Americans. Therefore, the six-point scale design, which avoids the midpoint (Neither Disagree nor Agree) of the Likert scale was better suited to my research in assisting the participants represent their attitudes, experiences and behaviours more specifically as, “a more elaborate 1-6 scale would help the participants to pinpoint their degree of agreement/disagreement with more precision” (Amani, 2014, p. 74). In the absence of a “no opinion” decision, even number judgement data will elicit participants’ opinions or attitudes, through answers such as “Agree” or “Disagree”, to make the responses into a dichotomous variable for data analysis (Kim, 2013).

The MAIME consists of two parts. Part 1 concerns the participants’ background information and their beliefs about writing in English; it includes age, gender, years of English study, English proficiency, English writing proficiency, practice in writing in English, beliefs in evaluating a good composition, self-reported writing difficulty, experience of teaching methods, and English learning motivation. Part 2 is the self-report section designed to assess participants’ metacognitive awareness in writing in English, in particular in multimedia environments rather than English learning in general. Three main categories of Flavell’s metacognitive model: Person, task, and strategic variables, as well as the metacognitive experiences are implicit in the questionnaire. The focus, however, is on assessing the students’ metacognitive awareness when engaged in using computers for writing in and out of class.
Table 3.5 presents the design of the second part of the questionnaire based on Flavell’s (1976, 1987) theoretical framework.

Table 3.5

**A Survey of Chinese EFL Writers’ Metacognition in Multimedia Environments**

<table>
<thead>
<tr>
<th>Super Categories</th>
<th>Descriptions</th>
<th>Sub-categories</th>
<th>No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metacognitive Knowledge</strong></td>
<td>Refers to what individuals know about themselves and others as cognitive processors</td>
<td>Person</td>
<td>1-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Task</td>
<td>7-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Strategy(C/S)*</td>
<td>11-16</td>
</tr>
<tr>
<td><strong>Metacognitive Experience</strong></td>
<td>Refers to those experiences that have something to do with the current, on-going cognitive endeavour</td>
<td>Positive Experience</td>
<td>17-21, 23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Negative Experience</td>
<td>25-27</td>
</tr>
<tr>
<td><strong>Metacognitive Regulations</strong></td>
<td>Refers to conscious control processes such as planning, monitoring of the progress of processing, effort allocation, strategy use and regulation of cognition</td>
<td>Planning</td>
<td>28, 30-32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monitoring</td>
<td>33-42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Evaluating</td>
<td>43-50</td>
</tr>
</tbody>
</table>

*Note. Strategy (C/S)* = Cognitive or Social Strategy

3.4.1.2 Intervention to Help Students Improve Metacognition

Phase 2 was a quasi-experiment, the participants of which were a subset of the Phase 1 participants. They had volunteered, and were chosen, to participate in the English writing instructional intervention programme. They volunteered by returning “the Consent Form” (see Appendix D) attached to the Phase 1 questionnaire. One hundred and six students applied for the programme, from which 64 volunteers were confirmed as the second phase participants.

Another questionnaire, *Metacognitive Strategy Use in Multimedia Environments Questionnaire* (MSUQ-ME), which was focused on the investigation of metacognitive strategy development, was developed and administered to the students in the two groups immediately after the pre-and post-test writing tasks (see Appendix G for all the items).
The self-reported MSUQ-ME drew upon a variety of sources (Amani, 2014; Purpura, 1999; Samuelstuen & Bråten, 2007; Tsai, 2004; Zhao, 2011). Among them, Amani’s (2014) 20-item Metacognitive Strategy Questionnaire (MSQ) and Wang’s (2009) Questionnaire on Metacognitive Strategy Use of Students with Different Levels of English Proficiency in Multimedia Environments (MSU-SDLEPME) were particularly relevant to the present study. Amani’s (2014) MSQ represented four types of strategies: Planning, considering the audience, monitoring, and evaluating. In connection with this study in the Chinese context, the students learn English in a classroom-based environment, and all the written products are submitted to their teachers in English for feedback or scoring. Therefore, the category of “considering the audience” was deleted while three other categories, planning, monitoring, and evaluating were adopted in the study. As with the questionnaire I (MAIME) in Phase 1, some items were adapted for use specifically in a multimedia writing environment. For example, item 11 concerned the self-revising strategy use. Amani’s (2014) original version was, \( \textit{when I was writing, I tried to think about whether I was spelling some words correctly.} \) For multimedia environments the revised version was, \( \textit{when I was writing, I tried to modify the spelling mistakes, following the prompts on the computer screen.} \) I also consulted Wang’s (2009) questionnaire, MSU-SDLEPME, and added three metacognitive strategies (included in Items 13, 14, 16, 17, and 18), which pertain to performance in a multimedia environment to this questionnaire.

As in the MAIME questionnaire used in Phase 1, the participants were asked to make evaluative judgments on a six-point Likert scale. In order to give participants the opportunity to respond freely to questions, Zhao’s (2011) open-ended Writing Strategy Application Survey (WSAS) was employed in the study, as open questions “enable the researcher to trawl for the unknown and the unexpected” (Gillham, 2008, p. 34) so that in-depth answers may be gathered from the respondents in this study.
The final version of the MSUQ-ME includes both close-ended statements (18-items) and open-ended questions (3 questions). These questions were designed to assess the three categories of metacognitive strategies: Planning, monitoring, and evaluating during the students’ writing processes. Specifically, the first five items relate specifically to the planning strategies, the next eight items relate to the monitoring strategies, and the next five items relate to evaluating strategies. At the same time, participants are also encouraged to respond to the open questions in their own words after each category.

3.4.2 The Pre-and Post-Writing Tests

Judging students’ writing achievement by asking them to finish a written product has been a common practice in writing performance assessment. In order to examine the impact of the instructional programme on the student writing performance in multimedia environments, pre-test, immediate, and delayed post-tests were employed before and after the students participated in the programme. The composition form and genre (the argumentative essay) for the tests in this study were selected from the College English Test (CET) for two reasons: First, the CET test is a nationally standardized examination of the largest scale to assess the English proficiency of non-English majors in China’s colleges and universities. Its importance has been widely recognized by the university students in China (as discussed in Chapter 1), and it is generally accepted as the China’s most widely used high-stakes English proficiency test; Second, according to the information on the CET website (http://www.cet.edu.cn/), the test has been carefully designed and developed by a team of testing experts in China. Its validity has been widely recognized, and it has been accepted as a reliable benchmark for English proficiency currently used in China’s colleges and universities.

Given that CET test topics are disseminated in public and the students could have easy access to model essays online, I chose the topics for the tests according to the students’ background knowledge to ensure it was original work written by the students themselves. To
enhance students’ engagement, the topic familiarity to the participants was guaranteed by help from experienced teachers and researchers in this university.

In contrast to the traditional administration of the CET test (examinees sit an exam with strict time constraints with paper and pen), the participants in my study sat the writing tests in the Writing Lab by using the computers. Moreover, in the standard CET test, only 30 minutes was allowed for the writing task while the participants in this study were allowed to have 40 minutes to finish their essays. This was to ensure the participants had enough time for preparation of their writing tasks’ using modern technology, such as online information searching, online dictionary use, and Microsoft word’s usage. The extra 10 minutes’ preparation time was based on the studies of researchers who investigated the impact of planning in writing, such as Amani (2014), Ellis (2005), and Ong (2014). They were also required to submit their compositions online immediately afterwards.

The first topic, in the pre-test before the writing course, concerned the widespread use of the computers and smart phones. The second topic, in the post-test immediately after the writing course, concerned online shopping. The third topic, in the maintenance test, concerned with the relationship between academic study and the use of mobile phones. To guarantee the inter-consistency in difficulty of the three tests, I consulted language test experts who have doctoral degrees in the language testing research field. The following steps were taken: Firstly, all three topics were taken from the CET real tests but were redesigned for the research tests using the same form and genre. The topics were relevant to the study life of present university students in China, that is, the three tests were internally homogenous in form and genre based on the rationale of the CET authentic tests. Secondly, all three tests were held in the same conditions, using the same computers to write in the Writing Lab with the same time limit of 40 minutes. Thirdly, all the essays were similar in a word requirement of no less than 120
words but no more than 180 words (see Appendix I). Fourthly, the same assessment criteria were used to evaluate all participants’ written products.

The assessment criteria were adapted from “ESL Composition Profile” of Jacobs and his colleagues (1981, p. 90). This marking rubric has been widely employed in the quality evaluation of the students’ written texts (see, e.g., Cahyono, 2015; Hasan, Muhammad, & Aswandi, 2015; Lee, 2013; Ong & Zhang, 2013; Ruan, 2005; Teng & Zhang, 2016; Zaini & Mazdayasna, 2015). There are five components of writing performance: Content, organization, language use, vocabulary, and mechanics. Each component is weighted in the rating scheme as follows: Content (30 points), organization (20 points), vocabulary (20 points), language use (25 points), and mechanics (5 points) (see Appendix J for the detailed criteria and the operational measures).

Jacobs et al.’s (1981) marking rubric is particularly useful for teachers to evaluate the students’ compositions in a practical way (Cahyono, 2015). It has a clear illustration of the writing components and the criteria of evaluation (Harris, et al., 2009, as cited in Cahyono, 2015), with a rating system consistent with that used by Chinese instructors. The marking rubric was used, therefore, for the evaluation of the participants’ written products collected in this study.

Two evaluators, trained to use the marking rubric, were invited to mark the written products. Each composition was submitted to the online automatic scoring system and a holistic score was obtained by comparing the students’ compositions with the standard established language corpus. The score was used only for reference, to guarantee the reliability and objectivity of each score. The final score was compiled by two experienced teachers who have expertise in second language acquisition.
3.4.3 Semi-structured Interviews

The interview is known as “the most commonly used method of data collection in qualitative research” (King & Horrocks, 2010, p. 1). Compared with “objective” written products and self-reported one-to-six numerical questionnaire, interviewing gives the researcher access to a person’s “subjective” world (Gillham, 2005). Most importantly, as a kind of retrospective report, interviews have the advantage of “tracing the development of the metacognitive knowledge through interactions between interviewer and interviewees, an advantage that is absent from think-aloud and questionnaire studies” (Ruan, 2005, p. 63).

There are many different types of interviewing which vary in terms of the amount of structure that the researcher imposes on the interviewees (see, e.g., Bryman, 2012 for a detailed explanation). Generally, interviews can be categorized into three main types: (1) structured interviews; (2) semi-structured interviews; and (3) unstructured interviews (Bryman, 2012). Considering that, with the structured interviews, the interviewee is limited to the choices of possible answers they can provide and with an unstructured interview the interviewee may digress from the research topic (Bryman, 2012), a semi-structured interview was adopted in the present study. Bryman (2012) defines a semi-structured interview as:

The researcher has a list of questions or fairly specific topics to be covered, often referred to as an interview guide, but the interviewee has a great deal of leeway in how to reply. Questions may not follow on exactly in the way outlined on the schedule. Questions that are not included in the guide may be asked as the interviewer picks up on things said by interviewees. But, by and large, all the questions will be asked and a similar wording will be used from interviewee to interviewee. (Bryman, 2012, p. 471)
This definition shows the semi-structured interview allows the researcher to explore freely the interviewees’ thinking through allowing for greater flexibility. In this study, the semi-structured interview was employed as a tool for different purposes at different stages. It was used to try to depict a holistic view of the students’ metacognitive knowledge and use of strategies when engaged in EFL writing in the multimedia environments. It also enabled an insight into the students’ perception of the impact of the intervention on their writing improvement.

A semi-structured interview guide (see Appendix K) with “open” questions was prepared and designed before the pre-intervention stage and at the post-intervention stage, to gather more information about participants. At the pre-intervention stage, there were two sets of questions prepared to elicit the participants’ responses, including general and specific questions. The general questions were designed to explore information such as the participants’ language and education backgrounds, their experiences and beliefs about using modern technology to learn writing in English, and their previous experiences of teaching English. The specific questions were adapted from Kim (2013)’s semi-structured interview questions, which he had used to investigate Korean students. Due to the similarity of English learning environments in China and South Korea, the instrument was appropriate for interviewing Chinese university students.

At the post-intervention stage, a semi-structured interview was conducted to evaluate the effectiveness of the intervention. The interview guideline included questions on three main areas: The participants’ metacognitive awareness development, their EFL writing in multimedia environments, and their perceptions of the writing course. The semi-structured interviews were arranged for pre-course and end-of-course stages individually.
3.4.4 Journals Recorded after Class

As Nunan and Bailey (2009) observe, keeping a journal or diary for research purposes has been recognised as a useful method in the field of second or foreign language teaching and learning since the late 1970s. Journal study can be defined as “a first-person account of a language learning or teaching experience, documented through regular candid entries in a personal journal and then analysed for recurring patterns or salient events” (Bailey, 1990, p. 215). Compared with interviews and questionnaires, learner journals are usually less structured. Journals can provide a valuable source of information and insight regarding learners’ experiences, feelings, perceptions, and strategies they use when facing difficulties. They provide regular longitudinal self-reported track of the learners’ learning processes, thereby allowing the researchers to access learners’ hidden views over time (Nunan & Bailey, 2009). In this regard, the student journals were integrated into the research design of the present study for the purpose of probing more deeply into the participants’ dynamic mental activities.

At the orientation meeting before the instructional programme began, the two groups of students were informed that they were required to keep a journal at least once a week and the journal would be entered as an important link of the whole writing session. A journal guide was also provided in this meeting outlining the main purpose of the journal. The students were asked to write their views and perceptions of the writing course, their approaches to the assigned writing task, their problems encountered in writing, and their plans and practices towards these problems. They were given no requirement as to how long they should write in each journal, and which language to use (English or Chinese), as long as they felt that they could fully express their thoughts and feelings (Most of the participants opted for Chinese).

The participants’ journals were a convenient way for students to communicate with the instructor, keeping the instructor informed of how they felt about the instructional programme during the semester. They were also a research tool: As Nunan (1992) pointed out, journal
entries could reveal learners’ language learning processes that the researchers could not access through direct observations. In this regard, the journals were a further way of gathering valid and reliable data from the participants. Information gleaned from the student journals was triangulated with data from the interview data to enable a comprehensive analysis.

3.5 THE METACOGNITIVE INSTRUCTION INTERVENTION PROGRAMME

This section provides information about the instructional design of the metacognitive strategy-focused multimedia EFL writing instruction and its implementation for the students in the experimental group. The first part outlines the context of the EFL writing instructional practice as well as the multimedia application in the university the participants attended. The second part introduces the instructional procedures for implementing the strategy training.

3.5.1 The Metacognitive Strategies-focused Multimedia EFL Writing Instruction

3.5.1.1 The Institutional Context of the Intervention Programme

In Chapter 1, I discussed English language teaching and learning in Chinese universities (see section 1.2.2), and described the participating university as the context in which the study took place. The English language course in the participating university, as is the case in all other Chinese universities, follows the National College English Syllabus. College English is a compulsory course in the National College English Syllabus for all the enrolled students in their first and second years’ academic study (except English majors in the foreign language faculty). In the participating university, this course is subdivided into Listening and Speaking, in which the students focus on listening and speaking abilities in the language laboratory, and Intensive Reading, incorporating reading, writing and translation practice in class. At the end of the first semester of the second year of academic study, students are allowed to sit for the high-stake nationwide English test for non-English majors, known as College English Test (CET-4), in which the first part is a short essay writing task (see section 1.2.3.3).
In the participating university, multimedia systems are used to support instruction in all the lecture rooms and the students have easy access to the wireless network covering the whole campus. Furthermore, the Faculty Multimedia Center in the university is committed to providing expert support for student and faculty success in teaching and learning on multimedia projects.

It is in this context that the current metacognitive strategy-focused multimedia EFL writing instruction was implemented. The participants were 64 year-two non-English major students, who were selected to participate following the voluntary completion of the questionnaire I (MAIME). They (22 male and 42 female students) were allocated to two parallel classes with an average age of 19.5. The experimental group underwent a 16-week metacognitive writing strategy training programme but the control group exposed only to the relatively more traditional, teacher-centred, mode of writing instruction.

These students had learned English for 6 to 9 years from elementary schools to secondary schools before entering the university. None of them had studied abroad in English-speaking countries. All would sit for the national CET-4 test for their English proficiency at the end of the semester, as required by the university.

None of the students had yet received formal instruction on English writing, particularly in multimedia environments, although they had been offered English language lessons for two semesters during their first year of study in the university. Most of their lessons had been concerned with developing reading, listening and speaking skills while writing skills were occasionally referred to in the Extensive Reading class. Furthermore, in almost all Chinese universities, the English courses are test-oriented lacking opportunities to use English language in real communication environments. In the participating university, as in many other universities, CET-4 is a high-stakes test, the scores of which are crucial in evaluating the university’s English teaching and for students. Moreover, CET-4 is the minimum language
requirement of many corporations in the job market, and so passing the test is part of preparation for job seeking after graduation.

3.5.1.2 Writing Instruction in the Participating University

The College English Teaching Section is the largest department in the university. It offers English language skill training courses on listening, speaking, reading, writing, and translation to all students during the first two years of academic study, except English majors who study in the Faculty of Foreign Languages. Five native English speakers are employed in the faculty to teach speaking-skill courses and hold an “English Corner”\(^{21}\) (one hour per week) for the students on a voluntary basis. All the other courses are CET (Band 4/6)-oriented, in which students meet their instructors twice a week for two different sessions. Writing is embedded in the \textit{Intensive Reading} course, in the form of short argumentative essay writing to prepare students for the writing section in CET (Band 4/6). Although first-class multimedia tools are available in the university, they are seldom used for English writing instruction but are often used for other courses such as \textit{Basic Computer Skills}, \textit{Basics of Computer Programming}, and \textit{Networking} to provide students with broader career choices after their graduation.

Another feature of the courses offered by the College English Teaching Section is the prevalence of a traditional lecture-dominated approach to teaching, even in multimedia classrooms. The traditional product-based approach still prevails among the faculty English teachers. They perform the role of ‘directors’, guiding students to complete a writing task in class. Because of the influence of CET, the genre of writing is usually focused on argumentative essays. Therefore, in a typical English writing class, the teacher spends most of the time teaching the students the components of the argumentative essays, usually called “the three-paragraph essay” (introduction, argument, and conclusion). The class focuses on aspects

\(^{21}\) The phrase \textit{English Corner} commonly applies to informal periods of instruction in English held at schools and colleges in China. As an informal session the topics can be far ranging. In the participating university, English Corner activities are held on Friday afternoons after lunch, usually lasting one hour.
of language use and sentence structures through an analysis of a “model essay” by the teacher. If time allows, the teacher will ask the students to write the composition assignment independently after class, and provide evaluative feedback soon after the students submit their assignments.

As Ruan (2005) observes, it is not a common practice for the students to produce multiple drafts of their assigned writing task. Most students accept instructions passively, only to wait for a score from their teachers. Furthermore, although the College English Teaching Section has adopted the Computer-assisted Instructions (CAI) in curricula, many teachers are neither aware of such technology-rich learning resources and learning environments, nor ready to use them to support students in successful language learning. EFL student writers often face difficulty in writing using computers as they lack guidance and familiarity with aspects of multimedia components.

3.5.2 The Instructional Design

The metacognitive strategy-focused multimedia EFL writing instruction programme was implemented in the participating university to develop student writers’ writing performance as well as their self-regulatory process in the multimedia environments. It was expected to promote educational technology as an integral and interactive part of the curricula. It was anticipated that faculty members would benefit from adopting such pedagogical practices and encouraged to create richer learning environments.

Enhancing a student’s academic writing skills in multimedia classrooms does not simply entail supplying multimedia tools. The development of independent academic writers requires specific processes to enhance metacognitive awareness in multimedia environments (see Section 2.5.3). In the current study, a control group and an experimental group comprised of 64 non-English majors were selected based on random assignment. Both groups were taught within multimedia environments but the experimental group was provided with metacognitive
strategy-oriented instruction. The control group received traditional product-oriented instruction, as was the practice in the participating university. In order to ensure that I can collect the real data for the study, however, the participants were not told whether they were in an experimental group or control group. The course was outlined in the course profile below, taken from Ruan’s (2005) portfolio of the course components.

**Course title:** Basic English Writing for Non-English Majors

**Course status:** Selective

**Students:** Year-two non-English major voluntary students in two separate multimedia classrooms. Every student was provided with access to a computer in class.

**Class time:** 16 hours of class instruction, 1 hour per week for 16 weeks

**Course duration:** 1st semester of the academic year, from September 2015 to January 2016. At the end of the course, the CET-4 was going to be conducted.

**Instructor:** An experienced instructor with a master’s degree in applied linguistics who has taught EFL writing for five cumulative academic years. She taught both groups.

### 3.5.2.1 The instructional intervention

The main goal of the intervention was to investigate the impact of an instructional process targeting the development of metacognition, supported by multimedia learning resources, on writing in L2 by EFL students. The course focused on planning, monitoring, and evaluating as well as the coordination and regulation of these processes in L2 writing. The intervention and course on L2 writing drew on extensive research on metacognitive strategies (e.g., De Silva, 2015; Graham, Harris, & Mason, 2005; Graham, McKeown, Kiuhara, & Harris, 2012; Harris, et al., 2008; Harris, Santangelo, & Graham, 2010; Mayer, 2014; Xiao, 2007; Yang, Yeh, & Wong, 2010; Yeh, 2015), but the instructional package was based mainly on three resources: (1) the eclectic approach of “the cycle of strategy instruction” developed by De Silva (2015) used to develop a model for process-based writing; (2) the academic writing course design for
online writing developed by Yeh (2015), which had a focus on metacognition in relation to the use of multimedia in writing. Mayer’s (2014) multimedia learning principles were used to optimize instructional design decisions to support the development of students’ self-responsibility for their own writing in the multimedia environments. For example, given the complex multimedia learning environment, the participants may need proper guidance from the teacher on how to select and utilize the right information to enhance their writing efficiency. As Mayer (2014) claims, the instructional design should consider the students’ “limited capacity” presented in a multimedia environment. Students may experience intrinsic and extraneous cognitive load when they are learning to write in such a context. Unlike intrinsic cognitive load which is normally fixed and generally unchangeable, extraneous cognitive load “is unnecessary and extraneous to the learning goals” (Sweller, Ayres, & Kalyuga, 2011, p. 57). Therefore, the instructor needed to consider thoughtfully to reduce extraneous cognitive load when she designed the writing task in order to increase learning efficiency and maximize the learning outcomes; (3) the mnemonic strategies, such as TREE, POW and WWW, What = 2, How = 2 strategies, were used to enhance “students’ independent use of the target strategies and accompanying self-regulation procedures” (Graham, Harris, & Mason, 2005, p. 217).

The instructional sessions were carried out for the experimental group after the participants’ writing ability (the experimental group and the control group) had been assessed through the pre-test writing. Each session lasted for one hour. Students were required to practise the strategies individually, after class, by completing assignments to internalize

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22 According to Graham, Harris, and Mason (2005), the general planning strategy students are taught included three steps, represented by the mnemonic POW: Pick my ideas (i.e., decide what to write about), Organize my notes (i.e., organize possible writing ideas into a writing plan), and Write and say more (i.e., modify and upgrade the plan while writing). With this strategy, they ask themselves the following questions represented by the mnemonic, WWW, What = 2, How = 2: Who are the main characters? When does the story take place? Where does the story take place? What do the main characters want to do? What happens when the main characters try to do it? How does the story end? How do the main characters feel? Once students have mastered using these strategies, they are taught how to focus on generating writing content relevant to persuasive essays. This strategy, represented by the mnemonic TREE, prompted students to do the following: Tell what you believe (State your topic sentence), give 3 or more Reasons (Why do I believe this?), Examine each reason (Will my reader buy it?), and End it (Wrap it up right).
knowledge they learned in the course. To comply with course objectives specified in the College English Teaching Syllabus (see Section 1.2.2 for details), the current instruction was divided into 16 sessions. In each session, the students were taught metacognitive writing strategies to enhance their writing performance. The lesson plans had step-by-step directions for each session for the instructor to use with the experimental group. The instructor and I met weekly to discuss any problems that occurred to ensure the instructional programme was delivered with integrity.

The control group had the same number of teaching hours and the same teaching content, under the same multimedia environment conditions. The instructor, however, taught the students using the traditional L2 writing instructional approach. I observed some of the instructors’ lessons in the control-group class to ensure that the students did not receive any explicit and systematic training in metacognitive strategies. I also observed some of the instructors’ sessions with the experimental class to ensure the training package were implemented correctly. General writing instructional strategies were a component of the course with an emphasis on metacognitive strategies for the experimental group (see Appendix M for the structure of each teaching session for the whole course). Each teaching session was presented using PowerPoint slides to support the teacher’s instruction.

As well as ensuring the integrity of the instructional package through adequate preparation of lesson plans, instructional materials, and the PowerPoint slides, Amani’s (2014) recommendation that the instructor’s choice of words in his/her teaching and students’ self-questioning strategy-training were crucial to “invoke a thoughtful classroom” (p. 83), was also adhered to in this study. Amani (2014) advocated the use of instructional words, such as think, imagine, reflect, hypothesise, predict, guess, expect, explain, support, classify, clarify, or justify and these were included in the instructor’s training. Kolencik and Hillwig (2011), have also
argued that teachers’ language use in class could help students “regulate the thought processes by providing a culture of concepts to guide thinking and reflect on one’s own thinking” (p. 14).

Second, during planning, monitoring, and evaluating strategies as part of the metacognitive training, the instructor was required to highlight the process of self-questioning to promote students to grow as critical thinkers. Examples adapted from Chamot et al.’s (1999) metacognitive model of strategic learning to encourage self-questioning to improve their self-awareness of becoming independent writers were included in the programme. The checklist (see Table 3.6) was given to the participants at the beginning of the course to guide their practice. Students were encouraged to master a repertoire of strategies, recorded in the checklist, to use independently and systematically in their writing tasks in the multimedia environments, and to record use of the checklist in their journal. The journal was collected by the instructor and reviewed by the researcher (me) at the end of each session. Comments were also made on each student’s journal by the researcher (me).

The general procedures of the instructional metacognitive training were recorded in a checklist in Table 3.6 as follows:

Table 3.6

*The Regulatory Checklist*

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Self-questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>What is my goal for this task? What do I want to be able to do?</td>
</tr>
<tr>
<td></td>
<td>How can I focus my attention? How can I ignore distractions?</td>
</tr>
<tr>
<td></td>
<td>What do I already know about this?</td>
</tr>
<tr>
<td></td>
<td>What do I think will happen?</td>
</tr>
<tr>
<td></td>
<td>What might I need to do? How can I plan for the task?</td>
</tr>
<tr>
<td></td>
<td>How can I best accomplish this task? What do I know best?</td>
</tr>
</tbody>
</table>
Monitoring

Do I understand this? Am I making sense?
What parts should I pay most attention to? Is this information important?
Which rule can I apply to help me in this situation?
How does this fit with my experiences? How does this fit in with the real world?
What important information can I write down?
Can I imagine a situation or draw a picture that will help me understand?
Can I use real objects or act out the situation to help me do this?
What strategies can I use to help me?
How can I work with others to do this?

Evaluating

Were my predictions and guesses right? Why or why not?
What is the gist of this? What is the main idea?
Did I meet my goal?
How well did I do?
Did I choose good strategies? What could I do differently next time?

*Source: Adapted from Chamot et al. (1999)

Tasks in the planning stage

An aim of this study was to ensure that the student participants in the experimental group would acquire planning strategies to become good writers, as planning “plays a central role in the writing of many successful authors” (Graham, MacArthur, & Fitzgerald, 2013, p. 120). The first two sessions began with Goal-setting (De Silva’s cycle of writing strategy instruction). In the first session, students were required to write their goals related to the course objectives and their own academic language task performance. The instructor introduced the concept of metacognitive knowledge about planning strategies through whole-class discussion to enhance students’ awareness of preparing for writing and to discover the value and benefits of planning in writing.

Meanwhile, the researcher and the instructor discussed the rationale for the optimum use and management of the multimedia components, which were then implemented. In the
second session, the writing goals were reviewed and an action plan developed. The third session focused on *Task Analysis*, during which the participants were trained to analyse the writing tasks they were required to accomplish according to the syllabus and requirements of the CET-4 examinational standard. Following the focus on planning for writing, pre-writing preparations were discussed and different planning strategies introduced and practiced. The students’ initial response was to write an outline, including key words, conjunctive words, content and language features. To activate their prior knowledge about a topic, a variety of pre-writing strategies were introduced in class, such as mind mapping, brainstorming, and self-questioning. They were encouraged to use multimedia tools to investigate and make decisions about topics, using online resources, such as an online dictionary to make appropriate vocabulary choices. The instructor also highlighted the differences in the rhetoric of Chinese and English essays by comparing and modelling explicit examples. Students were trained also to manage their time adequately during this phase through allocating an appropriate amount of time for each paragraph. In the Chinese educational context, writing in English often occurs in examinations, requires students to complete the writing tasks within a limited time. A salient theme could be relevant to this study is that students feel motivated to write when expecting recognition from exam scores (Ruan, 2014). Understanding this context has at least two points of relevance: (i) the students as writers seldom thought who their readers were because their written products were generally read by their teachers; (ii) managing time and allocating it adequately to each part of the writing was regarded as an important and useful skill in their writing. To make the activities engaging, the instructor prepared a model essay with the topic of recent rapid development of high-speed rail in China, a topic of recent interest, which had aroused wide public concern.

After that, the instructor modelled the procedures for applying strategies for generating ideas for writing by talking aloud, and using the computer in class for composing the writing.
Students were aware of the choices made by the instructor through listening and watching the screen at the front of the classroom. The instructor modelled the mnemonic TREE strategies from the Self-Regulated Strategy Development (SRSD) model, regarded as one of the most effective instructional strategies in teaching writing (Graham, McKeown, Kiuwhara, & Harris, 2012). The TREE strategies are: Tell what you believe (e.g. Topic sentence); provide two or more Reasons (e.g. Why do I believe this? Will my reader believe this?); End it, (i.e. Wrap it up right); and Examine it (i.e. Do I have all my parts?) (Harris, Graham, Mason, & Friedlander, 2008). The students were then organized in class for group discussion and whole-class activities to co-develop the instructional strategies based on the instructor’s model to complete writing tasks successfully. According to De Silva (2015), the next stage is the independent construction of the text by the student writers, with the instructional scaffolding gradually withdrawn. The students individually applied the modelled strategies to generate their own ideas based on the topic given by the instructor.

The key idea from this stage is that planning is an ongoing process, which “can take place at any time in the writing process” (Graham, MacArthur, & Fitzgerald, 2013, p. 194). The instructor encouraged the students to continue the planning process as the writing progressed. To scaffold the students in the process of planning while writing on computers, the instructor introduced the students to word-processing programmes which enable the deletion of redundant details, addition of new ideas to a plan, or expansion or modification of a sentence or paragraph by just clicking the mouse (ibid).

Tasks in the monitoring stage

During this stage, students were encouraged to monitor their writing performance and behaviour, and evaluate their effectiveness while working on the writing task. They were taught, explicitly and systematically, strategies to accomplish specific writing tasks. While monitoring, students were reminded that they needed to focus their concentration on specific aspects of the
During writing, “keeping on thinking…of how the essay had been developed so far and how it would finish smoothly” (Amani, 2014, p. 86). A series of instructional strategies integrated into various aspects of the writing task implemented from session 6 through to session 11. These included how to narrow the writing topic, write a topic sentence, develop an effective paragraph, self-regulate the consistency of the topic, and how to write a concluding paragraph. Through the instructional focus on enhancing their composing capability, the students were able to acquire and internalize strategies for their own use.

Computers can scaffold instructional contexts by providing access to the Internet so that student writers can easily and quickly search for information online to broaden their perspectives and deepen their understandings of selected writing topics. There are numerous attractions (e.g. videos, computer games, etc.), however, that easily distract students’ attention if there is a lack of supervision or individually internalized controlling procedures. Students and instructors, therefore, need to be aware of the importance of monitoring in such an environment. As Tsai (2009) pointed out, students who have a full understanding of the writing task they face, and who set goals associated with the completion of the learning task, were more likely to self-monitor their progress towards completing the goals. Tsai also argued that students who were aware of, and used, metacognitive strategies were more likely to benefit from Internet-based learning environments (Tsai, 2009). Therefore, special attention was given to monitoring at this stage in this study.

*Tasks in the evaluating stage*

In the final stage of the instruction, the strategy of evaluation was introduced using a process type of writing evaluation. This provided an opportunity for the student writers to reflect on their writing, to assess whether they met their goals, and to consider how they might use strategies better the next time.
The instructor guided the students in using the criteria based on marking rubrics developed by Jacob and his colleagues in 1981 to give feedback to peers on the content, organization, language use, vocabulary, and mechanics of their draft essays in terms. In the multimedia environment, the electronic draft essays were easily circulated among students in class, and read on the computer screen. Peer feedback and revision is a key component of instruction for improving the quality of written products. It generally has a positive effect when integrated with instruction in evaluation and revision (Graham, Macarthur, & Fitzgerald, 2013). Specific guidance was provided on how to give constructive and qualitative feedback, including micro-level and macro-level feedback. As students’ initial response to the drafts stayed at the micro-level, such as spelling, grammar, and punctuation, the instructor explained that writing well was more than proper grammar and spelling. Students were encouraged to go beyond editing for errors or adding minor details and to make more substantive revisions. Suggestions included adding ideas to enrich the content, deleting redundant components to make sentences more accurate and succinct, editing arguments to support the topic, and clarifying the genre as written language. The instructor and the students worked together to establish positive interactive environments to help further develop their own evaluation skills. Students were then encouraged to go through the drafts again, thinking about these aspects. It was a reciprocal process, which assisted students to become proficient writers who are critical thinkers.

Writing in multimedia environments involves using Internet technology to create a learning platform that can benefit from new and innovative technologies. Recent attention has focused on the positive effects on teaching strategies for revising writing in combination with use of technology-assisted tools (see e.g., Chang, 2016; Elola, & Oskoz, 2016; Shintani, & Aubrey, 2016). Given that specific criteria is easier for students to learn and easier to use in making revisions, Pigaiwang, one of the most commonly used online assistance platforms in
Chinese universities\textsuperscript{23}, was introduced to enhance evaluation and revising. The automatic essay scoring system provides a holistic score for each essay, real-time diagnostic feedback in terms of grammar, lexical usage, mechanics, style and organization, and other important additional functions, such as plagiarism checking, deadline setting, peer review, sample essay sharing, instructor interacting, etc. It is based on a linguistic corpora specifically tailored to the analysis of L2 student writers and linked to cloud computing. During the class, after reading the feedback from the peers, the students were required to revise the previous versions of their essays and re-post them on Pigaiwang. The system allows multiple submissions with each giving feedback, which in turn motivates students to produce final copies and stimulates their interest in learning to revise effectively. The automated, constructive feedback is a highly effective way for the students to monitor their written products and develop their evaluating skills. Without the automated essay evaluation tool as a plagiarism checker, it was not easy to pinpoint plagiarism in the student essays. From the technical point of view, Pigaiwang also serves as a safeguard to ensure the originality of the students’ writing in multimedia environments (see Figure 3.3 for reference).

As for the development of peer review process, the instructor’s role was indispensable. Many researchers have expressed concerns about the automated feedback of a written product’s content and its logic because of the limitations of artificial intelligence technology, (see e.g. He, 2016). Instructors, therefore, need to consider a repertoire of teaching strategies to cope with individual student’s revisions. During the class time in the experimental group, the instructor provided frequent opportunities for oral reflection, as a whole class or group, for students to provide additional and lengthier comments on the content, structure, and organization of each other’s essays. Through interactions between students and the instructor,

\textsuperscript{23} According to its official website, Pigaiwang has attracted more than one million users from over 1,000 universities, including top university users like Tsinghua University, Nanjing University, Fudan University, Shanghai Jiaotong University and so on.
students were enabled to make revisions that are more meaningful, and thus improve the quality of their writing in English.

Figure 3.3

*Screenshot of Student Essay’s Feedback from Pigaiwang*

![Screenshot of Student Essay’s Feedback from Pigaiwang](image)

3.6 DATA COLLECTION PROCEDURES

This section describes the data collection procedures for the two phases of the study, including the large cohort of questionnaire 1 (MAIME) administration in Phase 1 and the quasi-experiment study in Phase 2.

3.6.1 Phase 1: The Large Cohort of Questionnaire Administration

In Phase 1, data were first collected from a large pool of the second year students in the participating university by a large-scale questionnaire investigation (MAIME). Prior to the administration of the questionnaire, some preliminary work had been done. First, two different groups of participants were invited to pilot the questionnaire. An initial English version was
first piloted in June 2015 with the Chinese doctoral student community at the University of Auckland. They were chosen because most of them had teaching backgrounds in Chinese universities before they came to New Zealand to pursue a doctoral degree, and so their comments would likely be pertinent to my study. Their feedback provided an assurance that the questionnaire was suitable to be used in the Chinese university context, and that the items were generally clear and easy to respond to. Some redundant items were deleted and several wording problems were revised in the light of their comments. They were concerned, however, that although the questionnaire was written in plain English, the English proficiency of the potential would be variable. The revised version, therefore, was translated verbatim into Chinese, the students’ mother tongue, so that the prospective participants could clearly understand what was being asked for them. This prevented participants’ English proficiency from becoming a confounding factor in the questionnaire outcomes. An experienced English teacher in the university, who was a highly proficient bilingual academic writer, verified the translated version for accuracy and easy understanding. The revised Chinese version was piloted in September 2015 with 44 year-two students, in two classes, who were not participants for the research but were students at the participating university. On the one hand, the clarity and validity of the questionnaire were checked from the users’ perspective. Based on the students’ opinions and feedback, the questionnaire was further modified by deleting some overlapping items and items that were unsuitable for year-two students. On the other, the initial imputation of the data collected from the 44 students revealed that the data collected were normally distributed and the data met the assumptions of homogeneous variances, demonstrating the suitability for multivariate analysis. The completion of the questionnaire took from 10 minutes to 20 minutes.

24 I chose these two intact classes for piloting because they would go to another city for practicum when the formal investigation was administered later on.
After the pilot study was completed, permission was sought from the Dean of the Faculty of Foreign Language Studies and access was granted for me to carry out the investigation. The Dean’s secretary was appointed as a research assistant.

The MAIME was administered to the cohort of 400 students in September 2015, the start of a new academic year. All contact with the students was through the secretary. Firstly, with her help, the identity of the students in the cohort was kept confidential. Secondly, the secretary helped distribute the participant recruitment advertisement via social media such as QQ and WeChat, which are widely used in China for communication. So that the advertisement was published as an electronic bulletin on QQ and WeChat to publicise the research. Interested students could get a hard copy of questionnaire from the secretary’s office. Thirdly, the secretary also distributed questionnaire to, and collected the completed questionnaires from classes. Three hundred and twenty questionnaires were collected through classes while only 64 questionnaires were collected through advertising. All hard copy questionnaires were collected by the secretary and transferred to me for analysis.

3.6.2 Phase 2: The Quasi-Experimental Study

A quasi-experimental study was undertaken in Phase 2 with volunteer students selected from the cohort who had completed the questionnaire in Phase 1. Two groups of 64 students took part in Phase 2: One was the experimental group and the other the control group. As noted previously the two groups were taught by the same instructor. The control group was taught the regular English programme while the experimental group was taught the intervention, a 16-week writing programme focussed on metacognitive strategies for writing in an EFL programme. Two multimedia classrooms in the university were used as the student lectures, and the writing laboratory was used as the site for student writing tests. I trained the instructor prior to Phase 2 in the procedures outlined in the instructional package.
Data were collected over the course of 16 weeks, during which regular reports, that is, the students’ journals, were submitted to me on a weekly basis. I also observed the progress of the study through online and face-to-face communication during this period. The first data collection session was conducted in the first week of the new semester in early September 2015. Data were collected through a pre-course writing test to assess the participants’ writing performance at the start of Phase 2; the MSUQ-ME to establish the students’ metacognitive awareness and perceived use of metacognitive strategies; and a pre-course interview to gather more in-depth information about participants, including the participants’ language and education backgrounds, their experiences and beliefs about using modern technology to learn writing in English and their previous experiences about English teachers’ writing instruction.

Both groups sat the pre-test writing test, an argumentative essay, in the writing lab using computers. They had 40 minutes to plan, write, and revise the essay. Essays were submitted by email to me. Following the completion of writing test, they were asked to respond to the metacognitive strategy use questionnaire. There was no time limit in completing the questionnaire but all students completed it in less than 15 minutes. The writing tests and questionnaires were submitted with only the student ID number to ensure confidentiality. After that, two participants were invited to an interview by using purposive sampling based on their English proficiency as determined by their self-reported NCEE (Gaokao) English score and last semester’s English-course score. One student with high-level English proficiency and one student with low-level proficiency were selected from the experimental group. Interviews were conducted in Mandarin Chinese because, as Ruan (2005) pointed out, by using students’ mother tongue to conduct an interview, participants could “talk about their thoughts and feelings far more accurately and thoroughly” (p. 65). All the interviews were audio-recorded by using a smart phone with recording functions; backup copies were stored in iCloud computing disk.
and on my laptop’s hard disk via Wi-Fi connection, from which the data could be retrieved for analysis and records.

The focus of the second data collection session was on the participants’ learning experiences as well as their metacognitive development. That is, the data enabled an evaluation of the impact of the instructional programme through a comparison of data obtained from the experimental and control groups. This was conducted in the last contact session of the writing course in the 16th week. The assessment tools administered at the first data collection were re-administered, and the procedure repeated but with the writing test topic changed. The post-course interview focused on their perception of any changes in their beliefs and attitudes towards the EFL writing in the multimedia environments as a result of their experiences over the past 16 weeks. All the data were collected by me after the series of the surveys completed.

The third data collection session was a test of maintenance of writing; administered two weeks after the participants in both groups had completed the writing course. The students undertook only the writing test, which was held at the time of the high-stakes biannual CET-4 test. At the end of Phase 2, I collected the participants’ journals, copied them, and returned the original ones to participants.

No participant pulled out from the experimental group or the control group. In summary, data collection in Phase 2 consisted of: (i) two questionnaires (pre and post the instructional intervention) with the two groups; (ii) an assessment of writing (pre, post, and maintenance) from each student; (iii) audio-taped interviews with two participants pre-and post-course; and (iv) journals written by the participants in the experimental group each with 16 pieces.

3.7 DATA ANALYSIS PROCEDURES

The data were analysed employing both qualitative and quantitative methods. Triangulation occurred in the process of data analysis to enable a more comprehensive picture of the participants’ strategy use and the complex nature of the L2 writing and learning process. The
two types of the quantitative data were analysed using the statistical programme SPSS 23.0. Qualitative data such as the students’ stimulated individual face-to-face interviews, including the pre-course interviews and the post-course interviews, were analysed manually by means of coding, transferring, and categorizing. It proved to be a profitable strategy for analysing qualitative data, especially when the sample size was not large (In this study, there were only two interviewees).

3.7.1 Quantitative Analysis of Scores from Questionnaires and Writing Tests

3.7.1.1 Phase 1: Data from the Large-cohort Questionnaire — the MAIME

Two pilot administrations of the Metacognitive Awareness Inventory of EFL Writing in Multimedia-mediated Environments (MAIME) were carried out to check the reliability, suitability, and comprehensibility of the instrument. A validation process was undertaken accordingly. First, the preliminary questionnaire was presented to my supervisors and PhD colleagues at my faculty to assess face and content validity. By scrutinizing the initial items, they provided expert judgements regarding the clarity, intelligibility, and practicality of the questionnaire. Their recommendations resulted in three major modifications of the instrument:

(i) With reference to the wordings of the questionnaire items, I corrected some ambiguous expressions. For example, the responses for the rating scale labels on Question 6 were changed to allow for a more specific response, as in the following:

6. [Original] How often do you use the modern advanced technology (e.g. using the word processor on computers, using the Internet to send emails, or using the cell phone to send text messages) for practising your writing in English (Please tick one of the following)?

A. Always        B. Often        C. Seldom        D. Never

6. [Rephrased] How often do you use the modern advanced technology (e.g. using the word processor on computers, using the Internet to send emails, or using the cell phone to send text messages) for practising your writing in English (Please tick one of the following)?
A. Daily  B. Weekly  C. Monthly  D. Occasionally in a semester  E. Never

In addition, in the second part, items that were unclear, repetitive, and inconsistent were restated, revised, or deleted, resulting in 50 items being amended.

(ii) The 5-point Likert scale was changed into a 6-point Likert scale based on the Chinese cultural influences.

(iii) Chinese rather than English was used in all the data collection procedures to increase reliability and validity (Dörnyei & Csizér, 2012), as Chinese is the mother tongue of the participants and is widely used in educational system.

The piloting of the questionnaire revealed no initial problems with the instrument. It was then administered again as a pilot, to the students at the participating university who were at the same level of study as the participants to check the relevance of the items in China and the internal reliability of the instrument. In part one, no participant had registered for CET-6 Test or sat for any international English proficiency tests at the time the questionnaire was administered. Therefore, Question 3 was revised to include high-stakes examination related to English academic performance as in the following:

3. [Original] Would you please tell me your scores of the following examinations?

1) National University Matriculation English Examination  Score: ________.
2) Last Semester’s Final English Examination  Score: ________.
3) College English Test (CET) Band IV or Band VI  CET-4: _____ or CET-6: ____.
4) Any other international standardized tests of English language proficiency
   IELTS: _____ or TOEFL: _____ or BEC: _____ or _____ (please specify)

3. [Rephrased] Would you please tell me your scores of the following examinations?

1) National University Matriculation English Examination  Score: ________.
2) Last Semester’s Final English Examination  Score: ________.
3) College English Test (CET) Band IV  CET-4 score: ________.
The final version of the questionnaire was administered to the target participants in the university later on in the study. All the data were cleaned. Four hundred students were invited to respond to the questionnaire, with 384 valid responses. This was a high return rate (96%). Seventeen questionnaires were found to be invalid, with 10 failing to complete all sections and seven of them only choosing similar numbers, leaving 367 valid questionnaires. Although this process was tedious, it was crucial to ensure a clean, error-free data set (Pallant, 2013). After that, the data were entered into SPSS 23.0 for further descriptive and inferential statistical analysis to investigate the link between the participants’ self-reported perceptions and performance on the L2 writing in multimedia environments and their metacognitive awareness.

Data from all the valid questionnaire responses (n = 367) were then entered into the SPSS 23.0 for preliminary internal consistency reliability analysis by using Cronbach Alpha coefficient. An overall reliability coefficient was found to have an Alpha of .87 as a whole, above the .70 threshold value, indicating the questionnaire achieved satisfactory internal-consistency reliability (Dörnyei & Csizér, 2012). Further classification of the data and the internal consistency of the subscales will be presented in Chapter 4.

In summary, a self-report instrument to evaluate the Chinese university students’ metacognitive awareness in English writing in multimedia environments was developed. This entailed the following steps: Developing an item pool, piloting and administering the revised instrument, and processing the data, followed by Dörnyei and Taguchi’s (2010) guidelines to ensure the survey instrument was valid and reliable. Once the final version of the instrument was completed through this process, the consecutive steps in processing the data were carried out, including coding and categorizing. Since the questionnaire was divided into two parts with different investigation purposes, different categorisation strategies were employed. In part 1, the items investigated the participants’ background academic information and their perceptions of learning English in general; thus the categorisation of these items was conducted by the
researcher’s independent judgement. Part 2 was the main study to explore the participants’ metacognitive awareness. It was designed under Flavell’s (1979, 1981, 1987) theoretical framework, thus the rough classification of the coding categories was elicited from the theoretical framework, as was shown in Table 3.7.

Table 3.7

*Categorisations of Chinese EFL Writers’ Self-reported Metacognitive Awareness in Multimedia Environments*

<table>
<thead>
<tr>
<th>Items</th>
<th>Themes and Clusters/Subcategory</th>
<th>Main Category</th>
<th>Super Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2</td>
<td>Knowledge about cognitive strengths in L2 writing</td>
<td>Person Variables</td>
<td>Metacognitive Knowledge</td>
</tr>
<tr>
<td>3,4</td>
<td>Knowledge about cognitive weaknesses in L2 writing</td>
<td>Task Variables</td>
<td></td>
</tr>
<tr>
<td>5,6</td>
<td>Knowledge about their own writing ability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7,8,10</td>
<td>Knowledge about task nature in evaluating L2 writing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Knowledge about the awareness of considering the audience (their teachers)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11,12</td>
<td>Translation strategies</td>
<td>Strategy (C/S) Variables</td>
<td></td>
</tr>
<tr>
<td>13-16</td>
<td>Help-seeking strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Organizing the writing in advance</td>
<td>Planning Variables</td>
<td>Self-reported Metacognitive Regulations (Observed Strategic knowledge)</td>
</tr>
<tr>
<td>30, 31</td>
<td>Functional planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Goal setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33-36,40,41</td>
<td>Self-focusing</td>
<td>Monitoring Variables</td>
<td></td>
</tr>
<tr>
<td>37, 39,42</td>
<td>Self-controlling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Self-transferring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>43,44</td>
<td>Self-correction</td>
<td>Evaluation Variables</td>
<td></td>
</tr>
<tr>
<td>45-48</td>
<td>Self-assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>49,50</td>
<td>Self-expectation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-21, 23</td>
<td>Sense of enjoyable experiences</td>
<td>Positive-experience Variables</td>
<td>Metacognitive Experience</td>
</tr>
<tr>
<td>25-27</td>
<td>Sense of unpleasant experiences</td>
<td>Negative-experience Variables</td>
<td></td>
</tr>
</tbody>
</table>
3.7.1.2 Phase 2: The Sub-group Intervention Questionnaire — the MUSQ-ME

Although Amani’s (2014) Metacognitive Strategy Questionnaire was used as a starting point in assessing the course participants’ pre-and post-course responses, the items had been largely changed to adapt to the Chinese learning context and the purpose of this study. Further refinement and the validation were required for the Phase 2 quasi-experiment of the impact of the instructional intervention in EFL writing.

Phase 1 focused on evaluating the multi-faceted feature of metacognition for better understanding the nature of EFL writing in multimedia environments, and characteristics of writers in a Chinese university context with the large-cohort, therefore the questionnaire MAIME was used. Phase 2 focused on the metacognitive strategy development; therefore, a revised version of the questionnaire, The Multimedia-Environment Metacognitive Strategy Use Questionnaire (MSUQ-ME), was used. MSUQ-ME consisted of three subscales, namely planning, monitoring, and evaluating. A similar process, as for MAIME, was applied to check the overall reliability of the instrument as well as the internal consistency reliability for the three subscales, and a pilot survey was administered.

The overall reliability coefficient of the instrument was found to have a Cronbach’s Alpha of .867 as a whole, as shown at the very bottom of Table 3.8, indicating a good degree of reliability and in the region accepted by Dörnyei and Taguchi (2010). However, demonstrating how individual items correlate with the overall set of items in the entire questionnaire is “essential” (Amani, 2014, p. 96). A detailed result of each individual item’s relation to the overall score of the questionnaire was presented in what follows.
Table 3.8

Reliability Estimates: MSUQ-ME Individual Items

<table>
<thead>
<tr>
<th>Item</th>
<th>Subscale</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach’s Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning</td>
<td>.577</td>
<td>.856</td>
</tr>
<tr>
<td>2</td>
<td>Planning</td>
<td>.445</td>
<td>.861</td>
</tr>
<tr>
<td>3</td>
<td>Planning</td>
<td>.308</td>
<td>.865</td>
</tr>
<tr>
<td>4</td>
<td>Planning</td>
<td>.592</td>
<td>.856</td>
</tr>
<tr>
<td>5</td>
<td>Planning</td>
<td>.657</td>
<td>.854</td>
</tr>
<tr>
<td>6</td>
<td>Monitoring</td>
<td>.368</td>
<td>.864</td>
</tr>
<tr>
<td>7</td>
<td>Monitoring</td>
<td>.252</td>
<td>.869</td>
</tr>
<tr>
<td>8</td>
<td>Monitoring</td>
<td>.252</td>
<td>.868</td>
</tr>
<tr>
<td>9</td>
<td>Monitoring</td>
<td>.389</td>
<td>.863</td>
</tr>
<tr>
<td>10</td>
<td>Monitoring</td>
<td>.457</td>
<td>.861</td>
</tr>
<tr>
<td>11</td>
<td>Monitoring</td>
<td>.540</td>
<td>.857</td>
</tr>
<tr>
<td>12</td>
<td>Monitoring</td>
<td>.334</td>
<td>.864</td>
</tr>
<tr>
<td>13</td>
<td>Monitoring</td>
<td>.692</td>
<td>.851</td>
</tr>
<tr>
<td>14</td>
<td>Evaluating</td>
<td>.231</td>
<td>.868</td>
</tr>
<tr>
<td>15</td>
<td>Evaluating</td>
<td>.365</td>
<td>.864</td>
</tr>
<tr>
<td>16</td>
<td>Evaluating</td>
<td>.483</td>
<td>.860</td>
</tr>
<tr>
<td>17</td>
<td>Evaluating</td>
<td>.683</td>
<td>.852</td>
</tr>
<tr>
<td>18</td>
<td>Evaluating</td>
<td>.680</td>
<td>.853</td>
</tr>
</tbody>
</table>

Cronbach Alpha for the 18 items = .867

A coefficient of .30 is considered the minimum requirement for an item correlation with the overall score of the questionnaire (Field, 2013). By looking at the above statistics computed by SPSS 23.0, we can easily see which item reduces the internal consistency of the questionnaire and which item will increase the internal consistency if deleted (Creswell & Creswell, 2017). This table shows that there were three items (items 7, 18 and 14) with a correlation coefficient of below .30. However, if we turned to the column labelled Cronbach’s Alpha if Item Deleted,
none of the three items if deleted would produce a significant increase of the $\alpha$. Therefore, we decided to keep the three items in the later formal investigation.

The correlation between the three subscales and the total score of the entire questionnaire was also tested using Cronbach’s Alpha. Table 3.9 provides the summary statistics for the correlation between each item and the total score for each subscale.

Table 3.9

Summary Statistics of Reliability in Subscales

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach Alpha if Item Deleted</th>
<th>Cronbach Alpha for the subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Planning in the mind</td>
<td>.603</td>
<td>.687</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Making the outline</td>
<td>.621</td>
<td>.680</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Focusing on the topic</td>
<td>.494</td>
<td>.728</td>
<td>.759</td>
</tr>
<tr>
<td>4</td>
<td>Thinking of the writing goal</td>
<td>.472</td>
<td>.734</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Thinking of the time allocation</td>
<td>.459</td>
<td>.738</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Checking the writing contents</td>
<td>.363</td>
<td>.750</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Adjusting the time arrangements</td>
<td>.357</td>
<td>.768</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Focusing on cohesion and coherence</td>
<td>.370</td>
<td>.764</td>
<td>.756</td>
</tr>
<tr>
<td>9</td>
<td>Focusing on grammar correction</td>
<td>.536</td>
<td>.733</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Focusing on mechanics</td>
<td>.501</td>
<td>.735</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Modifying the errors</td>
<td>.695</td>
<td>.695</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Focusing on reviewing</td>
<td>.355</td>
<td>.751</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Help-seeking</td>
<td>.679</td>
<td>.701</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Revising the language use</td>
<td>.229</td>
<td>.759</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Revising the contents</td>
<td>.560</td>
<td>.691</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Making the self-evaluation</td>
<td>.663</td>
<td>.651</td>
<td>.750</td>
</tr>
<tr>
<td>17</td>
<td>Thinking about the improvements</td>
<td>.785</td>
<td>.608</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Making no evaluation</td>
<td>.604</td>
<td>.679</td>
<td></td>
</tr>
</tbody>
</table>

It can be seen from the table above, in terms of subscales, the $\alpha$ value ranged from .750 to .759, which were all above the cut-off point of .70 given the diversity of the psychological constructs being measured (Dörnyei, 2007; Creswell & Creswell, 2017), corroborating the satisfactory internal consistency reliability. What stands out in the table is item 14 “revising the language use” was observed to show a low reliability ($\alpha = .229$) to the third subscale – evaluating. This is easily understandable given that in the multimedia environment, the revising language use
strategy might cover quite diverse themes of “revising”, such as the word processor’s auto correction, the selective attention of the writers on the screen, and the writers’ self-controlled revision. The statement was relatively “general” in terms of statistical measures. Despite its low correlation with the subscale, excluding this item would only result in the improvement of .009 in reliability, which would not be a meaningful increase; therefore, this item was retained. The questionnaire was then used in the formal investigation in Phase 2.

3.7.1.3 Phase 2: The L2 Writing Proficiency Test

The participants’ written products for pre- and post-course tests were assessed by two independent raters who were not the instructors of the participants in the study. The raters were faculty members of the English School at the participating university. Both had taught EFL writing for at least three academic years in the university, and had been invited to evaluate CET-4 essay writing in the national benchmark examinations.

Various measures were taken to guarantee the reliability of the rating in this study. First, each rater was required to have a good grasp of the assessment criteria: The “ESL Composition Profile” (see Appendix J). Any doubts about the criteria were discussed and clarified. To make sure that the profile was applied correctly in the evaluation, the raters were asked to evaluate five student written texts together as a pilot. Two measures were taken in the piloting process: 1) the total and each category scores for the writing were compared after their rating. Any rating discrepancy over 5 points, either in total or category scores, required the written texts to be re-evaluated and re-discussed to reach a consensus for the inter-rater agreement; 2) Each composition was submitted to the online automatic scoring system and a holistic score obtained by comparing the students’ composition with the standard established English language corpus. If there existed a discrepancy between manmade scores and the computed scores of over 5 points, the computed scores would “prompt” the two raters to reconsider their ratings. In this way, the computed scores worked as a safeguard in helping the
raters to make valid academic interpretations and judgements. Secondly, a major concern was plagiarism, which had become an issue for universities, particular with computer-based writing (Harris, 2017). All the student pre-and post-course written texts therefore were checked for originality by means of using antiplagiarism software.

After the face-to-face training session, the two raters then independently evaluated the students’ essays. The total score and category scores for each student essay was the average score of the two independent evaluators. The inter-rater reliability for the total scores was computed by using the Pearson correlation coefficient. Their inter-rater reliability was $r = .91$, $p < .001$, an acceptable inter-rater reliability between the two independent raters (Cohen, 1988).

3.7.2 Qualitative Analysis of Semi-structured Interviews and Journals

The qualitative data collected from semi-structured interviews and journals were transcribed, coded, and categorized for in-depth analysis. The interview data were stored in the Chinese language and translated into English. Direct quotes were recorded verbatim from the participants.

Transcribing audio-recorded interviews is a time-consuming and costly work, involving the researchers’ judgement (Rossman & Rallis, 2011). To ensure reliability and avoid anything that I might have missed in the transcripts, the two interviewees were invited to check the accuracy and credibility of the transcripts and of audio recordings that were sent to them by email.

Once the interviews had been transcribed, a process of coding, sifting, sorting, and identifying themes in the data was undertaken. Known as content analysis, it has to be an iterative and recursive process (Gillham, 2000, 2005). The coding procedure is a fundamental and central process in the analysis to reduce the data to “key, substantive points and putting them into categories” (Gillham, 2000, p. 59). It makes it possible to probe deeply into the participants’ mental activities when they were engaged in EFL writing tasks. As recommended
by Glaser (1978, as cited in Urquhart, 2012), the coding procedure in this study followed three different stages: Open coding, selective coding, and theoretical coding. According to Urquhart (2012),

Open coding means just that — going through the data, line by line or paragraph by paragraph, attaching codes to the data and very much staying open, seeing what the data might be telling you. The open codes are then grouped into larger categories in the stage of selective coding, on the basis of the key categories that are shaping the theory. In theoretical coding, those categories are related to each other and the relationships between them considered. You may well have spotted that this is the act of building theory-finding constructs, connecting them and considering the nature of that relationship (p. 10).

To get more complete and reliable data in the coding process of the transcripts of the interviews, the interview protocols were coded through a process of rater-collaboration. An experienced EFL instructor, with a master’s degree in applied linguistics, who had once taught EFL writing, worked with me to refine and practise the coding. The instructor also was trained to use the coding process. The inter-rater reliability coefficient between the instructor and me was then calculated on 15% of the protocols. The inter-coder reliability coefficient was .87 \( (p < .01) \), indicating good reliability.

As the interviews used a semi-structured interview guide, the coding was fitted to the guide. The purpose of semi-structured interview was to probe the students’ metacognitive awareness, their multimedia English writing experiences, and their perceptions of the intervention course, and to supplement data from the questionnaires. Although the “open” questions were included in the design of the questionnaire, we had observed that few participants wrote in in-depth thoughts in the pre-questionnaire investigation. A possible explanation was that writing demanded further effort, and this may have inhibited them.
Gillham (2000) gave a similar explanation of the “open” questions in relation to the participants’ responses.

You can ask ‘open’ questions in a questionnaire,…people often can’t be bothered to make an adequate response here…the lack of stimulus of a ‘live’ interview…people may need encouragement to say what they think and a bit of ‘steering’ to set them in the right direction…obviously these things can only be given in a live interview (pp. 13-14).

The coding process was carried out in each subcategory level that was sifted from the interview data. Each theme was labelled as a way of refining the process of systematic conceptualization. The origin of the interview data source was shown in the brackets at the end of each quote when direct quotes from the two participants were likely to be needed. The two participants were named Yin and Yu under pseudonyms. For example, as the first semi-structured interview took place on 02 September 2015, the first participant’s data were presented as Int1Yin02/09/2015 while the second participant’s data were presented as Int2Yu02/09/2015. All the quotes were presented in English in this study. For instance:

Yin: I usually make a plan for writing in my mind. Otherwise, I will not feel confident when I am writing. I usually spend a lot of time on outlining the general structure, thinking of the main idea of each paragraph, as well as preparing some sentence structures for use before I engage in the writing task. (Int1Yin02/09/2015)

In this unit of data, Yin described her preparation work before she started to write. This unit of data was coded, therefore, as “advanced planning”. The code was put into the category of “metacognitive strategy use”, a key theme investigated in this study.

Similarly, the journal data, which were collected from the two participants, were also presented in a sequential way on a weekly basis. For Yin’s journals, they were presents as
Yin: The teacher always emphasizes that it is far from enough to just complete the writing assignment as an imposed task. To practice writing, we should have our own plan. Yes, she is right. Next week, I plan to write an essay on a CET-4 related topic as my extra practice since the high-stakes examination is approaching.

(JW14Yin06/12/2015)

In this unit of data, Yin wrote down her initial self-effort in using specific planning strategies to help her keep active in language learning. The unit of data was coded as “advanced planning”, indicating her use of strategies in a more elaborative and feasible fashion after the teaching intervention.

3.8 SUMMARY

This chapter has presented information about the research design, participants, research instruments, data collection methods, and analysis procedures for this study to answer the research questions. It started with a description of the two phases of the study and an explanation of, and justification for, the qualitative and quantitative research paradigms. The discussion laid the theoretical rationale for the adoption of mixed methods for data collection and analysis. The second section presented a description of participants in this study, followed by the design and development of the four main research data collection instruments, i.e. questionnaires, writing tests, interviews, and learner journals. A justification for, and a description of, the instructional intervention course to enhance students metacognitive awareness and use of metacognitive strategies for writing in EFL contexts, which is central to this study, followed in the next section. Finally, the last two sections provided an explanation of data collection and data analysis procedures.
This chapter thus forms the methodological basis for the research, the findings of which are reported in the following chapters. The results of the questionnaire in Phase 1 (MAIME) and the data gathered from the four research instruments in Phase 2 of the study will be presented and discussed.
CHAPTER FOUR

RESULTS FOR INSTRUMENT VALIDATION

4.1 CHAPTER OVERVIEW

This chapter presents a detailed account of instrument validation — questionnaire 1 (MAIME), which was used to investigate the nature and development of Chinese university students’ metacognitive awareness about EFL writing in multimedia environments. Following the rubric of Flavell’s (1987) threefold metacognition framework, the data were subjected to confirmatory factor analyses (CFA) to evaluate the psychometric properties of the instrument. The underlying factors of the students’ metacognitive awareness as reflected in their perceptions and beliefs of their multimedia-mediated writing processes are discussed.

4.2 QUESTIONNAIRE DEVELOPMENT

Questionnaires are one of the most common and popular tools to gather data from participants to explore their factual characteristics, behaviours, and attitudes (Dörnyei, 2007) and are widely used methods for researching in L2 writing (Hyland, 2010). In this study, the large-scale questionnaire, as a useful method of quantitative research, has been very productive in providing us with a way of developing an interactional model for better understanding Chinese EFL writers’ intertwining nature of the complicated writing processes underlying their writing in multimedia environments. This section presents the statistical procedures of developing and validating the instrument mainly through internal consistency estimate and confirmatory factor analyses (CFAs).

4.2.1 Validation: Confirmatory Factor Analysis

Given that the rationale for the selection of the metacognitive awareness variables was informed by Flavell’s (1987) theoretical taxonomies and the questionnaire was developed on
the basis of the existing questionnaire (see Section 3.4.1 in detail), the data collected were subjected to confirmatory factor analyses (CFAs) to check the construct validity. The results from CFAs provided empirical evidence for the validity of the one-factor second-order metacognitive awareness inventory.

**Descriptive Statistics and Normality Check**

Initially, a more strict assessment of the data set was conducted before starting to analyse the data. I first imported the data into the SPSS (version 23.0) programme for an initial descriptive analysis. Results showed that there had been almost unanimous disagreement (99.8%) about the item 22, where the participants were asked whether they were copying the details relevant to their writing topics when they wrote. This item was eliminated. Items 24 and 29 were also eliminated due to their low answering rates. This left a 47-item scale for the final sample size of 367 participants (see section 3.7.1.1), which met the desired variables-to-cases (1:5) ratio analysis (Field, 2013). The assumptions of linearity, singularity, and homogeneity of the data were satisfied and no outliers were detected.

The 47 items in Part 2 of the MAIME were then subjected to SPSS 23.0 for further analysis. Results showed that all the items in the instrument were normally distributed as indicated in descriptive statistics (see Appendix N). As was shown in the table, of all items, the mean scores ranged between 3.15 and 4.74 with the standard deviations from 1.160 to 1.444. The values for skewness and kurtosis of all items were within the critical values of |3.0| and |8.0| respectively (Kline, 2015). Inspection of the correlation matrix revealed the presence of many coefficients of .30 and above. Two statistical measures were also generated by SPSS to help address the assumptions required to do the CFA: Bartlett’s Test of Sphericity (Bartlett, 1954), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Kaiser, 1974). Results showed that the KMO value was .909, exceeding the recommended value of .6 (Kaiser, 1974) and the Bartlett’s Test of Sphericity was significant ($p = .000$) (Bartlett, 1954). The
examination of KMO measure and Bartlett’s test (KMO = .909; $\chi^2 = 7401.351$, df = 1176, $p < .001$) and inspection of the correlation matrix indicated that the MAIME was appropriate for performing CFAs.

_Evaluating the Correlated Models of the MAIME_

The data were then subjected to CFAs using the maximum likelihood (ML) estimation, which is the method used most often in structural equation models (SEM) described in the literature (Kline, 2015). As a general rule of thumb, prior to report the results, three notes of caution must be clarified to provide a starting point for the application of SEM.

First of all, as a cutting-edge statistical technique in multivariate analysis, SEM has provided a conceptually appealing way to test the construct validity in a theory by simultaneously examining a series of interrelated variable relationships to “assess how well the theory fits reality as represented by data” (Hair et al., 2010, p. 654). In other words, in order to represent and operationalize a construct, a model needs to be formalized so that the empirical evidence can be provided through taking advantage of SEM’s ability. As suggested by Hair et al. (2010), the competing models strategy is adopted in our study for model comparisons with the aim of explicitly addressing the factorial structure of the MAIME. Based on our consultation of the relevant literature (see Chapter 2, for a review), three competing models were compared and evaluated through running a series of the powerful CFAs for the development of a theoretically justified model. They are: 1) an eight-factor-correlated model (Model 1), which was developed by specifying the 47 items in the MAIME into eight distinct but correlated factors framed within metacognition theory; 2) a three-factor second-order model (Model 2), which was developed by the hypothesis that there existed a hierarchical structure in which the eight factors were conceptualized into three second-order uncorrelated factors, including metacognitive knowledge, experience, and regulation factors within the framework that was informed by Flavell’s (1987) classification of metacognition as well as developed by the
following researchers, such as Wenden (1998) and Zhang (2010, 2016); 3) a one-factor second-order model (*Model 3*), which aimed to examine whether there was a consistent thread running through the *MAIME* instrument, that is, whether a single higher-order common factor, metacognition, was sufficient enough to make the correlations of the eight lower order factors explicit.

Secondly, when it comes to report the results of the CFAs, the chi-square statistic and its degrees of freedom and *p* value are the fundamental statistical measure in structural equation modelling (Kline, 2015). With reference to chi-square statistics, a value of 3.0 or less of the ratio of $\chi^2$ divided by its degree of freedom with the *p*-value is indicative of an acceptable fit between the hypothesized model and the sample data (Kline, 2015). Apart from that, Kline (2015) identifies a total of four absolute model fit indices which should be included: the root mean square error of approximation (RMSEA; Steiger, 1990) with its corresponding 90% confidence interval, the goodness of fit index (GFI; Jöreskog & Sörborn, 1982), the comparative fit index (CFI; Bentler, 1990), and the standardized root mean square residual (SRMR). After running the SPSS computer programme, the various fit indices will be obtained and they should be compared against a series of established cut-off criteria to assess the data-model fit. As suggested by Hu and Bentler (1999), the recommended values of RMSEA are equal to or less than .06 indicating a generally acceptable model fit. The GFI is an absolute important fit index that estimates the hypothesized model and the observed proportion of covariance. A value of more than .90 is indicative of good model fit. As for the pairs of the CFI and the SRMR, because the CFI depends on the same distributional assumptions as the RMSEA, the rational is to use the pairs together in order to make the assumptions tenable. Their combination threshold for indicating an acceptable level of model fit based on these two indices was values of CFI larger than .90 and SRMR equal to or less than .08.
Thirdly, when displaying the results, the IBM SPSS AMOS computer programme is used to specify, view, and perform the models graphically, which is “an easy-to-use programme for visual SEM” (Arbuckle, 2013, p.1). In AMOS graphics, rectangles/squares indicate the observed variables. That is, the items in the questionnaire are going to be enclosed in rectangles/squares. Ellipses signify the unobserved/latent variables. Single-headed arrows represent one-way direct structural or causal effect relationships between the observed and unobserved variables. Double-headed arrows denote the covariance between variables without structural specificity.

Turning now to the empirical results provided by using a series of CFAs, the three model comparisons are examined and evaluated by resorting to the values mentioned above. Table 4.1 shows the results of a series of CFAs for all the three competing models.

Table 4.1

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>( \chi^2/df )</th>
<th>CFI</th>
<th>GFI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>2183.043*</td>
<td>1097</td>
<td>1.990</td>
<td>.894</td>
<td>.870</td>
<td>.084</td>
<td>.066</td>
<td>.061-.087</td>
</tr>
<tr>
<td>Model 2</td>
<td>2147.825*</td>
<td>1029</td>
<td>2.087</td>
<td>.906</td>
<td>.899</td>
<td>.067</td>
<td>.059</td>
<td>.054-.071</td>
</tr>
<tr>
<td>Model 3</td>
<td>2152.428*</td>
<td>1008</td>
<td>2.135</td>
<td>.981</td>
<td>.993</td>
<td>.049</td>
<td>.057</td>
<td>.049-.068</td>
</tr>
</tbody>
</table>

*Note. df = degree of freedom; * = p < .001; CFI = Comparative Fit Index; GFI = Goodness-of-Fit Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; RMSEA 90% CI = RMSEA 90% Confidence Interval.

Considering adequate model fit and model parsimony, from the data in Table 4.1, it is apparent that Model 3, the one-factor second-order model \((\chi^2 = 2152.428; \ df = 1008; p < .001; \ \chi^2/df = 2.135; \ \text{RMSEA} = .057; \ \text{SRMR} = .049; \ \text{GFI} = .993; \ \text{CFI} = .981)\), had the best fit indices with the desired values and all the subscale internal consistency reliability coefficients were
acceptable at .70 and above. Therefore, Model 3 was retained as the final model. Figure 4.1 is a detailed graphic display of the model produced by the SEM analysis.

Figure 4.1

One-Factor Second-order Factor Model of the MAIME

Note. McK = Metacognitive Knowledge; McK-PE = Metacognitive Knowledge, Person variables; McK-TA = Metacognitive Knowledge, Task variables; McK-ST = Metacognitive Knowledge, Strategy variables; McE = Metacognitive Experience; McE-PO = Metacognitive Experience, Positive variables; McE-NE = Metacognitive Experience, Negative variables; McR = Metacognitive Regulations, Planning variables; McR-MO = Metacognitive Regulations, Monitoring variables; McR-EV = Metacognitive Regulations, Evaluating variables.
4.2.2 Internal Reliability

Reliability is a fundamental issue in psychological measurement. The overall reliability coefficient of the MAIME was very high ($r = .87$) as was reported in the previous chapter (see section 3.7.1.1). Based on the three major theoretical dimensions as Flavell (1987) coined, the MAIME was further categorised into three thematic subcategories in terms of metacognitive knowledge, experience, and regulation variables\(^{25}\) as being confirmed by using a series of CFAs. Scale reliability tests were then conducted by importing the data into the SPSS 23.0 programme for checking the internal consistency reliability of each combination of categories by using the Cronbach’s Alpha value. The results are laid out in Table 4.2.

As one of the most commonly used indicators of a scale’s quality, Cronbach’s (1951) coefficient alpha is often cited by researchers and professionals for computing the internal consistency reliability. As a commonly accepted rule of thumb, a reliability of .70 or higher is equated as a reasonable threshold in research projects (Nunnally, 1978). As can be seen from Table 4.2, the inter-item reliability of the items under each domain and their dimensions is acceptable based on the sample size, corroborating that the questionnaire achieved satisfactory internal-consistency reliability. To be specific, the figures of the three rubric categories are all consistently acceptable, with “metacognitive knowledge domain” ($\alpha = .799$), “metacognitive experience domain” ($\alpha = .828$), and “metacognitive regulation domain” ($\alpha = .917$) at very high reliability levels. Their construct dimensions also indicate very good statistical figures except the cluster of “negative experience variables”, showing reliability at $\alpha = .604$, which is “minimally acceptable” in DeVellis’ (2012) suggested, “comfort ranges”. This is possibly because there are only three items in this cluster. What is acceptable, though, is that, although

\(^{25}\) Given the participants’ self-reported nature of filling out the questionnaire, the metacognitive regulation variables are actually the metacognitive strategic variables, which are included in the metacognitive knowledge domain in Flavell’s framework. However, due to its extreme importance in facilitating students’ learning performance (Wenden, 1998; Zhang, 2010), this variable was calculated separately in order to stress the importance of this knowledge base while the other strategic variables, such as cognitive and social/affective strategies are retained in the metacognitive knowledge domain.
more items may lead to better construction representation (DeVellis, 2012), the questionnaire is developed from the fixed theoretical framework, and the three items are promised to capture the relevant negative experience dimensions. Furthermore, reviewing the available literature, in practice, many researchers also reported the coefficient that was below .60 due to fewer items (see also Foster, 2001).

Table 4.2

*Categorisations and Dimensions of the MAIME and Their Reliability Coefficients*

<table>
<thead>
<tr>
<th>Categorisations</th>
<th>Dimensions</th>
<th>No. of Items</th>
<th>Reliability Coefficients (Cronbach Alpha)</th>
<th>N (Valid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metacognitive Knowledge <em>Domain</em></td>
<td>.799</td>
<td>351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Person variables</td>
<td>6</td>
<td>.743</td>
<td>363</td>
<td></td>
</tr>
<tr>
<td>Task variables</td>
<td>4</td>
<td>.737</td>
<td>361</td>
<td></td>
</tr>
<tr>
<td>C/S Strategy Variables</td>
<td>6</td>
<td>.769</td>
<td>359</td>
<td></td>
</tr>
<tr>
<td>Metacognitive Experience Domain</td>
<td>.828</td>
<td>361</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Experience variables</td>
<td>6</td>
<td>.781</td>
<td>362</td>
<td></td>
</tr>
<tr>
<td>Negative Experience variables</td>
<td>3</td>
<td>.604</td>
<td>366</td>
<td></td>
</tr>
<tr>
<td>Metacognitive Regulation Domain</td>
<td>.917</td>
<td>341</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning variables</td>
<td>4</td>
<td>.818</td>
<td>359</td>
<td></td>
</tr>
<tr>
<td>Monitoring variables</td>
<td>10</td>
<td>.848</td>
<td>357</td>
<td></td>
</tr>
<tr>
<td>Evaluating variables</td>
<td>8</td>
<td>.804</td>
<td>364</td>
<td></td>
</tr>
</tbody>
</table>

*Note. C/S Strategy Variables = Cognitive or Social Strategy Variables*

**4.3 SUMMARY**

The results of CFAs provided substantial evidence for the factorial structure of the instrument used in Phase 1 in the study — questionnaire 1 (*MAIME*). Structural equation modelling (SEM) validated a one-factor second-order model of metacognitive awareness for Chinese university
students in EFL writing in multimedia environments as it was designed in the MAIME. The overall factor, metacognition, can be conceptualized with 8-factor latent variables, entailing metacognitive person knowledge (McK-PE), task knowledge (McK-TA), cognitive/social strategy knowledge (McK-C/S), metacognitive positive experience (McE-PO), metacognitive negative experience (McE-NE), and metacognitive regulations of planning (McR-PL), monitoring strategy (McR-MO), and evaluating (McR-EV). The findings supported the utility of the MAIME as a reliable instrument to measure metacognitive awareness in EFL multimedia learning environments with satisfactory psychometric properties.
CHAPTER FIVE

RESULTS FOR RESEARCH QUESTION 1

5.1 CHAPTER OVERVIEW

This chapter presents the results of the analysis of the data from the large-scale questionnaire, MAIME in Phase 1. It describes the participants’ self-reported metacognitive awareness in multimedia writing environments to provide answers to the first research question. What is the nature of Chinese EFL writers’ metacognitive system in their writing processes in multimedia environments? The chapter includes a descriptive quantitative analysis of the subcategories in terms of the participants’ metacognitive knowledge, metacognitive experience, and self-reported metacognitive regulation. A comparison of the metacognitive awareness in multimedia environments of students with high and low proficiency in writing, as well as the predictive effects of the eight latent variables (see Chapter 4) on the students’ language performance is reported. The analysis of the questionnaire provides insights into the relationships between students’ strategy use and L2 achievement; it is the basis for the instructional intervention implemented in Phase 2.

5.2 DESCRIPTIVE RESULTS OF THE QUESTIONNAIRE RESPONSES

The participants’ responses to each item and the thematic subcategories are reported with descriptive statistics in terms of percentages, mean scores, and standard deviations. The questionnaire was designed using 6-point Likert scale, so means of 3.50 represent relative positive responses to the items representing perceptions and beliefs. The analyses of the questionnaire in Phase 1 provide an overview of the participants’ perceptions of their metacognitive awareness in multimedia environments, prior to the instructional intervention.
5.2.1 Metacognitive Knowledge

According to Flavell (1979), metacognitive knowledge describes what is known about the factors or variables that “affect the course and outcome of cognitive enterprises” (p. 907). The chapter reports the students’ metacognitive knowledge in the current study, which was investigated from the three domains: Person variables, task variables, and cognitive or social (C/S) strategy variables.

5.2.1.1 Person

Person knowledge, or knowledge of oneself, refers to students’ perceptions of themselves. As applied to L2 writing, it refers to the students’ ability to identify their strengths and weaknesses in their writing process, perceptions that “are essential to self-regulated learning” (Zhang, 2010, p. 333). The first six items in the questionnaire reflected the participants’ knowledge and beliefs in relation to the person variable; including knowledge of cognitive strengths in L2 writing, knowledge of cognitive weaknesses in L2 writing, and knowledge of their own language learning ability.

The mean scores show that the relatively high scores on Item 3 ($M = 4.41$) and Item 4 ($M = 4.17$), items concerned with the participants’ perceptions about their weaknesses in L2 writing. These two items suggest that the majority of the participants felt confident of finding their own weaknesses, but, in contrast, less than half of the participants’ responses to Item 1 ($M = 3.25$) and Item 2 ($M = 3.19$) indicated that they could identify their strengths in L2 writing. These results suggest that the participants express their perceptions in a reserved way. The participants’ responses to Items 5 (59.9%) and 6 (57.2%), however, suggest that over half the participants reported that they felt confident of their language learning ability and had positive attitudes towards language learning, which was also observed by Li (2010).
Table 5.1

**Descriptive Statistics for Questionnaire Items on Person Variables**

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I know about my strengths in multimedia-mediated writing in English well.</td>
<td>56.3*</td>
<td>43.7*</td>
<td>3.25</td>
<td>1.355</td>
</tr>
<tr>
<td>2</td>
<td>I can adduce concrete evidence to explain my strengths in multimedia-mediated writing.</td>
<td>58.9*</td>
<td>41.1*</td>
<td>3.19</td>
<td>1.365</td>
</tr>
<tr>
<td>3</td>
<td>I know about my weaknesses in multimedia-mediated writing in English well.</td>
<td>22.7*</td>
<td>77.3*</td>
<td>4.41</td>
<td>1.307</td>
</tr>
<tr>
<td>4</td>
<td>I can identify concrete evidence to explain my weaknesses in multimedia-mediated writing.</td>
<td>29.2*</td>
<td>70.8*</td>
<td>4.17</td>
<td>1.337</td>
</tr>
<tr>
<td>5</td>
<td>I am confident that I know the correct use of sentence structures (e.g. inverted sentence, emphatic sentence, elliptical sentence, etc.) in my writing.</td>
<td>40.1*</td>
<td>59.9*</td>
<td>3.65</td>
<td>1.280</td>
</tr>
<tr>
<td>6</td>
<td>I am confident that I know the correct use of tenses (past, present, and future) and voices (active and passive) in my writing.</td>
<td>42.8*</td>
<td>57.2*</td>
<td>3.62</td>
<td>1.313</td>
</tr>
</tbody>
</table>

*Note.* *Percentage* 1-3 disagree, including strongly disagree, disagree, and moderately disagree
4-6 agree, including partly agree, agree, and strongly agree

**5.2.1.2 Task**

Task variables encompass the participants’ knowledge about the nature task of writing in L2, that is, knows the essential requirements for successful L2 writing. An understanding of the nature of writing task can influence a writers’ success in achieving their goals (Flavell, 1979). Table 5.2 reports the descriptive statistics of the participants’ responses to questions on task variables. Across all items, a majority of the participants’ responses suggest they had an understanding of the criteria of good writing. Their responses to Item 7, knowledge of vocabulary ($M = 4.46$); Item 8, fluency in writing ($M = 4.31$); Item 9, awareness of audience ($M = 4.23$) and Item 10, understanding of good composition in a multimedia environment ($M = 4.37$) may indicate that they are aware of the requirements of writing when in multimedia-mediated writing and apply them in their own writing.
Table 5.2

Descriptive Statistics for Questionnaire Items on Task Variables

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>I think the prerequisite of a good composition is that it should not have spelling and grammar mistakes in multimedia-mediated writing.</td>
<td>25.6*</td>
<td>74.4*</td>
<td>4.46</td>
<td>1.444</td>
</tr>
<tr>
<td>8</td>
<td>I think the prerequisite of a good composition is that it should express clearly the writer’s ideas in multimedia-mediated writing.</td>
<td>23.4*</td>
<td>76.6*</td>
<td>4.31</td>
<td>1.237</td>
</tr>
<tr>
<td>9</td>
<td>I think the prerequisite of a good composition is that it is easily comprehensible to the readers in multimedia-mediated writing.</td>
<td>25.6*</td>
<td>74.4*</td>
<td>4.23</td>
<td>1.240</td>
</tr>
<tr>
<td>10</td>
<td>Sometimes even if I cannot write out a good composition, I can still identify what kind of composition is a good composition in multimedia-mediated writing.</td>
<td>24.1*</td>
<td>75.9*</td>
<td>4.37</td>
<td>1.335</td>
</tr>
</tbody>
</table>

* Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree 4-6 agree, including partly agree, agree, and strongly agree

5.2.1.3 Cognitive or Social (C/S) Strategy

The participants’ perceptions of their knowledge and beliefs about the cognitive or social (C/S) strategy variables refers to their “knowledge about both cognitive and metacognitive strategies, as well as conditional knowledge about when and where it is appropriate to use such strategies” (Livingston, 2003, p. 3). Six strategies are included within C/S strategies; these are included to investigate the participants’ preferences of strategies and resources to support their writing in EFL in multimedia environments. As shown in Table 5.3, the participants reported a range of strategies that they applied to complete writing tasks, including the translation strategies (Items 11 and 12), and the help-seeking strategies (Items 13, 14, 15 and 16).

The mean scores show that Item 12 ($M = 4.25$), using translation, ranked highest in this group of strategy items, with Item 11 ($M = 3.84$), using online dictionaries the second highest. The participants’ responses to the rest of the items indicate that they were aware of the role of the multimedia tools in accomplishing their writing tasks, however, less than half of the
participants reported using online information (Item 13: $M = 3.15$). It appears, that, overall the participants are not cognisant of the value of using technological tools. Nonetheless, the majority reported using multimedia when they encountered difficulties with some aspects of writing, such as using audio or pictures (Item 14: $M = 3.61$), when they knew the writing topic (Item 15: $M = 3.77$). Whereas, if they did not know the writing topic, they tended not to refer to the internet (Item 16: $M = 3.20$). These responses may indicate that, if the teacher required them to write an assignment with an assigned topic they would use multimedia tools, whereas, they were not self-motivated to use multimedia tools when learning English independently. Participants’ responses to these items suggest a need for teachers to focus on enhancing students’ experience of learning and writing in multimedia environments.

Table 5.3

**Descriptive Statistics for Questionnaire Items on Strategy Variables**

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree ($%$)</th>
<th>Agree ($%$)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>I translate key words and phrases by use of online dictionaries if I do not know how to express by myself.</td>
<td>38.4*</td>
<td>61.6*</td>
<td>3.84</td>
<td>1.307</td>
</tr>
<tr>
<td>12</td>
<td>I would like to think the whole sentence in advance how to express in Chinese, and then translate it into English with the help of online dictionaries when I write.</td>
<td>26.5*</td>
<td>73.5*</td>
<td>4.25</td>
<td>1.357</td>
</tr>
<tr>
<td>13</td>
<td>I try to use <em>Google</em> or <em>Baidu</em> to find any online information relevant to help me organize a well-structured composition of my own when I write.</td>
<td>59.5*</td>
<td>40.5*</td>
<td>3.15</td>
<td>1.390</td>
</tr>
<tr>
<td>14</td>
<td>I make sure I find out from multimedia support to stimulate my inspiration when I do not know how to do the writing task when I write (texts, pictures, audios, videos, online class, etc.).</td>
<td>43.1*</td>
<td>56.9*</td>
<td>3.61</td>
<td>1.346</td>
</tr>
<tr>
<td>15</td>
<td>I usually surf the Internet for the information that are related to the writing topic if I know the topic in advance.</td>
<td>41.7*</td>
<td>58.3*</td>
<td>3.77</td>
<td>1.309</td>
</tr>
<tr>
<td>16</td>
<td>I usually surf the Internet for the so-called English writing templates whether or not I know the writing topic.</td>
<td>59.1*</td>
<td>40.9*</td>
<td>3.20</td>
<td>1.349</td>
</tr>
</tbody>
</table>

*Note. * Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree 4-6 agree, including partly agree, agree, and strongly agree
5.2.2 Metacognitive Experiences

Built upon contributions to metacognition by Flavell (1979, 1987) who described metacognitive experiences as fundamental elements to metacognition, Tarricone (2011) argued that metacognitive experiences involve “awareness, thoughts, intuitions, perceptions, feelings, judgements and monitoring during problem solving and task completion” (p. 134). Efklides (2009) further identified two kinds of metacognitive feelings — the positive and the negative. Feelings of satisfaction and of confidence are associated with positive affect whereas feelings such as difficulty and frustration are associated with negative affect. Students’ responses to metacognitive experiences in the current study therefore, have been divided into two categories: Metacognitive positive experiences and metacognitive negative experiences. I explain them in next section.

5.2.2.1 Positive Experience

Table 5.4 below shows the results of the participants’ responses to negative and positive experience items. Overall, the participants identified a range of positive experiences in their multimedia-mediated writing contexts. Efklides (2006b) divided students’ writing process into three stages — the prospective phase, during task processing, and the retrospective phase. Over half the participants reported that when the writing task was difficult, they expended high amounts of effort in overcoming the difficulty (Item 23: $M = 3.91$). At the retrospective phase, 81.1% (Item 17: $M = 4.65$) reported a sense of achievement when they accomplished a satisfactory written product. Responses to Item 19 ($M = 4.74$) suggest that the participants view their teacher’s evaluation as a positive experience, while the percentage of agree statements for Item 21 ($M = 4.19$) and Item 20 ($M = 4.65$), indicate that most of the participants had an enthusiasm for learning writing well at the prospective phase. In response to Item 18 ($M = 3.36$), less than half of the participants reported feeling positive about compulsory writing assignments.
Table 5.4

*Descriptive Statistics for Questionnaire Items on Positive Experience Variables*

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>I feel a sense of achievement when I finish the writing task satisfactorily.</td>
<td>18.9*</td>
<td>81.1*</td>
<td>4.65</td>
<td>1.296</td>
</tr>
<tr>
<td>18</td>
<td>I am aware that I feel happy when the teacher assigns us to write a composition with the computer.</td>
<td>59.9*</td>
<td>40.1*</td>
<td>3.36</td>
<td>1.393</td>
</tr>
<tr>
<td>19</td>
<td>I am aware that I feel more confident about writing in English when I was praised by the teacher for my good writing.</td>
<td>13.4*</td>
<td>86.6*</td>
<td>4.74</td>
<td>1.188</td>
</tr>
<tr>
<td>20</td>
<td>I tell myself I must try even harder to improve my writing ability when I find I have made some progress.</td>
<td>15.3*</td>
<td>84.7*</td>
<td>4.65</td>
<td>1.160</td>
</tr>
<tr>
<td>21</td>
<td>I have a strong desire to make up for the failure when I find that I have failed to make improvement in writing in English.</td>
<td>27.0*</td>
<td>73.0*</td>
<td>4.19</td>
<td>1.268</td>
</tr>
<tr>
<td>23</td>
<td>It will stimulate my determination for improving my English writing ability when I encounter difficulties.</td>
<td>30.5*</td>
<td>69.5*</td>
<td>3.91</td>
<td>1.336</td>
</tr>
</tbody>
</table>

*Note.* Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree; 4-6 agree, including partly agree, agree, and strongly agree.

5.2.2.2 Negative Experience

The nature of subjective experiences in the participants’ process of monitoring their writing tends to be multifaceted, complex and changing (Efklides, 2006b). As shown in Table 5.5, a majority of the participants expressed negative experiences when they encountered frustration during their process of writing, including inappropriate time arrangements (Item 25: $M = 4.16$), little progress in writing (Item 26: $M = 3.91$), and unaccustomed use of computers (Item 27: $M = 4.62$).
Table 5.5

Descriptive Statistics for Questionnaire Items on Negative Experience Variables

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>I feel frustrated when I did not finish my writing on a fixed time.</td>
<td>28.1*</td>
<td>71.9*</td>
<td>4.16</td>
<td>1.337</td>
</tr>
<tr>
<td>26</td>
<td>I feel anxious when I find that I have not made progress in writing in English.</td>
<td>35.4*</td>
<td>64.6*</td>
<td>3.91</td>
<td>1.336</td>
</tr>
<tr>
<td>27</td>
<td>I feel frustrated over the use of the new multimedia-mediated writing environment. I need to learn to use computers skilfully.</td>
<td>21.0*</td>
<td>79.0*</td>
<td>4.62</td>
<td>1.337</td>
</tr>
</tbody>
</table>

Note. * Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree 4-6 agree, including partly agree, agree, and strongly agree

5.2.3 Metacognitive Regulation

The metacognitive regulation domain in this study includes the following three subcategories: Planning, monitoring, and evaluating, as identified by many researchers, such as O’Malley and Chamot (1990), Wenden (1998) and Zhang (2010).

5.2.3.1 Planning

Table 5.6 provides statistics on the participants’ perceptions of their planning strategy use. Using O’Malley and Chamot’s (1990) classification of metacognitive planning strategies\(^\text{26}\), Item 28 ($M = 3.76$) indicates that over half the participants see themselves as “advance organisers” (p. 119). Item 30 ($M = 3.84$) and Item 31 ($M = 3.91$) suggest that the participants identify some key processes in the planning as they engage in writing. These include language sentence structures and the key points of views, described as “functional planning” (p. 119) by O’Malley and Chamot (1990). Goal setting (Item 32: $M = 3.95$), ranked highest in this group of items. O’Malley and Chamot (1990) view “goal setting” is a critical part of the planning process. They claim that committing to a goal can encourage learners to put in substantial effort,

\(^{26}\) O’Malley and Chamot’s (1990) classification of metacognitive strategies has been regarded as one of the most influential and widely-cited classifications in applied linguistics. See also Amani, 2014.
motivate, and guide them to perform better. As Item 32 \((M = 3.95)\) is a general question about goal setting \((\text{Before I start to write, I think about the goal I want to achieve in the writing})\), further investigation into the students’ specific goals for writing is warranted. As reference to Item 49 \((M = 4.47)\) in Table 5.8 shows, students tend to hold a specific goals for writing, accomplishment of which can be seen, for example, in passing the national CET-4.

Table 5.6

Descriptive Statistics for Questionnaire Items on Planning Variables

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Before I start to write, I make an outline to help structure the composition in a new word document.</td>
<td>41.1*</td>
<td>58.9*</td>
<td>3.76</td>
<td>1.328</td>
</tr>
<tr>
<td>30</td>
<td>Before I start to write, I have a plan in my mind for what kind of sentence structures I will use in body paragraphs.</td>
<td>38.7*</td>
<td>61.3*</td>
<td>3.84</td>
<td>1.315</td>
</tr>
<tr>
<td>31</td>
<td>Before I start to write, I make a list of the key points of views that I want to include in the composition in a new word document.</td>
<td>36.0*</td>
<td>64.0*</td>
<td>3.91</td>
<td>1.342</td>
</tr>
<tr>
<td>32</td>
<td>Before I start to write, I think about the goal I want to achieve in the writing.</td>
<td>33.9*</td>
<td>69.1*</td>
<td>3.95</td>
<td>1.207</td>
</tr>
</tbody>
</table>

Note.* Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree 4-6 agree, including partly agree, agree, and strongly agree

5.2.3.2 Monitoring

The descriptive statistics in Table 5.7 indicate that participants reported often using: “self-allocating writing time efficiently” (Item 33: \(M = 4.05\)); “self-working on coherent composition structure” (Item 34: \(M = 4.02\)); “self-working on supportive arguments” (Item 35: \(M = 3.96\)); “self-controlling negative emotions” (Item 37: \(M = 3.97\)); and “self-transferring knowledge in L2 writing” (Item 38: \(M = 4.23\)). Other strategies also frequently reported were “self-optimizing the use of multimedia environments” (Item 39: \(M = 3.87\)), “self-focusing on the present writing task through removing distractions” (Item 40: \(M = 3.68\)), and “self-controlling
the modification of the written production” (Item 42: $M = 3.71$). A smaller number of the participants responded by agreeing that they paid attention to specific details in language while writing, such as “marking out the unsettled contentious places in the text” (Item 36: $M = 3.32$) and “modifying the errors, following the prompts on the screen” (Item 41: $M = 3.21$). This suggests that only focusing on surface level features in writing was not necessarily a common practice for the participants.

In general, however, response to the items on monitoring strategies suggest that, to keep focused on their writing, the participants tended not to take advantage of the multimedia tools available, particularly with regard to “cosmetic linguistic corrections” (Ruan, 2014, p. 84). Their focus appeared to be on the contents and idea generation rather than on surface features.

Table 5.7

*Descriptive Statistics for Questionnaire Items on Monitoring Variables*

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>As I write in a time-limited task, I pay attention to the rationality of the time use, adjusting my time arrangements to ensure completion of the writing task.</td>
<td>29.4*</td>
<td>70.6*</td>
<td>4.05</td>
<td>1.193</td>
</tr>
<tr>
<td>34</td>
<td>As I write, I check my writing to make sure that the key points of views are consistent with the topic of the composition.</td>
<td>29.8*</td>
<td>70.2*</td>
<td>4.02</td>
<td>1.177</td>
</tr>
<tr>
<td>35</td>
<td>As I write, I check if the paragraphs contain necessary and appropriate details.</td>
<td>32.2*</td>
<td>67.8*</td>
<td>3.96</td>
<td>1.186</td>
</tr>
<tr>
<td>36</td>
<td>As I write, I mark the places in the composition with different colours on the computer screen that I think require revision to remind me of revising after I accomplish the writing task.</td>
<td>57.1*</td>
<td>42.9*</td>
<td>3.32</td>
<td>1.292</td>
</tr>
<tr>
<td>37</td>
<td>As I write, I adjust my negative emotions (e.g. anxiety, nervousness, etc.) whenever it is necessary.</td>
<td>33.0*</td>
<td>67.0*</td>
<td>3.97</td>
<td>1.240</td>
</tr>
<tr>
<td>38</td>
<td>As I write, I encourage myself to use the information I accumulated to create the English writing as originally as possible.</td>
<td>25.1*</td>
<td>74.9*</td>
<td>4.23</td>
<td>1.177</td>
</tr>
<tr>
<td>39</td>
<td>As I write, I understand multimedia environments are quite helpful to my English writing success so I turn to orchestrate the complex writing environments to my</td>
<td>36.9*</td>
<td>63.1*</td>
<td>3.87</td>
<td>1.208</td>
</tr>
</tbody>
</table>
As I write, I remove distractions to keep attentive to the writing task, for example, cutting off the connection between the computer and the Internet.

As I write, I modify the errors, following the prompts on the computer screen.

As I write, I will not modify the mistakes until I finish my writing task in case the revision interrupts my train of thought.

Note.* Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree
4-6 agree, including partly agree, agree, and strongly agree

5.2.3.3 Evaluating

The last part of the questionnaire concerned the participants’ awareness of metacognitive strategies for evaluating their multimedia-mediated writing. The three sub-processes are self-correct (Item 43 and Item 44), self-assessment (Item 45, Item 46, Item 47 and Item 48), and self-expectation (Item 49 and Item 50). Table 5.8 presents the descriptive statistics of the participants’ responses to each item.

Despite their similar functions of the strategies, participants’ responses had different patterns. Over 70 percent participants reported using self-correct process for sentence accuracy (Item 43: $M = 4.17$) and content modifications (Item 44: $M = 4.18$). With the ease of self-correct when writing on a computer, a multimedia-mediated writing environment has the potential to facilitate students’ self-correct. The role of self-assessment in writing was generally agreed with by the participants. The degree to which they agreed with the different types of assessment, however, varied: (a) assessment of their own performance (Item 45: $M = 3.69$); (b) the assessment of the written products (Item 46: $M = 3.83$), and the assessment of the writing environments (Item 47: $M = 3.66$; Item 48: $M = 4.10$). Item 48, ranked highest in this cluster ($M = 4.10$); the majority agreed that once they had checked for any errors, they turned off the computer and appeared to have no further interaction with the technology. There was strong agreement with the items on self-expectation, the third subcategory which assume a
reference to practising English writing as a foreign language for the purpose of passing tests (Item 49: \( M = 4.47 \)) and job-seeking in the future (Item 50: \( M = 4.29 \)). The mean scores show that item 49, concerning writing for tests, ranked highest in the whole questionnaire. This response suggests that for the majority of the participants their writing instruction imposes extra constraints with the lack of real language communication context. The result may be indicative of the current situation for learning English in mainland China, in which writing for tests may act as a “deep-rooted factor that has influenced Chinese students’ writing motivation and writing anxiety” (Ruan, 2014, p. 85).

Table 5.8

*Descriptive Statistics for Questionnaire Items on Evaluating Variables*

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Disagree</th>
<th>Agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>43</td>
<td>After I have completed my writing, I will change the sentences or expressions that I think are not accurate even if there seems to be no errors in the word document.</td>
<td>27.4*</td>
<td>72.6*</td>
<td>4.17</td>
<td>1.256</td>
</tr>
<tr>
<td>44</td>
<td>After I have completed my writing, I reread my work to check if the key ideas are clearly stated with appropriate modifications.</td>
<td>28.1*</td>
<td>71.9*</td>
<td>4.18</td>
<td>1.288</td>
</tr>
<tr>
<td>45</td>
<td>After I have completed my writing, I think back to how I write, and about what I might do differently to improve my writing in English next time.</td>
<td>43.4*</td>
<td>56.6*</td>
<td>3.69</td>
<td>1.289</td>
</tr>
<tr>
<td>46</td>
<td>After I have completed my writing, I make an evaluation by myself about the scores I could get.</td>
<td>38.9*</td>
<td>61.1*</td>
<td>3.83</td>
<td>1.195</td>
</tr>
<tr>
<td>47</td>
<td>After I have completed my writing, I am thinking of my use of computers to write English compositions, which is what I like to do because in such a new environment, I feel less worried about my spelling and grammar errors.</td>
<td>45.2*</td>
<td>54.8*</td>
<td>3.66</td>
<td>1.406</td>
</tr>
<tr>
<td>48</td>
<td>After I checked the mistakes, I feel that there is no problem about my writing and tell myself that I can turn off the computer to relax and think no more about writing.</td>
<td>29.9*</td>
<td>70.1*</td>
<td>4.10</td>
<td>1.385</td>
</tr>
<tr>
<td>49</td>
<td>I will think about the importance of good English composition in passing CET-4 or CET-6.</td>
<td>9.7*</td>
<td>90.3*</td>
<td>4.47</td>
<td>1.260</td>
</tr>
<tr>
<td>50</td>
<td>I will think about the importance of good English writing for my future career.</td>
<td>33.0*</td>
<td>77.0*</td>
<td>4.29</td>
<td>1.345</td>
</tr>
</tbody>
</table>

*Note.* Percentage 1-3 disagree, including strongly disagree, disagree, and moderately disagree 4-6 agree, including partly agree, agree, and strongly agree
To investigate a possible association of participants’ metacognitive awareness with their EFL proficiency, the data were examined further through a Spearman’s Rank Order Correlation test (rho) and a series of independent-samples $t$-tests. The relationships identified are expected to have potential pedagogical implications for improving students’ EFL writing proficiency and performance on high-stakes examination, the CET-4.

Recent literature has reported that high-proficiency writers tend to have better understandings and perceptions of metacognitive strategies in operation before, during, and after their performance of a writing task (e.g., De Silva & Graham, 2015). The literature on Chinese tertiary students’ metacognition about EFL writing, however, is scarce, particularly with regard to EFL writing in multimedia-mediated environments. Against such a background, the relationship between metacognitive awareness and their English proficiency scores needed to be investigated. In my study, this was materialised through checking the Spearman’s Rank Order Correlation (rho).

Two continuous variables needed to be considered in the calculation: One was the perceived metacognitive awareness as measured by the large-scale questionnaire; the other was the participants’ English proficiency scores. The grouping was based on their scores in the subject English in the NCEE (Gaokao) as well as the results of their final exams in the recent semester, which were self-reported in part one of the MAIME questionnaire (refer to section 3.6). A participant’s EFL proficiency was therefore based on the two test scores; only those who had consistent scores across the two measures were included in the data analysis. A total of 337 participants were selected for correction analysis. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The result showed that there was a large, positive correlation between the two variables ($r = .74$, $n = 337$, $p < .001$), indicating quite a strong relationship between metacognitive awareness and
the participants’ English proficiency. This result suggests that the more metacognitive aware were the students, the higher proficiency in language writing/learning the students demonstrated.

Secondly, to investigate any differences associated with EFL proficiency the participants were then divided into two EFL proficiency groups (high vs. low) on the base of purposive sampling (Creswell, 2013). Participants whose scores were above 130 in the NCEE and above 85 in the final exams were considered as high EFL-proficiency participants (N = 81); while those whose scores were below 90 in the NCEE and below 60 in the final exams were termed low EFL-proficiency participants (N = 71).

A series of independent-samples t-tests were conducted to investigate whether high EFL-proficiency participants were differentiated from low EFL-proficiency participants with regard to their self-reported metacognitive awareness. The independent-samples t-test is often used as a means for analysis of the significance between two different groups by comparing the mean scores (Field, 2013). In order to avoid any Type 1 error, the independent-samples t-tests with Bonferroni adjusted alpha, p < .002 (.05/25), were performed in all subsequent analyses using Statistical Packages for the Social Sciences (SPSS) software.

Table 5.9 presents the results of the independent-samples t-tests with selected Cohen’s d values. As proposed by Cohen (1988), the guidelines for interpreting the strength of the effect size are: .20 = small effect; .50 = medium effect; .80 = large effect.

As reported in Table 5.9, the participants with high or low EFL proficiency levels responded to the questionnaire statements of these three metacognitive domains in a markedly different way. Overall, the high EFL-proficiency participants outperformed the lower EFL-proficiency participants in all the three metacognitive domains.

In the metacognitive knowledge domain, the EFL proficiency difference produced a medium effect on “strength identification” in person knowledge clusters (Cohen’s d = .513)
and “help-seeking” in C/S strategy knowledge clusters (Cohen’s $d = .512$). A small effect on “linguistic knowledge” in person knowledge clusters (Cohen’s $d = .340$), “language accuracy” (Cohen’s $d = .312$) and “theme and thought” (Cohen’s $d = .205$) in task knowledge clusters is evident. The two groups, however, did not differ significantly in terms of “weakness identification”, “reader awareness”, “writing standard,” and “translation”.

In the metacognitive experience domain, high EFL-proficiency participants reported more complex metacognitive experiences in the writing process than their lower EFL-proficiency counterparts did, including positive experiences and negative experiences. The EFL proficiency difference generated a moderate magnitude on both the positive experiences (Cohen’s $d = .668$) and the negative experiences (Cohen’s $d = .609$).

In the metacognitive regulation domain, those high EFL achievers demonstrated more metacognitive strategies for accomplishing their multimedia-mediated writing tasks than the low EFL achievers. The EFL proficiency difference yielded a large effect on all the three subcategories of self-evaluating strategies in terms of “self-correction” (Cohen’s $d = .838$), “self-assessment” (Cohen’s $d = .926$), and “self-expectation” (Cohen’s $d = .871$), followed by a large effect on “prior knowledge transfer” in self-monitoring strategies (Cohen’s $d = .833$). The difference also produced a medium effect on “time management” (Cohen’s $d = .555$), “multimedia optimum use” (Cohen’s $d = .651$), and “distraction removal” (Cohen’s $d = .666$) in self-monitoring strategies and a medium effect on “advance organizer” (Cohen’s $d = .682$), “functional planning” (Cohen’s $d = .535$), and “goal setting” (Cohen’s $d = .364$) in self-planning strategies. However, no significant differences were found in the use of other subcategories of strategies along the continuum of metacognitive regulations, such as “content checks”, “marking”, “psychological adjustment”, and “error modifications”.

To sum up, the magnitude of the differences in the means of the three metacognitive domains suggests that the participants’ EFL proficiency is a critical factor affecting their
perceptions and conceptualisations of metacognition in multimedia-mediated EFL writing, particularly with regard to their metacognitive strategy uses in self-evaluation.
<table>
<thead>
<tr>
<th>Variables</th>
<th>High</th>
<th>Low</th>
<th>95% CI</th>
<th>t</th>
<th>p</th>
<th>Cohen's $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  M SD</td>
<td>N  M SD</td>
<td>LL  UL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>McK Person</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Strength identification</td>
<td>81 3.51 .906</td>
<td>71 3.07 .808</td>
<td>.022 .850</td>
<td>3.081</td>
<td>.000**</td>
<td>.513</td>
</tr>
<tr>
<td>Weakness identification</td>
<td>81 4.46 1.414</td>
<td>71 4.49 1.463</td>
<td>-.454 .382</td>
<td>.168</td>
<td>.867</td>
<td></td>
</tr>
<tr>
<td>Linguistic knowledge</td>
<td>81 3.31 1.251</td>
<td>71 2.90 1.161</td>
<td>.019 .796</td>
<td>2.081</td>
<td>.000**</td>
<td>.340</td>
</tr>
<tr>
<td><strong>Task</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language accuracy</td>
<td>81 4.57 1.457</td>
<td>71 4.14 1.295</td>
<td>.144 .971</td>
<td>.583</td>
<td>.000**</td>
<td>.312</td>
</tr>
<tr>
<td>Theme and thought</td>
<td>81 4.49 1.097</td>
<td>71 4.27 1.050</td>
<td>.247 1.101</td>
<td>3.118</td>
<td>.001**</td>
<td>.205</td>
</tr>
<tr>
<td>Audience awareness</td>
<td>81 4.36 1.028</td>
<td>71 4.17 1.424</td>
<td>-.206 .584</td>
<td>.946</td>
<td>.346</td>
<td></td>
</tr>
<tr>
<td>Writing standard</td>
<td>81 4.41 1.349</td>
<td>71 4.15 1.327</td>
<td>-.178 .683</td>
<td>1.160</td>
<td>.248</td>
<td></td>
</tr>
<tr>
<td><strong>Strategy(C/S)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Translation</td>
<td>81 4.33 1.255</td>
<td>71 4.33 1.293</td>
<td>-.406 .415</td>
<td>.023</td>
<td>.982</td>
<td></td>
</tr>
<tr>
<td>Help-seeking</td>
<td>81 4.16 1.219</td>
<td>71 3.51 1.319</td>
<td>.247 1.060</td>
<td>3.173</td>
<td>.000**</td>
<td>.512</td>
</tr>
<tr>
<td><strong>McE Positive</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive Experience</td>
<td>81 4.68 1.293</td>
<td>71 3.81 1.311</td>
<td>.355 .784</td>
<td>.305</td>
<td>.000**</td>
<td>.668</td>
</tr>
<tr>
<td><strong>McE Negative</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative Experience</td>
<td>81 4.36 1.278</td>
<td>71 3.57 1.313</td>
<td>.128 .703</td>
<td>1.367</td>
<td>.000**</td>
<td>.609</td>
</tr>
<tr>
<td><strong>McR Planning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advance organizer</td>
<td>81 3.90 1.300</td>
<td>71 3.08 1.096</td>
<td>.192 .642</td>
<td>1.067</td>
<td>.001**</td>
<td>.682</td>
</tr>
<tr>
<td>Functional planning</td>
<td>81 4.11 1.225</td>
<td>71 3.42 1.351</td>
<td>.072 .904</td>
<td>2.319</td>
<td>.000**</td>
<td>.535</td>
</tr>
<tr>
<td>Goal setting</td>
<td>81 3.98 1.235</td>
<td>71 3.57 1.008</td>
<td>-.304 .508</td>
<td>.497</td>
<td>.000**</td>
<td>.364</td>
</tr>
<tr>
<td>Time management</td>
<td>81 4.25 1.007</td>
<td>71 3.63 1.219</td>
<td>.059 .773</td>
<td>2.303</td>
<td>.000**</td>
<td>.555</td>
</tr>
<tr>
<td>Content checks</td>
<td>81 4.04 1.145</td>
<td>71 3.84 1.253</td>
<td>-.178 .597</td>
<td>1.059</td>
<td>.291</td>
<td></td>
</tr>
<tr>
<td>Marking, but not revising</td>
<td>81 4.14 1.137</td>
<td>71 3.80 1.226</td>
<td>-.046 .712</td>
<td>1.736</td>
<td>.085</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------------------------</td>
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<td>------------------------</td>
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<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.30</td>
<td>1.042</td>
<td>71</td>
<td>4.03</td>
<td>1.207</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.28</td>
<td>1.143</td>
<td>71</td>
<td>3.35</td>
<td>1.090</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>3.78</td>
<td>1.114</td>
<td>71</td>
<td>3.05</td>
<td>1.129</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.09</td>
<td>1.075</td>
<td>71</td>
<td>3.39</td>
<td>1.026</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>3.67</td>
<td>1.004</td>
<td>71</td>
<td>3.54</td>
<td>1.119</td>
</tr>
<tr>
<td>Evaluating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.43</td>
<td>1.072</td>
<td>71</td>
<td>3.42</td>
<td>1.324</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.67</td>
<td>1.173</td>
<td>71</td>
<td>3.47</td>
<td>1.407</td>
</tr>
<tr>
<td></td>
<td>81</td>
<td>4.42</td>
<td>1.023</td>
<td>71</td>
<td>3.53</td>
<td>1.020</td>
</tr>
</tbody>
</table>

*Note.* This table reports effect size (Cohen’s $d$) with Bonferroni adjusted alpha, $p < .002 (.05/25)$; CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit. McK = Metacognitive Knowledge; McE = Metacognitive Experience; McR = Metacognitive Regulations.
5.4 PREDICTIVE EFFECTS OF METACOGNITIVE VARIABLES ON CET TEST SCORES

In order to examine which specific metacognitive variables were predictors of EFL achievement, a series of multiple regression analyses were applied. Based on the idea of correlation, multiple regression analysis is a powerful statistical technique for describing how well a set of known independent variables (IVs, predictors) is able to predict a particular unknown dependent variable (DV, an outcome) (Pallant, 2016). As Pallant (2016) points out, multiple regression analysis is not just one technique but a family of techniques. There are three major analytic strategies in multiple regression: Simultaneous (standard); hierarchical (sequential); and stepwise (statistical). In this section of the study, simultaneous multiple regression, in which all the independent variables were entered into the regression equation simultaneously, were performed to evaluate the predictive effect of students’ self-reported metacognitive awareness on their CET-4 test scores. Simultaneous multiple regression is most suitable in this study in that there is no hypothetical causal structure of the data for considering any IV to be prior to any other IVs in terms of its predictive power. In this analysis in Phase 1, the DV was the participants’ CET-4 test scores collected after their sitting for the national CET-4, widely recognized as indicators of university students’ English proficiency level in mainland China (see Chapter 1). Three hundred and thirty-seven participants reported their scores in CET-4. The IVs were person knowledge, task knowledge, strategy (C/S) knowledge, positive experience, negative experience, planning, monitoring, and evaluating.

Prior to running the multiple regression analysis, assumptions of the programme were examined until we were assured that suitable basic assumptions were met (Pallant, 2016). By drawing on the sources from Tabachnick and Fidell (2007), Pallant (2016) provided us with the major assumptions in terms of sample size, multicollinearity and singularity, outliers, multivariate normality, linear relationship, and homoscedasticity. A simple rule of thumb for calculating the sample size is the formula: \( N > 50 + 8m \) (where \( m \) = number of IVs) for
estimating power in multiple correlation (Tabachnick & Fidell, 2007, p. 123). In Phase 1, there were 337 cases with eight IVs clustered. A higher case-to-IV ratio was ensured. For the various aspects of the distribution of scores and the nature of the underlying relationship between the variables, such as outliers, linear relationship, and homoscedasticity, the standardized residual scatterplot, which was generated as part of the multiple regression procedure, was crosschecked for evaluation. No standardized residual values were found above 3.3 or less than -3.3. For multivariate normality, histograms and Q-Q Plots generated by SPSS procedure as well were checked to inspect the distribution of the residual values. Finally, Cohen’s $f^2$ was used to evaluate effect size measures for multiple regression. According to Cohen (1988), the criterion for evaluating effect size was: .02 = small; .15 = medium; .35 = large.

5.4.1 Effects of Eight Latent Writer Variables on CET Test Scores

The initial statistical analysis validated a data set appropriate for multiple regression. The next step was to investigate how metacognitive awareness predicted the participants’ language achievement (CET-4). Given that the IVs as the criteria in this set of analysis were highly correlated ($r > .90$), a Bonferroni adjustment was adopted to set the alpha level at .006. On the basis of this, a simultaneous multiple regression analysis was conducted, in which the eight metacognitive awareness variables were entered as a group in one step. That is, all these IVs were automatically selected as predictors of the DV.

Results showed that the eight latent writer IVs, as a whole, explained approximately 35.8% of the variance in the participants’ CET-4 test scores, $F(8, 337) = 31.533, p < .001, R^2 = .358, \text{adjusted } R^2 = .342$. The predictive power produced a large effect size (Cohen’s $f^2 = .558$), indicating that the participants’ metacognitive awareness was a strong factor in predicting their language achievement.

In Table 5.10, it is clear to note that not all the eight IVs under the three metacognitive dimension variables are included in the model for predicting the participants’ EFL proficiency.
Metacognitive cognitive and social strategy knowledge ($p = .001$), metacognitive planning ($p = .006$), metacognitive monitoring ($p = .001$), and metacognitive evaluating ($p = .000$) were statistically significant and entered into the regression model while the other IVs were excluded from the model.

Table 5.10

*Results of Multiple Regressions: The Eight IVs on CET-4 Test Scores*

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>$B$</th>
<th>Beta</th>
<th>$p$</th>
<th>95% CI for $B$</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$\text{LB}$</td>
<td></td>
<td>$\text{UB}$</td>
</tr>
<tr>
<td>McK-PE</td>
<td>6.848</td>
<td>.085</td>
<td>.058</td>
<td>-.236</td>
<td>.136</td>
<td>.120</td>
</tr>
<tr>
<td>McK-ST(C/S)</td>
<td>11.013</td>
<td>.143</td>
<td>.001</td>
<td>4.476</td>
<td>.121</td>
<td>.105</td>
</tr>
<tr>
<td>McE-PO</td>
<td>6.136</td>
<td>.075</td>
<td>.194</td>
<td>-3.141</td>
<td>.081</td>
<td>.064</td>
</tr>
<tr>
<td>McE-NE</td>
<td>7.087</td>
<td>.104</td>
<td>.096</td>
<td>-1.545</td>
<td>.046</td>
<td>.037</td>
</tr>
<tr>
<td>McR-PL</td>
<td>7.758</td>
<td>.114</td>
<td>.006</td>
<td>.448</td>
<td>.313</td>
<td>.305</td>
</tr>
<tr>
<td>McR-MO</td>
<td>8.688</td>
<td>.101</td>
<td>.001</td>
<td>.697</td>
<td>.367</td>
<td>.348</td>
</tr>
<tr>
<td>McR-EV</td>
<td>18.175</td>
<td>.221</td>
<td>.000</td>
<td>8.288</td>
<td>.415</td>
<td>.400</td>
</tr>
</tbody>
</table>

*Note.* The dependent variable was CET-4 test scores. $P < .05$; $R^2 = .358$; Adjusted $R^2 = .342$; CI = Confidence Interval; LB = Lower Bound; UB = Upper Bound. McK-PE = Metacognitive knowledge-person variables; McK-TA = Metacognitive knowledge-task variables; McK-ST(C/S) = Metacognitive knowledge-cognitive or social strategy variables; McE-PO = Metacognitive Experience-positive experience variables; McE-NE = Metacognitive Experience-negative experience variables; McR-PL = Metacognitive Regulation-planning variables; McR-MO = Metacognitive Regulation-monitoring variables; McR-EV = Metacognitive Regulation-evaluating variables.

### 5.4.2 Metacognitive Regulatory Functions in Predicting CET Test Scores

The statistics in Table 5.10 seem to indicate that the metacognitive regulation domain, as a one-entity variable, is closely related to performance on CET-4. Given that the metacognitive regulation variables, planning, monitoring, and evaluating, were clustered categories of strategies that included several specific strategies under each, further statistical analysis was necessary. The three subcategories were analysed to examine if one strategy was more
powerful than the others in accounting for the variability of the participants’ language achievement (CET-4). Results are reported in Table 5.11.

When the four strategy items under “planning” were entered into simultaneous multiple regression, results showed that metacognitive planning as a whole accounted for 31.3% of variance in the participants’ CET-4 test scores, $F(4, 337) = 37.738, p < .001$, $R^2 = .313$, adjusted $R^2 = .305$, indicating a large effect size (Cohen’s $f^2 = .456$). All items concerning advance organizer, functional planning and goal setting turned out to be significantly predictive of the participants’ language achievement on the CET-4.

When the 10 strategy items under “monitoring” were entered into simultaneous multiple regression, results showed that metacognitive monitoring predicted 36.7% of variance in the participants’ CET-4 test scores, $F(10, 337) = 18.802, p < .001$, $R^2 = .367$, adjusted $R^2 = .348$, suggesting a large effect size (Cohen’s $f^2 = .580$). The following individual items were found to be significant predictors: “self-allocating writing time efficiently”, “self-working on supportive arguments”, “self-transferring knowledge in writing”, “self-optimizing the use of multimedia environments”, “self-focusing on the writing tasks”, and “self-modifying the errors”.

When the eight strategy items under “evaluating” were entered into a simultaneous multiple regression, results showed that metacognitive evaluating as a whole accounted for 41.5% of variance in the participants’ CET-4 test scores, $F(8, 337) = 28.974, p < .001$, $R^2 = .415$, adjusted $R^2 = .400$. The effect size (Cohen’s $f^2 = .709$) indicated that the “evaluating”, as a one-entity variable, generated a large predictive effect on the participants’ performance in CET-4 tests. In contrast to the previous two regulatory functions (planning and monitoring), “evaluating” strategies seems to be more powerful in accounting for the participants’ language achievement (All the Beta values in this cluster were larger than 2). Results also show that five of the eight items made a significant contribution to predicting the CET-4 scores. These were
“self-assessing the performance in the writing”, “self-evaluating the written productions”, “self-assessing the use of the multimedia writing environments”, “self-reflecting the use of the multimedia writing environments”, and “self-evaluating the importance of L2 writing in job seeking”. Table 5.12 shows the multiple regression results of the three cluster categories.

Table 5.11

*Multiple Regression Results of the Three Cluster Categories*

<table>
<thead>
<tr>
<th>Cluster Category</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$F$</th>
<th>Cohen’s $f^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>.313</td>
<td>.305</td>
<td>37.738</td>
<td>.456</td>
</tr>
<tr>
<td>Monitoring</td>
<td>.367</td>
<td>.348</td>
<td>18.802</td>
<td>.580</td>
</tr>
<tr>
<td>Evaluating</td>
<td>.415</td>
<td>.400</td>
<td>28.974</td>
<td>.709</td>
</tr>
</tbody>
</table>

To sum up, as the “manifestations of the executive dimension of metacognition” (Goh, 1998, p. 225), a focus on the subcategory within the “metacognitive regulation domain” has provided a nuanced understanding of the relationship between metacognitive awareness and L2 writing performance. The multiple regression analysis has provided insights into the role of metacognitive strategies in improving students’ performance in L2 writing in multimedia environments.

**5.5 SUMMARY**

In this chapter, data from the questionnaire in Phase 1 were presented and analysed, addressing the first research question of the study on Chinese EFL writers’ metacognitive systems in their writing processes in multimedia environments. The participants’ overall perceived uses of writing strategies, their metacognitive experiences, and their metacognitive knowledge in multimedia environments were documented. The findings were consistent, with some variability, with Flavell’s theoretical framework to explain metacognition in learning processes. A closer examination of the results has identified a relationship between participants’
knowledge and beliefs about the metacognitive systems based and their EFL proficiency. The high EFL-proficiency participants reported more sources of metacognitive knowledge, more abundant metacognitive experiences, and more frequent use of metacognitive strategies than participants with lower proficiency did.

Finally, multiple regression analyses showed that the eight writer IVs, especially the role of metacognitive strategies, made a significantly large contribution to predicting the participants’ English language achievement. These results suggest that students who had an awareness of metacognition and its role in writing and were adept at using metacognitive strategies may have better academic L2 writing achievement. It would appear that in the complex multimedia EFL writing context, there is a strong argument for incorporating metacognitive strategies in classroom instruction to facilitate the students’ EFL writing performance (Antonietti, et al., 2008; Maftoon et al., 2014). The multiple regression analyses illustrate the importance of metacognition in L2 writing in multimedia environments, and support the inclusion of metacognitive strategy instruction in L2 writing instruction. An instructional intervention, which included a focus on metacognitive knowledge and the use of metacognitive strategies, was built on these findings and evaluated in Phase 2 of this study.

The next chapter will move on to such a discussion on what types of changes over the intervention course to mirror the literature, considering the major themes emerged from the experiment.
Table 5.12

*Results of Multiple Regressions: The IVs in Metacognitive Regulations on CET-4 Test Scores*

<table>
<thead>
<tr>
<th>Variables</th>
<th>$B$</th>
<th>Beta</th>
<th>$p$</th>
<th>95% CI for $B$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance organizing composition framework</td>
<td>7.553</td>
<td>.150</td>
<td>.004</td>
<td>2.361 - 12.746</td>
</tr>
<tr>
<td>Planning on sentence structures</td>
<td>11.283</td>
<td>.220</td>
<td>.000</td>
<td>5.534 - 17.033</td>
</tr>
<tr>
<td>Planning on key points</td>
<td>6.821</td>
<td>.135</td>
<td>.021</td>
<td>1.027 - 12.616</td>
</tr>
<tr>
<td>Goal setting</td>
<td>12.569</td>
<td>.221</td>
<td>.000</td>
<td>6.372 - 18.765</td>
</tr>
<tr>
<td>Self-allocating writing time efficiently</td>
<td>7.858</td>
<td>.141</td>
<td>.012</td>
<td>1.709 - 14.007</td>
</tr>
<tr>
<td>Self-working on coherent composition structures</td>
<td>5.310</td>
<td>.095</td>
<td>.117</td>
<td>-1.334 - 11.953</td>
</tr>
<tr>
<td>Self-working on supportive arguments</td>
<td>7.217</td>
<td>.129</td>
<td>.029</td>
<td>.754 - 13.681</td>
</tr>
<tr>
<td>Self-working on functional marking</td>
<td>-.401</td>
<td>-.008</td>
<td>.878</td>
<td>-.549 - 4.748</td>
</tr>
<tr>
<td>Self-transferring knowledge in writing</td>
<td>6.122</td>
<td>.107</td>
<td>.049</td>
<td>.022 - 12.222</td>
</tr>
<tr>
<td>Self-optimizing the use of multimedia environments</td>
<td>6.842</td>
<td>.127</td>
<td>.012</td>
<td>1.544 - 12.140</td>
</tr>
<tr>
<td>Self-focusing on the writing tasks</td>
<td>5.543</td>
<td>.113</td>
<td>.024</td>
<td>.747 - 10.340</td>
</tr>
<tr>
<td>Self-modifying the errors</td>
<td>6.968</td>
<td>.137</td>
<td>.007</td>
<td>1.922 - 12.015</td>
</tr>
<tr>
<td>Self-controlling the modification of the written production</td>
<td>1.360</td>
<td>.026</td>
<td>.607</td>
<td>-3.832 - 6.552</td>
</tr>
<tr>
<td>Self-correcting the composition structures</td>
<td>4.474</td>
<td>2.757</td>
<td>.106</td>
<td>-.949 - 9.897</td>
</tr>
<tr>
<td>Activity</td>
<td>Mean (LB)</td>
<td>Mean (UB)</td>
<td>CI (LB)</td>
<td>CI (UB)</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Self-correcting the supportive arguments</td>
<td>8.112</td>
<td>2.728</td>
<td>.203</td>
<td>-2.746</td>
</tr>
<tr>
<td>Self-assessing the performance in the writing</td>
<td>5.099</td>
<td>2.134</td>
<td>.017</td>
<td>.900</td>
</tr>
<tr>
<td>Self-evaluating the written productions</td>
<td>8.737</td>
<td>2.516</td>
<td>.001</td>
<td>3.787</td>
</tr>
<tr>
<td>Self-assessing the use of the multimedia writing environments</td>
<td>7.332</td>
<td>2.718</td>
<td>.007</td>
<td>1.986</td>
</tr>
<tr>
<td>Self-reflecting the use of the multimedia writing environments</td>
<td>9.229</td>
<td>2.726</td>
<td>.001</td>
<td>3.867</td>
</tr>
<tr>
<td>Self-evaluating the importance of L2 writing in passing CET tests</td>
<td>2.581</td>
<td>2.433</td>
<td>.290</td>
<td>-2.205</td>
</tr>
<tr>
<td>Self-evaluating the importance of L2 writing in job seeking</td>
<td>1.984</td>
<td>2.150</td>
<td>.000</td>
<td>2.755</td>
</tr>
</tbody>
</table>

*Note.* The dependent variable was CET-4 test scores. CI = Confidence Interval; LB = Lower Bound; UB = Upper Bound
CHAPTER SIX

RESULTS FOR RESEARCH QUESTION 2

6.1 CHAPTER OVERVIEW

This chapter reports the results of the quantitative analysis in Phase 2 to answer the second research question in the study (RQ2: What are the impacts of the instructional programme in terms of the student writers’ EFL writing proficiency as well as their metacognitive strategy development?). Data collected were used to evaluate the metacognitive strategy-based writing intervention programme in multimedia environments. There are two sources: (a) the EFL writing test scores from the pre-test, immediate post-test and delayed post-test; (b) the pre-and post-test scores from the self-reported metacognitive strategy use questionnaire (MSUQ-ME).

The chapter is organized into the following two sections. First, it provides a description of the 64 voluntary participants who were divided equally into an experimental and control group for the quasi-experimental evaluation of the instructional intervention. This includes social considerations of age, gender, years of English language learning, and English typing speed; writing performance; and self-reported use of metacognitive strategies prior to the instructional intervention; Second, it reports the impact of the instructional intervention on the participants’ writing performance and their reported use of metacognitive strategies in multimedia environments. The chapter closes with a brief summary of key themes emerging from the study.

6.2 DATA ANALYSIS PROCEDURES

Prior to conducting any statistical analysis, the data obtained from both of the two groups on all variables was checked to see whether it was appropriate to use a parametric technique or its non-parametric alternative for analysis, as normal distribution of data was a prerequisite
(Pallant, 2016). Through the Kolmogorov-Smirnov tests, the normal distribution was established for all variables in terms of social factor differences, the participants’ pre-, post, and delayed post-writing performance in the form of writing scores, and the participants’ use of metacognitive strategies before and after the course with data obtained from the questionnaire (MUSQ-ME) investigation. The parametric technique used for comparing the difference of the mean scores of two different groups of people was then applied to address the second research question.

First, for the group difference in the use of metacognitive strategies between the experimental group and the control group, a series of independent-samples t-tests were conducted to ascertain whether the two groups differed. For the differences within each group, a series of paired-samples t-tests were applied. Cohen’s $d$ was used to indicate the effect sizes using an online calculator at http://www.uccs.edu/~lbecker/ as recommended by Larson-Hall (2015). Knowing the magnitude of an effect allows us to ascertain the practical significance of statistical significance. A larger absolute value always indicates a stronger effect. Cohen (1988) made the following recommendations: small, $d = .2$, medium, $d = .5$, and large, $d = .8$.

Second, according to Pallant (2016), to assess whether there were statistically significant differences between the two groups in writing achievement across three different situations (pre-, post-, and delayed post-tests), a series of one-way between-groups ANOVAs were performed. An F ratio was calculated which represented the variance between the groups. As recommended by Cohen (1988), the effect size was calculated using eta squared (partial $\eta^2$). According to Cohen (1988), the magnitude of the effect size was: small, $\eta^2 = .01$, medium, $\eta^2 = .06$, and large, $\eta^2 = .14$.

Third, the Chi-square test of independence was applied for gender comparison in the pre-course comparison.
6.3 PRE-COURSE COMPARISON BETWEEN THE TWO GROUPS

The study in Phase 2 involved an experimental group ("ExpG") and a control group ("ConG") established by random allocation from the 64 voluntary participants selected from the cohort in Phase 1 to examine the impact of the instructional programmes on their writing improvement and metacognitive awareness development (see Section 3.3 for detailed information of the two groups). To ascertain the participants’ equivalent entry level into the intervention programme, a series of baseline measures are described in this section.

6.3.1 Social Factor Considerations

First, both of the two groups were in the same social context, as the study was conducted in the same university at which the participants were in their second year of study (see Chapter 1 for detailed discussion). All second year students at the university in their second academic year take a compulsory English multimedia course before completing the national high-stakes examination. The two groups used the same multimedia classroom with the same teacher who served in the university.

Second, their interpersonal social factor differences, age, gender, years of English learning, and proficiency of using the computer word processor (speed of typing English words per minute\textsuperscript{27}) were analysed. For age, years of English learning components, and proficiency of using the computer word processor, the independent samples \textit{t}-test was applied because of the continuous numerical variables. For gender differences, the Chi-square test of independence was performed because gender is a categorical variable. The results are presented in Table 6.1.

\textsuperscript{27} The participants’ speed of typing English words per minute was tested through an online web-based software programme: \url{http://dazi.kukuw.com/}.
Table 6.1

Independent Samples t-tests: Age, Years of English Learning, and English Typing Speed before the Course

<table>
<thead>
<tr>
<th>Social Factor Differences</th>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p(two-tailed)</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LL</td>
</tr>
<tr>
<td>Age</td>
<td>ExpG</td>
<td>32</td>
<td>19.56</td>
<td>1.685</td>
<td>-0.83</td>
<td>.934</td>
<td>-.782</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>32</td>
<td>19.69</td>
<td>1.295</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of English learning</td>
<td>ExpG</td>
<td>32</td>
<td>10.50</td>
<td>.914</td>
<td>-0.576</td>
<td>.567</td>
<td>-.559</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>32</td>
<td>10.53</td>
<td>.821</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Typing Speed</td>
<td>ExpG</td>
<td>32</td>
<td>45.37</td>
<td>2.598</td>
<td>.577</td>
<td>.566</td>
<td>-1.043</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>32</td>
<td>44.95</td>
<td>3.237</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit

Descriptive statistics showed that there were no statistically significant differences in the ages of students from the two groups ($M_{\text{exp}} = 19.56$, $M_{\text{con}} = 19.69$), their reported average years of English learning experience ($M_{\text{exp}} = 10.50$, $M_{\text{con}} = 10.53$), and their average typing speed of English words per minute ($M_{\text{exp}} = 45.37$, $M_{\text{con}} = 44.95$). This is followed by the calculation of gender comparison through the Chi-square test of independence. No significant difference was found, $\chi^2 (1) = .069$, $p = .792$.

6.3.2 Writing Performance

Prior to the instructional intervention, the participants’ writing performance in both the experimental and control groups was assessed. The marking rubric from Jacobs et al.’s (1981) “ESL Composition Profile” in terms of content, organisation, vocabulary, language use, and mechanics was used. A series of independent samples t-tests were conducted in each component of the marking rubric. The results revealed no significant differences in the pre-intervention writing scores in each component and the total scores, indicating that the L2
writing proficiency of two groups prior to the intervention was equivalent, as described in Table 6.2.

Table 6.2

*Independent Samples t-tests: Pre-intervention Writing Scores*

<table>
<thead>
<tr>
<th>Pre-Test</th>
<th>Group</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p (two-tailed)</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LL</td>
</tr>
<tr>
<td>Content</td>
<td>ExpG</td>
<td>32</td>
<td>22.66</td>
<td>3.598</td>
<td>-.648</td>
<td>.519</td>
<td>-2.169</td>
</tr>
<tr>
<td>(30 points)</td>
<td>ConG</td>
<td>32</td>
<td>23.19</td>
<td>2.923</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>ExpG</td>
<td>32</td>
<td>16.88</td>
<td>1.913</td>
<td>.070</td>
<td>.944</td>
<td>-.857</td>
</tr>
<tr>
<td>(20 points)</td>
<td>ConG</td>
<td>32</td>
<td>16.84</td>
<td>1.629</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vocabulary</td>
<td>ExpG</td>
<td>32</td>
<td>15.03</td>
<td>1.576</td>
<td>.351</td>
<td>.727</td>
<td>-.733</td>
</tr>
<tr>
<td>(20 points)</td>
<td>ConG</td>
<td>32</td>
<td>14.88</td>
<td>1.963</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language Use</td>
<td>ExpG</td>
<td>32</td>
<td>15.47</td>
<td>2.724</td>
<td>.900</td>
<td>.371</td>
<td>-.725</td>
</tr>
<tr>
<td>(25 points)</td>
<td>ConG</td>
<td>32</td>
<td>14.88</td>
<td>2.550</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td>ExpG</td>
<td>32</td>
<td>4.63</td>
<td>.554</td>
<td>-.241</td>
<td>.811</td>
<td>-.291</td>
</tr>
<tr>
<td>(5 points)</td>
<td>ConG</td>
<td>32</td>
<td>4.66</td>
<td>.483</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Scores</td>
<td>ExpG</td>
<td>32</td>
<td>74.53</td>
<td>7.500</td>
<td>.269</td>
<td>.789</td>
<td>-3.222</td>
</tr>
<tr>
<td>(100 points)</td>
<td>ConG</td>
<td>32</td>
<td>74.03</td>
<td>7.394</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit*

6.3.3 The Use of Metacognitive Strategies before the Course

The use of metacognitive strategies was investigated by a self-reported questionnaire administered to both groups prior to the metacognitive strategy-based instruction programme (Questionnaire II, see Appendix G). The questionnaire was administered immediately after the pre-test writing assessment to reduce any practice effect of the questionnaire on raising the participants’ metacognitive awareness of L2 writing. The 64 surveys were subjected subsequently to a series of independent samples t-tests for analysis. The results revealed no
significant differences between the two groups, in the use of the three metacognitive strategies, including planning, monitoring and evaluating (see Appendix O for statistical information).

Summary

The two groups showed no statistical differences on their baseline measures of social factors, pre-writing performance, and reported use of metacognitive strategies, prior to the experimental group taking the metacognitive strategy instruction programme.

6.4 EFFECTS OF METACOGNITIVE STRATEGY INSTRUCTION ON STUDENTS’ WRITING AND METACOGNITIVE KNOWLEDGE

This section reports the effect of the intervention programme on the experimental group students’ writing, metacognitive knowledge and reported use of metacognitive strategies in contrast to the control group. The questionnaire II (MSUQ-ME), and the writing assessment tools were administered again to the ExpG and the ConG at the end of the 16-week intervention programme. Data from the MSUQ-ME and the writing performance tests were analysed using the same procedures as for the administration of the MSUQ-ME and the conducting of writing test prior to the intervention.

6.4.1 Participants’ Perceived Use of Metacognitive Strategies in EFL Writing

As previously stated in Chapter 3 (see Section 3.5.2), the metacognitive strategy-based multimedia-mediated writing intervention was designed with a focus on the three metacognitive strategies of planning, monitoring, and evaluating, corresponding to the three major writing processes in multimedia environments. The experimental group received this intervention over 16 weeks; the control group received the regular instructional programme. The following is a brief report on the changes within and between each group at the end of the intervention.
Changes within each group

Changes in three dimensions of metacognitive strategies, as reported by the participants in within each group, were analysed using a series of paired samples $t$-tests. Table 6.4 presents the descriptive statistics the paired samples $t$-tests within each group before and after the intervention programme.

Table 6.4 shows that the experimental group improved in the three categories of metacognitive strategies in comparison with their perceptions in the MSUQ-ME administered prior to the strategy instruction programme; effect sizes were large to medium from the comparison between the pre-test and post-test.

In terms of planning strategies, the greatest change was in their perception of “designing composition structures” ($\text{Pre-}M_{\text{exp}} = 4.34$ vs. $\text{Post-}M_{\text{exp}} = 5.00$, $p = .008$) with a medium but close to large effect size (Cohen’s $d = .712$). Other marked increases were in “making outlines” ($p = .028$), “examining writing topics” ($p = .047$), “setting up goals” ($p = .031$), and “predicting writing time” ($p = .018$) in the experimental group. Cohen’s $d$ statistics indicated medium effect sizes for all these variables (Cohen’s $d = .654$, .590, .476, and .683 respectively). There were no statistically significant changes over this period for the control group.

For the monitoring strategies, the greatest difference for the experimental group was in their perception of “seeking help for using multimedia tools interactively” ($\text{Pre-}M_{\text{exp}} = 4.28$ vs. $\text{Post-}M_{\text{exp}} = 5.14$, $p = .004$) with a large effect size produced (Cohen’s $d = .886$). This was somewhat interesting but undeniable evidence for the students’ improving awareness of being interactively involved in multimedia-mediated writing, contributing to their potential L2 writing success in their EFL learning. Paired samples $t$-tests indicated that the experimental group had significant increases for the reported strategies of “focusing on writing content” ($p = .045$), “focusing on cohesion and coherence” ($p = .041$), “adjusting time arrangement” ($p = .012$), “revising during writing” ($p = .033$), and “transferring prior-knowledge to writing” ($p = .031$).
= .016) with medium effect sizes generated in each variable (Cohen’s $d = .504, .350, .439, .599, \text{ and } .694$ respectively). There were also some significant differences in the reported use of strategies in the control group. These were “adjusting time arrangement” ($p = .022$) and “focusing on mechanics” ($p = .019$) with medium effect sizes (Cohen’s $d = .642, \text{ and } .631$ respectively).

Increases for the experimental group, that were not significant, were evident for strategies related to surface linguistic components as “focusing on grammar” ($p = .902$) and “focusing on mechanics” ($p = .825$), with mean scores of Pre-$M_{\text{exp}} = 4.66$ to Post-$M_{\text{exp}} = 4.69$ and Pre-$M_{\text{exp}} = 4.56$ to Post-$M_{\text{exp}} = 4.63$ respectively. For the experimental group it appeared that the greatest increase of strategies were those concerned with improving their quality of writing, such as content, organization, cohesion and coherence, and actively seeking help when encountered difficulties, rather than strategies associated with surface linguistic features.

In the case of evaluating strategies, the most conspicuous strategy distinguishing the pre-course self-reports was in the last item, which referred to the examination of the participants’ awareness of the metacognitive evaluating strategy use. This was a reverse question. The descriptive statistic indicated that mean scores decreased from Pre-$M_{\text{exp}} = 3.88$ to Post-$M_{\text{exp}} = 2.41$ in the experimental group ($p = .000$). The Cohen’s $d$ statistic (Cohen’s $d = 1.097$) indicated a very large effect size. No significant difference was found in the control group’s pre- and post-test scores gained from their reports. For the rest of the evaluating strategies, statistically significant differences were found for “reviewing written products in language use” ($p = .042$), “reviewing written products in content” ($p = .019$), “assessing scores of the written products” ($p = .006$), and “reflecting writing process” ($p = .016$) with a moderate effect size produced for each variable (Cohen’s $d = .597, .754$ and .690 respectively). No significant differences were found for the control group between their pre- and post-test scores gained from their reports. On the rest of the strategies, statistically significant differences were
also found in “reviewing written products in language use” ($p = .042$), “reviewing written products in content” ($p = .019$), “assessing scores of the written products” ($p = .006$), and “reflecting writing process” ($p = .016$) with a moderate effect size produced in each variable (Cohen’s $d = .597$, .754 and .690 respectively). As for the control group, no significant difference was found on any of them.
Table 6.4

Paired Samples t-tests: The Perceived Metacognitive Strategy Use at the Pre-and Post-tests within Each Group

<table>
<thead>
<tr>
<th>Treatment Conditions</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>ExpG (Pre vs. Post)</th>
<th>ConG (Pre vs. Post)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ExpG</td>
<td>ConG</td>
<td>N=32</td>
<td>N=32</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Writing Strategies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designing composition structures</td>
<td>4.34</td>
<td>1.066</td>
<td>4.00</td>
<td>1.270</td>
</tr>
<tr>
<td>Making outlines</td>
<td>3.94</td>
<td>1.243</td>
<td>3.97</td>
<td>1.307</td>
</tr>
<tr>
<td>Examining writing topics</td>
<td>4.91</td>
<td>.963</td>
<td>5.00</td>
<td>1.016</td>
</tr>
<tr>
<td>Setting up goals</td>
<td>4.09</td>
<td>1.058</td>
<td>3.97</td>
<td>1.150</td>
</tr>
<tr>
<td>Predicting writing time</td>
<td>3.28</td>
<td>.991</td>
<td>3.00</td>
<td>1.047</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focusing on writing content</td>
<td>4.47</td>
<td>.842</td>
<td>4.06</td>
<td>1.216</td>
</tr>
<tr>
<td>Adjusting time arrangement</td>
<td>3.88</td>
<td>1.264</td>
<td>3.44</td>
<td>1.564</td>
</tr>
<tr>
<td>Focusing on cohesion and coherence</td>
<td>4.41</td>
<td>1.132</td>
<td>4.19</td>
<td>1.230</td>
</tr>
<tr>
<td>Focusing on grammar</td>
<td>4.66</td>
<td>.902</td>
<td>4.56</td>
<td>.840</td>
</tr>
<tr>
<td>Focusing on mechanics</td>
<td>4.56</td>
<td>1.045</td>
<td>4.31</td>
<td>1.148</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Mean</td>
<td>SD</td>
<td>Confidence Interval</td>
<td>t-value</td>
</tr>
<tr>
<td>------------------------------------------------------</td>
<td>------</td>
<td>------</td>
<td>---------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Revising during writing</td>
<td>4.19</td>
<td>1.355</td>
<td>4.38 .870</td>
<td>4.84</td>
</tr>
<tr>
<td>Transferring prior-knowledge to writing</td>
<td>4.38</td>
<td>.942</td>
<td>4.19 1.256</td>
<td>5.00</td>
</tr>
<tr>
<td>Seeking help for using multimedia tools interactively</td>
<td>4.28</td>
<td>1.024</td>
<td>4.47 1.319</td>
<td>5.14</td>
</tr>
<tr>
<td>Reviewing written products in language use</td>
<td>4.34</td>
<td>1.359</td>
<td>4.31 1.148</td>
<td>4.94</td>
</tr>
<tr>
<td>Reviewing written products in content</td>
<td>4.34</td>
<td>1.066</td>
<td>4.22 1.475</td>
<td>4.88</td>
</tr>
<tr>
<td>Assessing scores of the written products</td>
<td>4.13</td>
<td>1.040</td>
<td>4.13 1.408</td>
<td>4.81</td>
</tr>
<tr>
<td>Reflecting writing process</td>
<td>4.16</td>
<td>1.019</td>
<td>3.69 1.281</td>
<td>4.81</td>
</tr>
<tr>
<td>No evaluation work</td>
<td>3.88</td>
<td>1.289</td>
<td>4.13 1.264</td>
<td>2.41</td>
</tr>
</tbody>
</table>

Note. 1 = strongly disagree, 2 = disagree, 3 = moderately disagree, 4 = partly agree, 5 = agree, and 6 = strongly agree
Differences between the two groups

To address the between-group differences, an analysis of independent-samples $t$-tests was conducted to compare the mean scores for the experimental group and the control group, pre and post intervention. The results are presented in Table 6.5.

Table 6.5 shows that, following the instructional intervention the experimental and control groups responded to all the three subcategories of the questionnaire differently. In the planning category, the experimental group had higher scores than the control group for all items. The analyses are as follows: “designing composition structures” (ExpG, $M = 5.00$, SD = .762; ConG, $M = 4.53$, SD = 1.016, $p < .05$); “making outlines” (ExpG, $M = 4.66$, SD = .937; ConG, $M = 4.31$, SD = 1.176, $p < .05$); “examining writing topics” (ExpG, $M = 5.41$, SD = .712; ConG, $M = 4.97$, SD = .933, $p < .05$); “setting up goals” (ExpG, $M = 4.28$, SD = 1.198; ConG, $M = 3.97$, SD = 1.062, $p < .05$); and “predicting writing time” (ExpG, $M = 4.13$, SD = 1.454; ConG, $M = 3.44$, SD = .840, $p < .05$). The effect sizes for the differences are from small to medium (Cohen’s $d$ = .523, .329, .530, .274, and .581 respectively). The greatest difference was in the two groups’ perception of “predicting writing time” (Cohen’s $d = .581$), producing a medium effect size. The data indicate that the experimental group reported using planning strategies more frequently after the intervention than the control group who had the regular English instruction.

In the monitoring category, a medium to large effect size is evident for the difference between the two groups in their reported use of multimedia tools during writing (ExpG $M = 5.14$, SD = .914; ConG $M = 4.38$, SD = 1.008, $p < .05$, Cohen’s $d = .790$). These data suggest that the students in the experimental group used multimedia tools more interactively to seek help to overcome writing difficulties during writing having had the intervention than the students in the control group who had the regular English instruction. There were moderate effect sizes for the differences in the reported use of two other strategies. These were “focusing
on writing content” (ExpG, $M = 4.94$, SD = 1.014; ConG, $M = 4.47$, SD = 1.016, $p < .05$, Cohen’s $d = .463$); and “revising during writing” (ExpG, $M = 4.84$, SD = .723; ConG, $M = 4.44$, SD = .982, $p < .05$, Cohen’s $d = .464$). There was also a small effect size for “adjusting time arrangement” (ExpG, $M = 4.41$, SD = 1.148; ConG, $M = 4.28$, SD = .991, $p < .05$, Cohen’s $d = .121$); “focusing on cohesion and coherence” (ExpG, $M = 4.78$, SD = .975; ConG, $M = 4.59$, SD = .979, $p < .05$, Cohen’s $d = .194$), and “transferring prior-knowledge to writing” (ExpG, $M = 5.00$, SD = .842; ConG, $M = 4.69$, SD = 1.061, $p < .05$).
Table 6.5

Independent Samples t-tests: The Perceived Metacognitive Strategy Use at the Post-test between the Two Groups \( (N_{exp} = 32, N_{con} = 32) \)

<table>
<thead>
<tr>
<th>Metacognitive Strategies</th>
<th>Subcategories</th>
<th>Group</th>
<th>( M )</th>
<th>SD</th>
<th>( t )</th>
<th>Sig. (2-tailed)</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>Designing composition structures</td>
<td>ExpG</td>
<td>5.00</td>
<td>.762</td>
<td>-2.852</td>
<td>.033</td>
<td>.523</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ConG</td>
<td>4.53</td>
<td>1.016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Making outlines</td>
<td>ExpG</td>
<td>4.66</td>
<td>.937</td>
<td>-1.618</td>
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<td>4.31</td>
<td>1.176</td>
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<td>Examining writing topics</td>
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<td>.712</td>
<td>-1.249</td>
<td>.026</td>
<td>.530</td>
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<td>ConG</td>
<td>4.97</td>
<td>.933</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Setting up goals</td>
<td>ExpG</td>
<td>4.28</td>
<td>1.198</td>
<td>-1.182</td>
<td>.045</td>
<td>.274</td>
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</tr>
<tr>
<td></td>
<td>Predicting writing time</td>
<td>ExpG</td>
<td>4.13</td>
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<td>-3.163</td>
<td>.016</td>
<td>.581</td>
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<tr>
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<td>Focusing on writing content</td>
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<td>.463</td>
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<td></td>
<td>ConG</td>
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<td>1.016</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjusting time arrangement</td>
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<td>ConG</td>
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<tr>
<td>Monitoring</td>
<td>Focusing on cohesion and coherence</td>
<td>ExpG</td>
<td>4.78</td>
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<td>0.857</td>
<td>.400</td>
<td>.194</td>
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<tr>
<td></td>
<td></td>
<td>ConG</td>
<td>4.59</td>
<td>.979</td>
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</tbody>
</table>

180
<table>
<thead>
<tr>
<th>Task</th>
<th>ExpG</th>
<th>ConG</th>
<th>P-value (Exp vs. Con)</th>
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</thead>
<tbody>
<tr>
<td>Focusing on grammar</td>
<td>4.69</td>
<td>4.84</td>
<td>.467 .654</td>
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<tr>
<td>Focusing on mechanics</td>
<td>4.63</td>
<td>4.97</td>
<td>1.781 .298</td>
</tr>
<tr>
<td>Revising during writing</td>
<td>4.84</td>
<td>4.44</td>
<td>-2.011 .028</td>
</tr>
<tr>
<td>Transferring prior-knowledge to writing</td>
<td>5.00</td>
<td>4.69</td>
<td>-1.948 .037</td>
</tr>
<tr>
<td>Seeking help for using multimedia tools</td>
<td>5.14</td>
<td>4.38</td>
<td>-2.508 .021</td>
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<tr>
<td>Transferring prior-knowledge to writing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviewing written products in language use</td>
<td>4.94</td>
<td>4.69</td>
<td>-1.032 .018</td>
</tr>
<tr>
<td>Reviewing written products in content</td>
<td>4.88</td>
<td>4.56</td>
<td>-1.757 .012</td>
</tr>
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<td>Assessing scores of the written products</td>
<td>4.81</td>
<td>3.88</td>
<td>-1.370 .000</td>
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<td>Reflecting writing process</td>
<td>4.81</td>
<td>4.22</td>
<td>-1.394 .001</td>
</tr>
<tr>
<td>No evaluation work</td>
<td>2.41</td>
<td>3.63</td>
<td>10.807 .000</td>
</tr>
</tbody>
</table>

*Note.* 1 = strongly disagree, 2 = disagree, 3 = moderately disagree, 4 = partly agree, 5 = agree, and 6 = strongly agree
Cohen’s $d = .324$). No significant difference was found between the two groups in other monitoring strategies, “focusing on grammar” (ExpG, $M = 4.69$, SD = 1.061; ConG, $M = 4.84$, SD = .808, $p > .05$) and “focusing on mechanics” (ExpG, $M = 4.63$, SD = 1.008; ConG, $M = 4.97$, SD = .933, $p > .05$).

In the evaluating category, the participants in the experimental group reported using evaluation strategies more frequently than the control group at the post-test questionnaire survey. As indicated by the Cohen’s $d$ value, the intervention had a medium effect on the experimental groups reported use of strategies of “reviewing written products in content” (ExpG, $M = 4.88$, SD = .707; ConG, $M = 4.56$, SD = 1.105, $p < .05$, Cohen’s $d = .345$), and “reflecting writing process” (ExpG, $M = 4.81$, SD = .859; ConG, $M = 4.22$, SD = 1.039, $p < .05$, Cohen’s $d = .619$); while a large effect size was produced for the reported use of the strategies of “assessing scores of the written products” (ExpG $M = 4.81$, SD = .738; ConG $M = 3.88$, SD = 1.212, $p < .05$, Cohen’s $d = .927$) and “no evaluation work” (ExpG $M = 2.41$, SD = 1.388; ConG $M = 3.63$, SD = 1.338, $p < .05$, Cohen’s $d = .895$). The significant differences between the two groups, with effect sizes of medium to large, suggests that the instructional intervention led to the students’ greater metacognitive awareness of evaluation when writing in English in a multimedia environment.

### 6.4.2 Participants’ EFL Writing Performance

The intervention in Phase 2 focused on the metacognitive strategy training to improve students’ writing achievement in the complex multimedia environments. Six writing variables based on Jacob et al.’s marking rubrics were used to assess students’ writing achievement in pre-, post-, and delayed post-tests. Writing score gains within each group, as well as between the two groups, were investigated.
Within group differences

The writing proficiency of each student was measured using Jacob et al’s matrix of six aspects: Content, organization, vocabulary, language use, mechanics, and the total scores. To investigate any changes within each group over the 16 weeks of the intervention, a series of paired samples t-tests were computed for each of the six dimensions. The results are presented in Table 6.6.

As seen in Table 6.6, the scores for all six variables assessed in the writing of the experimental group had increased when compared to their previous writing performance. The paired t-tests results were as follows: Content (Pre-\(M_{\text{exp}}\) = 22.66, SD = 3.598; Post-\(M_{\text{exp}}\) = 25.72, SD = 2.275, \(p < .001\)); organization (Pre-\(M_{\text{exp}}\) = 16.88, SD = 1.913; Post-\(M_{\text{exp}}\) = 17.84, SD = 1.247, \(p < .05\)); vocabulary (Pre-\(M_{\text{exp}}\) = 15.03, SD = 1.576; Post-\(M_{\text{exp}}\) = 16.31, SD = 1.401, \(p < .01\)); language use (Pre-\(M_{\text{exp}}\) = 15.47, SD = 2.724; Post-\(M_{\text{exp}}\) = 16.84, SD = 2.807, \(p < .05\)); mechanics (Pre-\(M_{\text{exp}}\) = 4.63, SD = .554; Post-\(M_{\text{exp}}\) = 4.94, SD = .246, \(p < .01\)); total scores (Pre-\(M_{\text{exp}}\) = 74.53, SD = 7.5; Post-\(M_{\text{exp}}\) = 81.63, SD = 5.868, \(p < .001\)). These results indicate a strong association between the strategy training and writing performance for the experimental group. The medium to large effect sizes (Cohen’s \(d = 1.017, .595, .858, .495, .723, 1.054\), respectively) suggest that the strategy instruction programme contributed to language proficiency of the experimental group over the period of the intervention.

Furthermore, the gains in writing outcomes continued to be maintained at the delayed post-test, although there was a slight decrease in the effect sizes between the pre-test and delayed post-test scores. The paired t-tests results were as follows: Content (Delayed Post-\(M_{\text{exp}}\) = 24.38, SD = 2.366, \(p < .05\)); organization (Delayed Post-\(M_{\text{exp}}\) = 17.59, SD = .946, \(p < .05\)); vocabulary (Delayed Post-\(M_{\text{exp}}\) = 15.97, SD = 1.121, \(p < .01\)); language use (Delayed Post-\(M_{\text{exp}}\) = 16.88, SD = 2.446, \(p < .05\)); mechanics (Delayed Post-\(M_{\text{exp}}\) = 5.00, SD = .000, \(p < .01\));
total scores (Delayed Post-$M_{\text{exp}}$ = 79.78, SD = 4.07, $p < .01$). The effect sizes were medium to large (Cohen’s $d = .565, .470, .687, .545, .945, .870$, respectively).

The control group had only a minimal increase in the total writing score at the post-test ($Pre-M_{\text{con}} = 74.03$, SD = 7.394; $Post-M_{\text{con}} = 74.75$, SD = 6.164, $p > .05$). Likewise, no significant difference was found when writing was assessed one month later although there was a slight increase in the mean total writing scores ($Pre-M_{\text{con}} = 74.03$, SD = 7.394; $Delayed\ Post-M_{\text{con}} = 75.25$, SD = 4.537, $p > .05$). There was, however, a significant difference in reported use of the mechanics variable at post-test with the gains maintained at the delayed post-test as indicated by the larger effect size ($Pre-M_{\text{con}} = 4.66$, SD = .483; $Post-M_{\text{con}} = 4.91$, SD = .296, $p < .05$; $Delayed\ Post-M_{\text{con}} = 4.94$, SD = .246, $p < .05$). The effect sizes were medium, ranging from .624 to .731 (Cohen, 1988).

In a word, the experimental group achieved higher writing scores post-test with the gains maintained at the end of the semester. In contrast, the control group made small gains in total scores with little increase in scores over a semester-long period. These differences were despite both groups having the same English language course taught by the same teacher using the same teaching materials in the same multimedia environments in both groups.
Table 6.6

**Paired Samples t-tests: Comparison within Each Group at Pre-, Post-, and Delayed Post-Tests of the Writing Scores (N_{\text{exp}} = 32, N_{\text{con}} = 32)**

<table>
<thead>
<tr>
<th>Marking Rubrics</th>
<th>Group</th>
<th>Pre-test (T1)</th>
<th>Post-test (T2)</th>
<th>T1 vs T2</th>
<th>Delayed Post-test (T3)</th>
<th>T1 vs T3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>t</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>23.19</td>
<td>2.923</td>
<td>23.44</td>
<td>2.526</td>
<td>-.506</td>
</tr>
<tr>
<td>Organization</td>
<td>ExpG</td>
<td>16.88</td>
<td>1.913</td>
<td>17.84</td>
<td>1.247</td>
<td>-2.467</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>16.84</td>
<td>1.629</td>
<td>16.53</td>
<td>1.414</td>
<td>.867</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>ExpG</td>
<td>15.03</td>
<td>1.576</td>
<td>16.31</td>
<td>1.401</td>
<td>-3.381</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>14.88</td>
<td>1.963</td>
<td>15.47</td>
<td>1.565</td>
<td>-1.629</td>
</tr>
<tr>
<td>Language &amp; Use</td>
<td>ExpG</td>
<td>15.47</td>
<td>2.724</td>
<td>16.84</td>
<td>2.807</td>
<td>-2.20</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>14.88</td>
<td>2.550</td>
<td>14.50</td>
<td>3.090</td>
<td>.645</td>
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<tr>
<td>Mechanics</td>
<td>ExpG</td>
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<td>.554</td>
<td>4.94</td>
<td>.246</td>
<td>-2.743</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>4.66</td>
<td>.483</td>
<td>4.91</td>
<td>.296</td>
<td>-2.273</td>
</tr>
<tr>
<td>Total Scores</td>
<td>ExpG</td>
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<td>7.500</td>
<td>81.63</td>
<td>5.868</td>
<td>-4.756</td>
</tr>
<tr>
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<td>ConG</td>
<td>74.03</td>
<td>7.394</td>
<td>74.75</td>
<td>6.164</td>
<td>-.559</td>
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</table>

*Note.* T1 = Time 1 (Pre-test); T2 = Time 2 (Post-test); T3 = Time 3 (Delayed Post-test).

Total score (100) = Content (30) + Organization (20) + Vocabulary (20) + Language Use (25) + Mechanics (5)
Comparison between groups

To assess whether there were statistically significant differences between the two groups in writing achievement at the post-test and the delayed post-test, a series of one-way between-groups ANCOVAs was performed between the two groups in the post- and the delayed post-writing tests by controlling for the pre-test writing scores. Prior to conducting the ANCOVA, the assumption of normality was evaluated. As can be seen in Table 6.7, the distributions were sufficiently normal for the purposes of conducting ANCOVAs as the values were associated with skewness and kurtosis less than [2.0] and [9.0], respectively (Schmider, et al., 2010). Furthermore, the assumptions of homogeneity of variances were tested and satisfied based on Leven’s F tests. As was shown in Table 6.7, the Sig. values were all greater than .05 (Pallant, 2016). The data did not violate the homogeneity of variance assumption. The results were presented in Table 6.8.

Table 6.8 indicates that there were significant differences in writing scores at the post-test between the two groups, with the exception of the variable of mechanics. Examination of the p values indicate significant differences in content \( F(1, 64) = 16.599, p < .001, \text{partial } \eta^2 = .214 \), organization \( F(1, 64) = 15.316, p < .001, \text{partial } \eta^2 = .201 \), vocabulary \( F(1, 64) = 4.950, p < .05, \text{partial } \eta^2 = .075 \), language use \( F(1, 64) = 9.016, p < .01, \text{partial } \eta^2 = .129 \) and the total scores \( F(1, 64) = 22.151, p < .001, \text{partial } \eta^2 = .266 \). The effect sizes, as indicated by partial \( \eta^2 \), were medium to very large, ranging from .075 to .266 (Cohen, 1988), with the variables of content, organization, and the total scores exceeding the .14 criterion for a large effect size (Cohen, 1988). No significant difference was found in the variable of mechanics \( F(1, 64) = .173, p > .05 \). The delayed post-test also indicated significant differences in writing scores of the five variables between the two groups. Although there were slight decreases for the variables of content (partial \( \eta^2 = .110 \)), organization (partial \( \eta^2 = .134 \)), language use (partial \( \eta^2 = .072 \)), and the total scores (partial \( \eta^2 = .255 \)), in the effect sizes.
To sum up, the metacognitive strategy-based instruction appeared to contribute to the higher achievement in writing of the experimental group when compared with the control group, at both the post-test and the delayed post-test. Furthermore, comparison of the variables of writing indicated that the experimental group reported greater attention to the higher-level aspects of composition, such as content relevant to the topic, succinct cohesive organization, and effective complex constructions in language use (Jacob et al., 1981).

Overall, the results of this chapter suggest that the metacognitive strategy-based instruction has contributed to students’ awareness of metacognition and role of metacognitive strategies, and that has led to development of their writing proficiency. Although the two groups were equivalent at the beginning of Phase 2, the experimental group reported greater metacognitive strategy use than the control group. Their writing achievement in L2 in complex multimedia environments also surpassed that of the control group.

6.5 SUMMARY
In this chapter, data from the quasi-experiment in Phase 2 were presented and analysed, addressing the second research question of the study on the effects of the metacognitive strategy-based instruction. Data collected from Questionnaire II (MUSQ-ME) and writing scores revealed that students from the experimental group outperformed their counterparts in the control group. This means that the 16-week metacognitive strategy instruction had positive effects on expediting Chinese students’ use of metacognitive strategies as well as their writing performance in multimedia environments. Teaching Chinese students explicit language learning strategies in the complex multimedia environments was crucial so that students’ language skills (i.e. writing proficiency) could be further enhanced. The strategy instruction not only developed students’ systematic knowledge of metacognitive strategies but also helped them become metacognitively self-controlled efficient learners in regulating their learning processes in multimedia environments after they completed their training.
The next chapter will move on to the case studies, aiming to corroborate the findings over the intervention course.
Table 6.7

Descriptive Statistics for Participants’ Writing Tests across Three Times in the Two Groups ($N_{exp} = 32$, $N_{con} = 32$)

<table>
<thead>
<tr>
<th>Marking Rubrics</th>
<th>Group</th>
<th>Pre-test (T1)</th>
<th>Post-test (T2)</th>
<th>Delayed Post-test (T3)</th>
<th>Levene’s Test</th>
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<td></td>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>Skew</td>
<td>Kurtosis</td>
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<tr>
<td>Content</td>
<td>ExpG</td>
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</tr>
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<td>ExpG</td>
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<td>Vocabulary</td>
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<td>1.576</td>
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<td>Language Use</td>
<td>ExpG</td>
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<td></td>
</tr>
<tr>
<td>Mechanics</td>
<td>ExpG</td>
<td>4.63</td>
<td>0.554</td>
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<td>0.403</td>
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<td>ConG</td>
<td>4.66</td>
<td>0.483</td>
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<td></td>
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</tr>
<tr>
<td>Total Scores</td>
<td>ExpG</td>
<td>74.53</td>
<td>7.500</td>
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<td>74.03</td>
<td>7.394</td>
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<td>-0.366</td>
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</tbody>
</table>

Note. T1 = Time 1 (Pre-test); T2 = Time 2 (Post-test); T3 = Time 3 (Delayed Post-test).
Total score (100) = Content (30) + Organization (20) + Vocabulary (20) + Language Use (25) + Mechanics (5)
### Table 6.8

**ANCOVAs: Comparison between the Two Groups at the Post- and Delayed Post-Tests of the Writing Scores**

\(N_{exp} = 32, N_{con} = 32\)

<table>
<thead>
<tr>
<th>Marking Rubrics</th>
<th>Group</th>
<th>Post-test</th>
<th>ANCOVAs (Post)</th>
<th>Delayed Post-test</th>
<th>ANCOVAs (Delayed)</th>
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<td></td>
<td></td>
<td></td>
<td>(M)</td>
<td>(SD)</td>
<td>(F)</td>
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<td>ExpG</td>
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<td>2.275</td>
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<td>.000</td>
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<td>22.88</td>
<td>2.459</td>
</tr>
<tr>
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<td>ExpG</td>
<td>17.84</td>
<td>1.247</td>
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<td>.000</td>
</tr>
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</tr>
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<td>ExpG</td>
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<td>1.401</td>
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<td>.030</td>
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<td>1.693</td>
</tr>
<tr>
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<td>14.50</td>
<td>3.090</td>
<td>15.47</td>
<td>2.286</td>
</tr>
<tr>
<td>Mechanics</td>
<td>ExpG</td>
<td>4.94</td>
<td>.246</td>
<td>.173</td>
<td>.679</td>
</tr>
<tr>
<td></td>
<td>ConG</td>
<td>4.91</td>
<td>.296</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Scores</td>
<td>ExpG</td>
<td>81.63</td>
<td>5.868</td>
<td>22.151</td>
<td>.000</td>
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CHAPTER SEVEN

QUALITATIVE RESULTS FOR RESEARCH QUESTION 3

7.1 CHAPTER OVERVIEW

Chapter 6 reported findings of the metacognitive strategy-based writing intervention programme in Phase 2 in this study. However, the individual perceptions and views of the participants throughout their participation in the course were largely overlooked. In this chapter, findings of a case study via two participants’ interviews and journals using qualitative analysis are presented in order to fill this gap.

The chapter starts with an introduction to the background information of the two invited participants. It follows a sequential detailed examination of their use of metacognitive strategies, perceptions of the use of multimedia tools, and a brief summary of their gains in the writing course. By means of detailing the case-study participants, the results are expected to triangulate with the quantitative data from a more in-depth qualitative perspective. The last section brings together the findings of the present research and discusses the insights that the study in phase two provides.

7.2 CONTEXTUAL INFORMATION

Case study research, sometimes as a typical focus on “an individual representative of a group” (Hancock & Algozzine, 2015, p. 15), has been widely recognized and used by scholars in the field of SLA research. As a qualitative methodology, it is a valuable method for researchers to study complex phenomena within the specific contexts, which is beneficial to develop a theory, evaluate a programme, or facilitate an intervention (Baxter & Jack, 2008). Qualitative findings presented case by case can epitomize our understanding of the complexity of a phenomenon.
In this study, based on a purposive convenient sampling principle, two participants were selected from the total sample of 32 participants from the experimental group as my cases for in-depth investigation. Drawing on the participants’ writing performance in their writing tests in the course as well as the instructor’s evaluation, a high-proficiency writer, named Yin (pseudonym) and a low-proficiency writer, named Yu (pseudonym) were invited to the case study. Each of them had completed 16 pieces of journals during the four-month writing course. The copies of their journals were collected as one of the qualitative data sources. The qualitative data were also collected from the semi-structured interviews. Two semi-structured interviews were conducted both on the pre-intervention stage and on the post-intervention stage separately. Comparisons were made in the belief that more could be understood about the nature and development of metacognition in EFL multimedia-mediated writing practice. Particular attention was paid to their perceptions and views regarding the impact of the intervention course on their L2 writing performance development.

There is no one completely correct way to report a case study (Baxter & Jack, 2008). However, as suggested by Baxter and Jack (2008), telling readers’ the story remains a potentially useful method to help illustrate a scenario of the complicated nature of EFL writers’ metacognitive processes during writing in multimedia-mediated environments. The summaries presented in the following sections are based on the analysis of the two participants’ online interview verbalisations as well as their retrospective writing of journals. Specifically, in what follows we will focus on two main aspects of the two participants’ stories with some contrast being made: (i) their metacognitive strategy awareness development as influenced by the intervention course; (ii) their views of and interactions with the use of the multimedia tools in the writing process.

7.3 YIN’S STORY: A HIGH-PROFICIENCY WRITER
“Yin” was 20 years old at the time the study took place. She was a second year student in the participating university, studying in the Faculty of Economics and Management. She was quite interested in learning English and English had always been one of her best subjects in schools. When she entered university, she was in the top 10 percent of her class as measured by her grades as a first year student. Given her interest in English, she had recently changed her major from accounting to international business because about half of the coming third- and fourth-year classes in international business major study would be required to adopt English as a medium of instruction with the objective of guiding students toward a high proficiency in international communications. As she stated,

I always did well in English class up until my entering university. The English subject was always my strong suit. Most of my English teachers were impressed with my English study from primary school until senior high school. I also felt great honoured to be selected as the English subject representative to work as an assistant for my English teachers. When I was entering university, I had to focus on my major study in the coursework while I spent less time in learning English. However, I did not like my major very much. Therefore, I changed my study to international business this year. It turns out to be a very good decision, since I can combine my language learning interest with my future career development. I think even if I cannot find a major-related good job in the future — as you know, the job market in China is very competitive, — at least, I can manage to become an English teacher.

(Int1Yin02/09/2015)

7.3.1 Yin’s Points of View before the Intervention Course

7.3.1.1 Metacognitive Strategy Use in Writing in English
As a conscientious and hardworking student, Yin made use of various opportunities to practise her English writing, such as taking mock writing tests, keeping English diaries, and completing teachers’ writing assignments. She believed the saying that “practice makes perfect”. With such rich experience in English writing, Yin reported multiple writing strategies she used in her writing process in order to increase her writing performance or achieve some English learning goals.

**Before writing**

Yin regarded herself with a strong sense of global planning in her study. First, she always reminded herself of the importance of planning, viewing it as an important key to the success of her study. The following are some excerpts written in her first week journal, revealing that Yin has got a good sense of global planning at the very beginning of her study.

As an old saying goes, “凡事预则立，不预则废” (Preparedness ensures success, unpreparedness spells failure). In order to help me write well, I must prepare a notebook to accumulate the beautiful language and sentence structures and remember them so that I can use them in my own writing. In addition, since I chose to participate in the writing course, I need to make a detailed plan of study for the course to make full use of such a precious chance to improve my English writing.

As we all know, “良好的开端是成功的一半” (Well begun is half done). I think writing must be a planned and logical activity, whether it is Chinese or English.

(JW1Yin06/09/2015)

Data also revealed that she seemed to associate her global planning closely with setting up goals with an instrumental propensity. She wrote in her journal,

*I think setting specific goals is a good way to motivate myself to learn English well.*

*I like writing and I was good at writing in Chinese in the secondary school. My Chinese teachers often praised me. At present, the utmost important thing is to*
improve my ability to write in an English fashion. I wish my English writing could be as fluent as my Chinese writing so that I will not worry about the writing test in exams. To pass CET-4 is the most realistic goal that I must achieve in this semester. In the long run, if I can pass the CET-4 test, it will definitely encourage me to challenge the higher-level CET-6. I should have confidence.

(JW1Yin06/09/2015)

In the pre-course interview, she was also delighted to have the opportunity to share her experiences and ideas about English learning/writing with the researcher. When asked whether she planned before her writing, she answered, “definitely, I will plan” without any hesitation. In describing how she deployed the planning strategies in her own writing process, Yin reported that she would focus on linguistic knowledge preparation because she held a view that the linguistic proficiency, including vocabulary and grammar, might be the largest barrier to hinder writing success. The following quote was an illustrative example.

When writing an English composition, I will not get involved into writing immediately. I have formed a habit to read the writing topic carefully first, and then I would like to think about the “beautiful” language or sentence structures that I have accumulated in my memory base. Also, I would like to surf the Internet to get some useful writing resources to support my argument as the pre-writing preparation if I use my laptop to practise writing in English. However, due to the time constraint, I seldom think of an outline to prepare a temporal structure and write it down. I think it may be a waste of time to actually get the words down on paper or computer screen. Moreover, I may not use the words in my actual writing.

(Int1Yin02/09/2015)

A closer look at Yin’s comments on her use of the planning strategy seemed to reveal the advantages and disadvantages of using such a strategy in her learning to write. On the one hand,
she has a good global plan for her study, stressing its positive function in directing her language study throughout her school life. On the other hand, her strategic knowledge about planning in her actual writing process seemed to revolve around English exams. Like all the other students who learned English as a foreign language in schools in anticipation of passing tests, Yin was no exception. She had to deal with the mental planning at a very basic level due to the time limit and set up goals to meet the needs for exams. With a particular regard to the exam context, she also mentioned her problems in planning in a limited time. She claimed that she often felt lost and less confident when planning in a competitive exam context although she was a good “advanced planner”\textsuperscript{28}. She wrote in her journal,

\begin{quote}
Although I am quite interested in learning English and I plan to practise writing in English, the purpose is to pass English tests. To be honest, achieving a good mark in a high-stakes English test has always been a reward for my study, which will definitely give me a strong sense of achievement. It used to be Gaokao (National College Entrance Exams) and now I am facing the challenges of passing CET-4 and CET-6. However, in doing writing tasks in such a situation, I often feel anxious and can only make a general plan in my mind because the limited time does not allow me to write all ideas down on paper before I write.
\end{quote}

(JW1Yin06/09/2015)

\textbf{During writing}

In describing her composing process, Yin reported a wide range of strategies to help her formulate the text and deal with difficulties, among which the translation strategy, the strategy of avoiding making linguistic mistakes and ignoring the intended audience featured prominently in the data accounts.

\textsuperscript{28} Cumming (1989) named those who created plans early in the course of composing as \textit{advanced planners}, while those who planned during the course of writing as \textit{emergent planners} (cf. Amani, 2014).
When asked whether she thought in Chinese or in English in the process of English writing, Yin replied that she used the strategy of translation to transmit her thoughts from Chinese to English. She admitted that Chinese had an irreplaceable role in her organising English sentences.

*I usually practise my writing skills through translation exercises. I think if I can translate well, I can write well. Even if I focus on a writing task, I would like to do a mental translation, which I think is vital to help me generate ideas in writing.*

(Int1Yin02/09/2015)

In addition, she would pay the most attention to eliminating language problems during writing. In her opinion, “a good piece of writing should have no spelling mistakes and should be grammatically clean” (Int1Yin02/09/2015).

The investigation also reveals that the important and useful strategy in writing of considering the audience in writing which has been frequently reported in the literature (e.g. Amani, 2014; Tsai, 2004; Victori, 1999) had never occurred to Yin during her writing. Yin pointed out her insufficient experience in using such a strategy.

*I seldom think of a need to take the audience into consideration because there are only two forms of writing in English in my language study. One is the writing practice including writing assignments assigned by my English teacher, the audience would be definitely my English teacher. The other is the writing on English exams. There is always an English writing test in the exams, which is usually designed in the last part. The audience would be the test markers who would probably also English teachers.*

(Int1Yin02/09/2015)

Ruan’s (2014) study of student writers in mainland China suggests that students who lacked the metacognitive awareness of the intended audience during writing may be less likely to
engage in writing tasks meaningfully and have little opportunity to engage with the “real-world” idea. In this case, Yin also showed her worry about the examination-oriented teaching of English writing, which got her to focus primarily on exam success and not to consider the importance of writing to an audience.

> *When writing, I pay the most attention to the language use. I will not bother thinking of my own organization of the text because I have accumulated many sample essay structures in my mind and there is always one fixed form to follow during my writing. In order to get high marks, I would like to spend most of the time on word choice and I will think very carefully on sentence patterns, trying to use as many patterns as possible to make my writing more powerful and more flowery, such as using inverted sentences, emphatic sentences and adding subordinate clauses to the main sentence. All of these are the foci of English exams. I fervently hope that someday I could write for a real communication to a native speaker in a real world.*

(Int1Yin02/09/2015)

> **After writing**

The last type of strategies we are interested in is the revision and evaluation strategy. With regard to knowledge and beliefs about the use of this strategy, Yin’s reports showed her uncertain feelings towards the need for its use in her writing. When it comes to evaluating strategies, she made a very clear distinction between the two different contexts — the usual writing practice context and the exam context.

On the one hand, as an independent writer, she described that she often reread and revised her written products in her writing practices. She regarded revising as an important step to reinforce her whole writing process. As her English teacher had told her, she believed that only those articles that had been revised a few times could probably become good ones. However, when asked how she deployed her revision strategies in her own writing process, she
confessed that she seldom made a major revision about the written product, confining her revisions to the linguistic aspects.

On the other hand, she emphasized many times that “if time permits”, in the exam context, she would focus on revising activities because she thought that to do these activities, she needed to invest extra effort and time after completing the composition. She explained,

*There are many other parts such as multiple choices on grammar test, reading comprehension, listening comprehension, and cloze test that I need to complete in a very limited time. I think I need to keep a balance use of time in each part. Besides writing, I usually spent a lot of time on reading part. The articles tested in the reading part are usually very long. It is a pains-taking task to read these articles and complete the questions due to the time constraints.*

(Int1Yin02/09/2015)

By the same token, if time permitted, she engaged in the self-assessment of her writing, having specific concerns on how many points she could be scored. “*After all, everyone is concerned about scores* (JW2Yin13/09/2015)”, she wrote in her journal. She also mentioned that her English teacher had encouraged her to make an assessment after finishing writing and she understood the function of self-assessment and its potential benefits to improve her writing. However, her comments showed that she had doubts about her ability to assess her written products by herself.

*Reviewing my exam experience, I never hand in my test paper ahead of the testing time. However, I can just make a general judgment about my writing, evaluating the linguistic structure used and checking spelling errors, grammatical problems and other mechanic problems. I do not think I have the ability to assess the written text in a professional way like what my teacher did although I do have some knowledge about a good written text in my mind. I think only my English teachers have the*
authority to make a professional assessment for my writing. I do appreciate my teachers’ precious suggestions and feedback for my writing, such as the logical problems, the coherence at discourse level, and the idiomatic way of expression in English. I think they are all beyond my English level at present. So my revising process would take place after my test paper was returned to me. For me, I think I cherish every opportunity to improve the quality of my writing. However, it is regrettable that it is not every English exam that I can get feedback from my teacher. If I only get a holistic mark, I would feel at a loss. Even more distressing, I could only get a holistic mark in most cases because there were so many students in my class, it seemed that it was almost impossible for my English teacher to give effective feedback to each student’s final product in a timely manner.

(Int1Yin02/09/2015)

In summary, as far as the evaluation and revision strategy is concerned, although Yin had a strong belief and expressed favourable comments towards the use of this strategy in her compositions in writing practices, revising and assessing a written text at a higher level seemed a challenging process. Having acknowledged her constraints in this process, Yin’s evaluating strategies were in effect limited to the surface-level assessment. The traditional teacher-centred evaluation seemed to serve as her major motivation to sustain her learning to write. However, even such opportunities were rare due to the teacher’s heavy workload.

7.3.1.2 Perceptions of the Use of Multimedia Tools in the Writing Process

The investigation of Yin’s attitudes towards modern technologies in helping her learn English writing started from her general experiences in learning the language. As revealed in the data accounts, even if she was considered as a top-ten student in her faculty, Yin’s experience of using modern technology for language learning was rather limited.
I downloaded a lot of apps on my cell phone and I indeed planned to use them in my spare time. However, I always feel that I have too much to do every day and feel like I do not have enough time to use them. The online English-Chinese dictionary is the most frequently used app on my smart phone. Except that, I can hardly think of an app that the functionality is closely related to my study even though they have been installed. Our English teacher encouraged us to be creative and use the modern technology to learn English in our daily life. However, I always feel embarrassed if I type English words with my friends when we use WeChat for chat. Sometimes, they just did not reply to my messages. As for the computers, most often, I use my computer for searching network resources.

(Int1Yin02/09/2015)

When asked about her multimedia-mediated writing experience in particular, Yin admitted that she benefited from the use of Microsoft Word software as it was powerful to help her quickly correct the spelling and grammar errors and made her revision easier than the hand writing. However, she preferred to consider the multimedia tools as a compensatory tool to facilitate her learning to write and did not experience a sense of interaction or scaffolding in the complex multimedia environment. This point was corroborated in the follow-up interview.

Because there is no specific writing course in our school curriculum, Google/Baidu has become my best teacher in the virtual world. Thanks to the rapid development of the Internet, I can access plenty of helpful free online resources and I have registered some online writing courses to help me improve my writing ability. However, the Internet is just like a “double-edged sword”. In the process of writing, I am very easy to be distracted by unexpected popup messages in the Internet. Sometimes I have to disconnect the Internet with the computer or turn off the Wi-Fi.

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29 WeChat is one of the biggest and the most popular chat apps in China. According to its official website, it had over 889 million monthly active users in 2016.
on my cell phone in order to focus my attention on the writing task on hand. I think I need to temper my willpower to foster an anti-interference ability. In such a multimedia-mediated writing environment, only a strong will and a determined spirit can guarantee my success in writing as well as language learning.

(Int1Yin02/09/2015)

In addition, although Yin demonstrated a certain degree of knowledge in using multimedia for language learning, she complained about her low efficiency in typing English words when using computers for writing and showed her conflicting orientations towards the use of computers for writing.

I believe that multimedia tools bring great convenience to me in many aspects and help me arouse my interest in the English language learning. However, typing English words into computers has always been a great challenge for me because of the total different language system between Chinese and English. I can write down an English word quickly on the paper but when I type the word, I need to think it for a while. During my writing, I have to go back and read over when I type. What matters most is that I have never taken any computer-based English tests before. It is said that the TOEFL iBT (Internet Based Test) test delivered via the Internet will replace the traditional TOEFL PBT (Paper Based Test). It definitely will require us to type quickly during the writing.

(Int1Yin02/09/2015)

This excerpt showed her insufficient experience in using computers for writing in English. These comments seem to indicate that although modern science and technology have been very popular among the university campuses, they are not receiving adequate attention in their applications in language teaching and learning. Yin, as a top student in her faculty, initially showed an inability to take effective further action and adapt to the new situation.
7.3.1.3 Attitude towards the Regular English Course

Given that there was no specific English writing course in the school curriculum from primary school to university, Yin’s attitudes towards the English writing course were associated primarily with her English subject in the school curriculum. Asked about her view of the regular English course, Yin pointed out that there was a noticeable demarcation between the high school study and the university study. Yin especially felt proud of the spirit of diligence she paid in her high school study with the goal of entering university and appreciated her English teachers’ efforts in helping her achieve great results of the NCEE (also known as Gaokao in China), which was her focus in the span of 3 years’ high school study.

When it comes to the English course, I can undoubtedly say that my experiences mainly come from the high school. Facing the incredibly high pressure of the Gaokao, I have no other choice but to study hard in the high school because there was nobody going to university in my entire family. What I value most in the English course is that my English teacher is a very responsible person. She provided ample writing practice opportunities for us to training and provided timely feedback to us. As far as her instruction in class is concerned, it proves to be effective in the examination because I may directly follow the sample structures in my own writing in a very limited time and get high marks as long as I can remember them and use them skilfully in the examination process. However, I do not think I have mastered the writing skills because I still do not know how to express my real ideas in my free writing. It seems that the English course has always been combined to catering to the exam needs.

(Int1Yin02/09/2015)

It appears that revolving around achieving better results in exams, Yin has gained great achievements in writing outcomes. However, as she claimed, she is not satisfied with the
achievements she gained. The above excerpt also shows that due to the limited writing instruction, Yin has not gained effective guidance for conducting systematic writing strategies to promote her writing ability.

Going to university does not mean the termination of language study for students. The English course, as a compulsory course in the university curriculum, is required of all year-one and year-two university students who receive university credit. As the end of the second academic year, all the students are required to sit for the national CET test (see Chapter One) to test their English proficiency. However, English teaching and learning at university have been greatly affected by such factors as administrative constraints, the increasing class size, as well as the university mandates. Following the increasing class size in classrooms, the teachers’ working load is increasing. Despite the importance attached to English language learning in the university academic study and the claims that writing should be viewed as a process rather than merely a product, the teachers’ focus on writing in English has been in effect on student written products. Maybe because they were too many students in each class, they could only provide feedback on linguistic knowledge aspects such as word spelling, grammar or sentence structures while seldom mentioned content revisions. Yin also expressed her dissatisfaction with the teaching in the university.

*In the university, we have only 2-hour English course once a week. I feel that it is not enough to make any real improvement of my language ability. The teachers in our department have always emphasized the importance of our major study. In this situation, I do not think our English teacher would care much about our language learning. Just imagine there are 120 students in my class while there is only one English teacher... In addition, because the achievement of our language study was measured by a comprehensive evaluating system, including grammar, listening, reading, writing, and even translation, during which writing is only counted as a*
small part in the total score, we ourselves do not pay much attention to writing practice. Sometimes even we hand in our written products, our English teacher may not have enough time to evaluate the writing. 我感觉自己由老手变菜鸟了 (I feel that I have degraded from an old-hand veteran to a green-hand rookie).

(Int1Yin02/09/2015)

7.3.2 Yin’s Points of View after the Intervention Course

7.3.2.1 Metacognitive Strategy Use in Writing in English

After the intervention, a very strong tendency reported by Yin was that she was prepared to develop a thorough understanding of the writing process and find her way out by using various metacognitive strategies skillfully to facilitate her learning to write.

As a hardworking student, Yin’s excellent global planning skills have helped her to keep active in language learning. She expressed her initial self-effort in promoting her writing ability development in this semester. And this awareness seems to be enhanced by her teacher’s instruction.

The teacher mentions that planning is a good anti-procrastination strategy. Her words often remind me that I must insist on carrying out the plan I made at the beginning of this semester. For example, as we all know, reading is a great way to improve writing. There is a saying, “读书破万卷, 下笔如有神” (Having pored over ten thousand volumes, one can write with godly power). Under the teacher’s guidance, I made a specific plan to keep reading in this semester and I feel that I have gained a lot in this semester.

(JW10Yin08/11/2015)

The teacher always emphasizes that it is far from enough to just complete the writing assignment as an imposed task. To practice writing, we should have our own plan.
Yes, she is right. Next week, I plan to write an essay on a CET-4 related topic as my extra practice since the high-stakes examination is approaching.

(JW14Yin06/12/2015)

A closer look at her use of specific planning strategies in writing also shows that Yin has apparently extended her understanding of the extensive usage of the planning strategies compared with her use of planning strategies that were illustrated in the pre-intervention data account. She considered planning to be a “fundamental” step, which would ensure a smooth operation in the following writing activities. Specifically, Yin reported deploying her strategies in a more elaborative and feasible fashion. In generating ideas, she noted that besides the linguistic aspects, thinking of a framework and making an outline were beneficial to lay a solid foundation for further development of her ideas. She said,

*Inspired by the teacher’s guidance, I realized that although the linguistic aspect is quite important in preparation for writing, it is more than that. Now before writing, I would like to think of a general structure and outline a central theme in each body paragraph. It will help me clear my thoughts and form a general framework of the whole essay, which actually improves the efficiency of the time use.*

(Int3Yin03/01/2016)

In setting up goals, Yu reported that thanks to the teacher’s guidance, she realized that although passing exams was a great motivator to promote the learning of writing, getting beyond that goal with higher intrinsic targets would probably bring more lasting motivation than the temporary imposed external tasks, such as the real communication with foreigners via email, which was a good way to practise English writing. She reported, “*An intrinsic goal is a motivating factor that is inside you, instead of outside of you. I think this is more important to me.*”(JW11Yin15/11/2015)
Another apparent change was her self-monitoring process of her writing. According to O’Malley and Chamot (1990), self-monitoring involves “checking, verifying or correcting one’s comprehension or performance in the course of a language task” (p. 137). Promoted by the questions in the post-course interview, Yin’s self-monitoring process was found to be more controlled and focused during her writing process. This was especially embodied in two aspects. First, it seems that she has developed an extensive knowledge of sub-strategies in boosting her confidence in overcoming difficulties. That is, a high level of self-efficacy about her ability to tackle writing tasks has been demonstrated. She said,

*In the face of difficulties, I do not flinch now. Learning is inherently an all-consuming task. Writing English essays is just so. I am mentally prepared for it. Because the teacher has shown us how to use different specific strategies to help us produce the text, I have got my own confidence now. During writing, based on the plan I made before writing, I try to keep my writing process continuous, focusing on the coherent connection from one paragraph to another. What’s more, thanks to the teacher’s guidance, I am not afraid of making mistakes now because I realize that writing is a multi-draft process, not a single draft product. I can revise it until I feel satisfied. Practice makes perfect. In exams, I can also handle the writing part well. Examination is a way, not an aim. We do not learn English for exams. Sometimes, even I feel a bit nervous due to the unfamiliarity of the writing topic, I persuade myself to calm down, comforting myself with the words that if I am not familiar, nobody else will.*

(Int3Yin03/01/2016)

Second, in text generation, she demonstrated skilful orchestration of the metacognitive strategies and made effective decisions about when to write, how to write, and where the strategies could be deployed to complete the complex writing task at hand. For instance, she
found that vocabulary has always been a problem in expressing her ideas. She used to feel isolated and demotivated when she encountered difficulties in vocabulary during writing while she often engaged in off-task activities. In contrast, after the intervention, she commented that when encountering vocabulary problems, she often determined that she would use a dictionary to look up unfamiliar words, made a thorough understanding with the English-English explanation, and compared the two languages for better comprehension. In exams, when the dictionary was not allowed to be used, she would search for an alternative word if she met with difficulty in vocabulary, which involved metacognitively searching her long-term memory. As she said, “sometimes when I am confronted with language problems, I would like to think of different ways of expression or replace the words with synonymous words that I know”. (JW12Yin22/11/2016) That is to say, Yin’s strategy use would not simply be considered as a cognitive translation process. Her determination to seek external help or the use of replacement strategy showed her metacognitive attitude of taking executive control in order to accomplish the complex writing task. Therefore, this strategy could be characterized as a kind of “mind monitoring”, which might be more appropriate to reflect what she did in her writing. This functioned as an important active impetus for her completing the writing task.

As discussed earlier in the summary of the pre-interview before the writing intervention course, although Yin had a strong awareness of using evaluating strategies in her writing, there is still a big gap in developing such strategy awareness into real action due to the lack of teacher’s explicit instruction. After the intervention, however, it seems that the well-designed writing instruction has a great positive impact on Yin’s perceptions and use of self-evaluating strategies. A salient feature after the intervention that is more enlightening is her frequent use of self-evaluation (revising and redrafting) in her writing process for further text development. She said,
I have developed a habit of revising my essays. Thanks to the teacher’s guidance, I realize that the reason why I often felt that I had no time to revise was I didn’t plan well at the very beginning. Time is always fair. It is the same for everyone, depending on how you use it. The evaluation checklist that the teacher gave us was proven to be efficient in checking the written products. I can feel that I have a big change in my writing, that is, I am willing to revise my own essay with more confidence, whether it is in the usual practice situation or in the exam situation. When revising, I would not only pay attention to the surface-level revision such as the spelling, punctuation, and grammar but also revised other aspects, including content and organization. Furthermore, as instructed by the teacher, writing was not a one-draft product. I didn’t feel worried about my first draft. That would save a lot of time for me to think more thoroughly about my writing, such as the coherence, the logic of the organization, and self-assessment of my written products. In the multimedia environment, the revision process was even more convenient.

(2016/03/01)

As we have already seen, Yin had developed a mature understanding of the writing process. Her strategic knowledge emerging from the post-course data was connected with a more mature consistent use of metacognitive strategies with more confidence in her writing: planning a framework prior to composing the full text, monitoring the writing behaviours during the composing and evaluating the writing process after completing the written text, which contributed to accelerating her writing achievement.

Furthermore, Yin made special mention of the benefits of keeping a journal in the course, which contributed greatly to her mastery and usage of the writing strategies the teacher had emphasized in class. Inspired by the strategy list given in the intervention course, she identified the journal as an invaluable means of her own self-learning guide and a practical tool.
for tracking her own process as time went by. Data from the journal accounts showed that commendable words such as “a dream catcher”, “an idea incubator”, and “a convenient storage location” were quite often recorded in her journal entries, revealing her perceptions of the function of keeping a journal in her study. Used in such a learning-to-write context, she wrote a well-designed plan of study for this course in her journal in the first week, engaged with enthusiasm in thinking back what she learned in class in the following weeks, and evaluated her writing activities at the end of the course. She wrote in her journal,

The teacher tells us that countless historical figures kept work diaries or journals to keep their memories and thoughts, which had immense benefits. Technically, it also made sense to apply this method to our study. She gave us a journal guide and required us to keep a journal on a weekly basis in the first week of this course. Reflecting on my own experience, the teacher’s instruction really helped me a lot. For example, I feel that it is quite useful to check the to-do/done list and have a prompt record in my journal. Keeping a journal has provided opportunity for me not only to think back on my writing activities, but more importantly, to evaluate the fulfilment of my goals and formulate specific action plans for further improvement of my English writing. I am proud of keeping my weekly learning journals in this course and enjoy the whole experience. I will keep doing that.

(JW16Yin26/12/2016)

7.3.2.2 Perceptions of the Use of Multimedia Tools in the Writing Process

As revealed in the data accounts, Yin had gained a rich experience with the multimedia-mediated EFL writing/learning. Benefited from the well-designed intervention course, Yin had formed a good habit of learning English in her academic study and showed a favourable attitude towards the use of multimedia tools in developing her language skills. She was very much
engaged with using technology in facilitating her study as she had been aware of the positive effects it had.

*We are living in a technology and information age. As a modern student, I need to incorporate the advanced technology into my study, having it work for me. I have downloaded many applications in my smart phone for different learning purposes. For listening practice, my teacher told us that if we want to improve English listening, the first simple action is to listen a lot. I have applied this to my daily life by downloading apps such as VOA and BBC. They are really convenient and helpful. For reading practice, as we all know, e-reading is rising in popularity nowadays, I spend a lot of my spare time reading e-materials downloaded from the Internet by using my smart phone. I would like to learn new words from reading because I find it more efficient than the dull rote memorization. For writing practice, emerging in the multimedia environment in a whole semester with teacher’s fine-grained guidance, I think I have benefited a lot. For example, the massive network resources has added some new materials into my writing, enhancing my preparing awareness before writing; the convenient use of Microsoft Word processor and the use of the Pigaiwang writing platform have encouraged me to make my revision process more efficient.*

(Int3Yin03/01/2016)

Furthermore, it is interesting and enlightening to see that Yin’s perception of the use of multimedia tools has been conceived as involving peer feedback and automated writing evaluation (AWE) feedback. This has broadened and enhanced Yin’s metacognitive knowledge about English writing, especially concerning the intended audience, which was not valued so much before the intervention.

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30 In this study, the automated writing evaluation (AWE) feedback was from the Pigaiwang, see also section 3.5.2.2.
Prior to the intervention, I thought only the teacher would read my written products. However, the introduction of multimedia technology into our class and the teacher’s correct guidance make me realize that writing is actually an interactive process. First, the automated constructive feedback from the Pigaiwang is just like another teacher of mine. The machine worked tirelessly to give me feedback on time, which kept pushing me to be closely involved in my writing task. Second, suggested by my teacher, we use WeChat to organize an English-learning group. Since members in this group are all interested in learning English, we just type English words to have an active discussion on our English learning problems.

(Int3Yin03/01/2016)

She also wrote in her journal,

I become more interested in learning English writing now. I did not think I could become a “teacher”, who could provide some suggestions to others. We often discuss our writing problems in the WeChat group. It is so interesting to share my views there.

(JW15Yin13/12/2016)

Yin saw such feedback as an indispensable step to help her evaluate her own written products. Gradually adapting to the multimedia-mediated writing environment, she made obvious improvement in her performance of the writing tasks in the post-test and delayed post-test. She thought the modern technology had become her “good friend” and attributed her writing improvement largely to “the interactive community” (Int3Yin03/01/2016) that the teacher helped to create. After the intervention, she felt quite confident in her ability to share her opinions with other students.
7.3.2.3 Summary

Having attended the 16-week metacognitive strategy-based intervention, Yin reported that she had displayed a high level of engagement with the intervention course. As a high-proficiency writer coming to the writing class, she claimed that participation in the intervention course was distinctive from other English classes she attended in two main aspects: the systematic instruction of English writing strategies and the efficient integration of multimedia tools into writing processes. Her profile outlined above reveals that throughout the intervention course, she has enhanced and broadened her metacognitive knowledge about English writing in multimedia environments, especially concerning person and strategic knowledge.

First, participation in the class seemed to have particularly enhanced her person knowledge. This was closely related to the shift of her view of considering her English teacher as the only intended audience to a concern for including her peers and the writing practice platform as her conductive readers. The enlarged metacognitive awareness of the intended audience showed her growth as a successful writer with more confidence. She became more confident in sharing her written products with her peers and provided suggestions to her peers’ written products. The interactive peer interaction provided opportunities for Yin to become a more independent writer.

Second, the most striking change may lie in her systematic and flexible use of metacognitive strategies. She held a strong belief that the well-designed metacognitive strategy-based writing instruction played a crucial part in guiding her to make great improvement in her learning to write in this semester. After the intervention, she reported that she had developed a rich repertoire of metacognitive strategies, including planning, monitoring and evaluating in her writing process. She was ready to independently deploy such strategies into writing in a fine-grained fashion to promote her writing achievement. At the same time, benefited from the teacher’s instruction, Yin had apparently learned how to monitor her writing
process in multimedia environments. In the complex multimedia environment, she reported an efficient use of multimedia tools in facilitating her writing development. She mentioned that thanks to the teacher’s instruction, she saved herself from drowning in the massive network resources with a targeted writing plan in her mind, increased her focus on monitoring her writing on the right track when writing, and integrated efficient multimedia tools in enhancing her evaluation awareness. As regards the evaluation process after writing, she claimed that the development of the writing ability largely depended on frequent practice and revisions, which she valued so much from the very beginning. The multimedia tools also provided opportunities for her to shift her focus gradually from the linguistic aspects such as spelling and grammar to high-value revisions such as coherence and organization for text-quality development.

By the end of the course, she felt proud of her effort and satisfied with her writing performance in this course. Despite the exam-oriented constraints she experienced, she expressed a broader view of the purpose of learning English writing after the course. Also, there appeared to be a clear change in her effort, persistence, and choices of strategies, reflecting her process of building up her English writing self-efficacy. The instructional intervention has not only demonstrated its positive effect on her use of metacognitive strategies but also acknowledged the essential role of motivational components such as her motivational attitudes, beliefs, and mindset in promoting her writing achievement. She commented in her post-course interview,

*As the teacher pointed out, compared to writing, other language skills may be improved by an exam-wise preparation in a very short period, such as how to do fast reading. Different from that, writing could not be crammed before exams. Learning to write proficiently should be for an intrinsic higher-level purpose instead of coping with the external imposed exams. I earnestly hope what I have learned in*
class will serve me well in communicating with native English speakers. At least, I
won’t worry about writing English emails in such a modern society. Haha.

(Int3Yin03/01/2016)

7.4 YU’S STORY: A LOW-PROFICIENCY WRITER

“Yu” was the same age, the same grade and studied in the same faculty as Yin. In contrast to
Yin, her major was marketing, belonging to another school in the faculty. She described herself
as an underachieving student who disliked English during her past school years. When she
entered university, she also described herself as “below average” as a first year student. At the
time of this research, she had taken after-school class on weekends to reinforce her English in
a cram school for three months under the requirement of her parents. She expressed her urgent
need to improve her English language proficiency in order to pass CET (Band 4).

I often feel inferior to others because of my poor performance in English class.
Actually my English score is too low for university acceptance. Thankfully, the
university entry standard was the total scores of all the subjects I sat for testing. If
it were not the high scores of the other subjects, I would not have been eligible for
admission to the university. My father is a businessman. My mother works in a bank.
Both of them are too busy to pay attention to my study. What they can do is just to
give me financial support and encourage me to think for myself to reinforce my own
study. After entering the university, I realize the importance of learning English well
in job market for my employment. In this semester, I must pass CET (Band 4) to
prove my English ability. So I registered a tutorial class out of class in the first year.
When I heard the news that there was a research programme focusing on English
writing, I applied for participating in the programme without hesitation.

(Int2Yu02/09/2015)

In her journals, she also expressed her insufficient ability to learn English well.
Maybe I am not a language talent; maybe I didn’t lay a good foundation for learning English during the past school years. I just don’t like English. The progress of writing in English is torturous. My vocabulary is very limited and I am poor at English grammar. I don’t think it is easy to improve my English writing proficiency by myself.

(JW1Yu06/09/2015)

7.4.1 Yu’s Points of View before the Intervention Course

7.4.1.1 Metacognitive Strategy Use in Writing in English

Different from Yin’s various writing practices, Yu’s writing practices were quite limited. Having recalled her experiences in English learning, Yin summarized that her experiences of writing in English were generally associated with two kinds of writing tasks — exam writing tasks and teacher-assigned writing tasks. In terms of writing strategies, she did mention using some metacognitive strategies in her writing process but at a very basic level.

**Before writing**

Compared to Yin’s various planning activities, Yu’s planning activities were very limited. It seemed that she did not have a clear long-term planning of her language learning. Her writing only took place in an imposed situation, either completing her teacher’s assignment or sitting for English exams. She said only in these situations was she fully involved in English writing. However, her typical planning activities were constrained to rudimentary surface-level language preparations. Sometimes she even jumped straight into writing without using any planning strategies. The following excerpt is illustrative of her approach,

*I know plan is good and the teacher also requires us to make a draft before writing. However, when I sit staring at a blank piece of paper, it is hard for me to come up with an idea. I can only think about what words and sentence structures I have stored in my memory that are pertinent to the writing topic so that I can use them in...*
my own writing. I always feel it a struggle to produce a composition. I usually read the directions in the writing part carefully as a starting point before my writing. According to the directions, I would like to think of a rough skeleton of what to write but I seldom make an outline on paper. The purpose is to save time. If time were limited, especially in exams, I would rather move to write directly.

(Int2Yu02/09/2015)

During writing

Although Yu considered writing as a “mundane learning task”, she never refused to write English essays. As a student, she felt an obligation to comply with study requirements. In her own words, “learning is the bounden duty of each student”, she wrote in her first-week journal. Cued by the questions in the pre-course interview, Yu showed some awareness of using some monitoring strategies in this stage.

When asked whether she thought in Chinese or in English in the process of English writing, she answered that undoubtedly she thought in Chinese. She mentioned that the application of translation strategy ran throughout her whole writing process. Almost all of her attention was focused on how to translate her Chinese ideas into English words and sentences. She claimed that Chinese thinking was essential to transmit all her thoughts into English sentences but grammar was a big problem. Because of her poorly translated English, her article was more like Chinglish. What’s more, when she encountered vocabulary problem, she reported that she often employed a “postponing” strategy as a means of sustaining her impetus for generating texts. That is, she just left a blank in her writing for later consideration if she could not think of an appropriate word or could not translate her Chinese into English. The result was that she often left a lot of blanks in her produced text, which might end up with a badly structured piece. 
I feel like that I have no other choice but to construct Chinese words and sentences in mind and then translate them into English. In this way, I mean, in a word-for-word manner, I put all my thoughts into English to complete my writing task. But I often cannot find equivalent translations. In such a situation, I would rather leave a blank in order to keep my writing flow. Because, you know, my vocabulary is very limited, if I cannot think of an equivalent English word, I will not think of an alternative one, either. I never think of using a dictionary when I am totally involved in my writing because it will interrupt my flow of mind. I just keep writing sentence by sentence until it looks long enough to meet the word requirement of the writing task.

(Int2Yu02/09/2015)

As was the case of Yin’s perceptions, Yu did not show any awareness of a perceived audience while writing. She tacitly admitted that the audience would be her English teachers. She reported that she showed more trust in her teacher’s authority and she would develop a sense of achievement if she could get praise from her teachers. The writing goal she set up for herself was just about to gain a good mark in the exam so that she could get her teacher’s praise. In order to meet the goal, her teacher’s recommended template, namely, the three-step argument essay, which was also mentioned in Yin’s case, was more widely used in her writing. She claimed that it was the quickest and most secure way for her to complete a writing task on time since she did not have enough ability to work out a framework to write consistently and concisely. This strategy was also reinforced by her English teacher, which had a great influence on her writing behaviours.

I don’t have any idea of “considering the audience”, since you (the researcher) mentioned that, I think it must be my English teachers. In exams, I feel like that every student wants to get a high mark. I am no exception. Our high school teachers
usually require us to recite writing templates and use the three-step argument writing method to reduce the risk of a waste of conceiving a framework of a writing. They insist that if we have no idea how to express ourselves in the process of English writing, we can just apply the method mechanically. I do believe what my English teachers taught us in class.

(Int2Yu02/09/2015)

After writing
Yu seemed to employ a non-stop strategy to complete her writing. At the post-writing stage, because she rarely did writing exercises in her language study, her knowledge and beliefs of her post-writing activities were mainly based on her behaviours in exams, focusing on revising at a very basic level.

I would like to read my written text for a second time when I have finished but I don’t dare to revise the content. I just check the language problems like spelling, capitalization, and punctuation. In addition, I pay much attention on counting the number of words to ensure that my produced text meets the word requirement in exams. I seldom care about other aspects.

(Int2Yu02/09/2015)

However, even the surface-level revisions were not guaranteed to be done each time in exams. Yu reported that if the time were constrained, she would just scan what had been constructed and ended her writing session immediately after she wrote down the last sentence. Sometimes, even the time was not constrained, she would consider setting out the written text neatly while she was reluctant to make a major revision.

When asked whether she would make a judgement about her written text, she believed that only the teacher had the authority to evaluate her written text in a professional way. She was not confident in evaluating her own writing. Her perception was similar to Yin’s view.
However, in contrast to Yin, she would not take further steps to improve her writing. To know the mark seemed to be an end to her writing.

The most frustrating thing is that I can’t evaluate my produced texts by myself. I think it is my teacher’s job. Maybe there are too many mistakes in my writing. I just can’t figure them out. Sometimes I just get a holistic mark from my teacher. Since this is the key point of exams, it is good enough to know the mark. I may feel a little bit disappointed if the mark is too low, but I have no idea how to improve it. Just waiting for the next exam.

(Int2Yu02/09/2015)

7.4.1.2 Perceptions of the Use of Multimedia Tools in the Writing Process

A low proficiency English writer notwithstanding, Yu showed an enthusiastic attitude toward the use of modern technology in her university life. She reported the great convenience the Internet brought to her in her daily life. Unfortunately, when it comes to the use of multimedia tools for learning, she admitted she did not use these tools a lot in her academic study. She seemed to have no clear understanding of how to use modern technology to facilitate her study but adopted a strategy of “just blindly following the trend” towards the applications of technology in learning (Int2Yu02/09/2015).

My parents bought a laptop for me when I was still in high school. I like surfing the Internet very much. My favourite pastime is surfing the Internet. The Internet brings much convenience to me and I can buy clothes online without going to downtown shops. However, it may affect my study. I am lacking self-control ability. Sometimes I just forget the time. My classmate has ever recommended some useful apps to me and I indeed downloaded them into my cell phone. But I just cannot help doing other things such as using WeChat for chatting while the learning apps become seldom-used apps. (Int2Yu02/09/2015)
When asked her multimedia-mediated writing experience in particular, Yu admitted that neither did she have experience in using Microsoft Word software for practising writing in English nor did she write English emails for communication although she could type English words pretty fast. To take a closer look at the use of multimedia on the writing process, the data showed that because there had never been a computer-based English exam and most of her English teachers just emphasized traditional conceptions of paper-and-pen writing, Yu appeared to be at a loss when it comes to how to integrate technology into helping her writing development with no presence of proper guidance programmes in her university. Her writing experience by means of multimedia tools were in effect constrained to searching the Internet for online resources as part of the preparation process in writing. As she reported,

_As you may know, examination is actually the most important thing in school. Our English teachers always emphasize the importance of setting our writing out neatly in the test paper so that the examiners could have a good first impression. In order to deal with the writing part in the examination, I just surf the Internet to get some online resources and memorize them so that I can use them in my writing. What’s more, I think I am a last-minute person. I believe that “临阵磨枪，不快也光” (it will help somehow even you start to prepare at the last moment). If there is no exam, I think I may spend a lot of time on the Internet for entertainment without any learning goals._

(Int2Yu02/09/2015)

7.4.1.3 Attitude towards the Regular English Course

Because generally English is not used much in the non-academic environments in China, English courses play a vital role in helping English language learners at school. Yu reported extensively on her self-perceptions of her writing experience and competence in the English
class. The data revealed that typically, Yu’s reports were centred on two major themes: her concerns about her English proficiency and her expectations in teachers’ professional guidance.

First, it appeared that Yu did not have a sense of self-confidence in writing in English. In contrast to Yin, Yu felt “worried” about English writing when coming to the English class. She often complained in the interview as well as in the journals that due to her limited vocabulary, she could not express her ideas although she usually had plenty of good ideas in mind in Chinese. When she wrote up the essay, she felt that her language was just too simple. She also reported a low willingness to complete the writing task that the teacher assigned to all the students in her class. For her, writing in English was a great challenge and she had lagged far behind others since her junior middle school. She said,

*I feel like that my English study has been left behind since my junior middle school. When I am given a writing assignment in the class, my mind often goes blank and I have trouble putting my ideas into English words although I have plenty of beautiful Chinese words in my mind. You know, my English is too poor. So I usually write the essay in a perfunctory way. When I sit down to write, I think my writing process is just like an imitating and translating process. And I write very slowly because I often spend a lot of time worrying about superficial linguistic corrections such as correct spellings, correct grammar, correct words, and so on.*

(Int2Yu02/09/2015)

Second, as a low proficiency writer, Yu admitted that she was unable to provide significant evaluation of her owning writing. She tended to rely heavily on the teachers’ professional guidance and feedback. She expressed her keen expectations of seeking help from teachers as a way to motivate her to improve her English writing performance in her journal.

*I am not proficient in English. I feel like that it is just so important to get my teacher’s appreciation of my writing and get her precious feedback.* (JW1Yu06/09/2015)
Moreover, when asked if she had some suggestions for the teaching of English writing, it seemed that she could make a long list as her own requirements. Some excerpts followed.

I think the teacher should have a dictation to check our vocabulary.

I think the teacher should teach us some useful sentence structures and recommend selected sample essays for us to recite. I feel that the resources I get from the Internet have a mixture of good and bad English sentence structures. I remembered that in a mock examination, I prepared a lot of English sentences by searching the Internet that I figured they were beautiful and pertinent to the writing topic, and I tried my best to memorize them and used them in my own writing but only got a comment of “awkward sentences” from the teacher. So I do believe what the teacher teaches us.

I think the teacher should assign us more writing tasks for practice because only the teacher’s assignment could motivate me to complete and hand in as an obligatory requirement.

(Int2Yu02/09/2015)

However, due to having to deal with larger class size, English teachers were in effect not able to assess each student to provide significant help. In the interview, Yu also expressed specific dissatisfaction upon the teacher’s instruction as illustrated in the following quote.

I don’t see much value of taking the English course in university. In my class, our English teacher only cares about good writings of some top students. I often feel quite distressed at being neglected by the teacher. Actually, the low proficiency students are in more dire need of encouragement. Sometimes the teacher’s feedback was just not findable, I felt quite disappointed.

(Int2Yu02/09/2015)
7.4.2 Yu’s Points of View after the Intervention Course

7.4.2.1 Metacognitive Strategy Use in Writing in English

Having been motivated, Yu demonstrated a high level of engagement with the intervention course and her own writing/language development by use of multimedia tools. It seems that the well-designed writing instruction with a focus on metacognitive strategy use had a powerful and positive impact on Yu’s writing ability development. After the intervention, she reflected very deeply about what she learned in class and reported a systematic and flexible use of metacognitive strategies in her writing to facilitate her writing ability development.

In terms of planning strategies, she admitted that she did not produce long-term plans in her language study based on her belief that the improvement of language ability was a gradual process. However, she demonstrated that thanks to the tailored instruction, she had gradually developed a strong sense of global planning in the practice of writing. She found that writing should be a well-designed process, during which a detailed plan functioned as a fundamental step to relieve her cognitive burden in the following writing activities. Meanwhile, she tended to show an increasing confidence pertaining to global objectives with a clearer future direction in her language study.

Previously, I thought writing was just a non-stop task that I must finish within a limited time. Once I got an impulse for writing, I needed to keep writing until the last word. Completing the required number of words meant completing an English composition. That often frustrated me when I met difficulties during writing. With the teacher’s professional guidance, I just realize how useful the writing strategies are in my writing. Planning is such a good way to help me develop my writing, such as setting up a specific goal for each writing practice, writing down an outline as a guide for idea development, and seeking information online to make full use of resources that the modern technology provided to us. All of these were taught by the
English teacher in class. I become more confident and feel more motivated to be engaged in English writing now.

(Int4Yu03/01/2016)

This excerpt reveals a striking change that was related to the shift of her view of an absence of any planning strategies at the very beginning to a more mature goal-directed learning involving the combination of different planning strategies at the end of the course. Such a positive change suggests that the metacognitive strategy instruction had a very positive influence on her cultivating the useful writing strategies into her own writing. In addition, based on the plan she made in the first week of the intervention course, Yu made an extra effort to enlarge her vocabulary to improve her linguistic competence. Gradually, with increased language knowledge, she seemed to have more confidence in expressing herself and was more willing to practise her writing in and out of class. She wrote in her journal,

*I must take full responsibility of my own learning. Previously, it was often the case that I had remembered an English word or a useful phase quickly but after a while, I just forgot them. I never thought planning was such a good way to help me memorize so many English words. I set up a goal for memorizing new words and made a review to consolidate my memorization. Moreover, under the teacher’s guidance, I realize that I need to use them in my own writing. When I was able to use them in my own writing, I feel that the words and phrases were just so impressive to me.*

(JW12Yu22/11/2015)

In terms of monitoring strategies, Yu seemed to have developed a better understanding of self-monitoring strategies to solve writing problems in a more flexible way during writing. She also emphasized the teacher’s role in her process of developing self-monitoring strategies. She said that it was the teacher’s carefully orchestrated instruction that provided opportunities for
her writing ability development, which at last brought more positive outcomes in her language learning achievement.

First, the content and organization monitoring strategy was the most reported strategy in the data accounts. In the post-course interview, Yu reported that she tended to focus on broader aspects of producing a well-organized text rather than only focus on the specific linguistic aspects during writing. She claimed that by successfully carrying out the plan she made at the very beginning of the course, she gradually enlarged her vocabulary and became more confident in English writing. This enabled her to concentrate on generating a text of high quality as her writing goal without much concern about cosmetic linguistic aspects. Different from her previous experiences in writing, she demonstrated a more frequent use of deletion, amplification, and substitution strategies to facilitate her writing improvement.

Second, the automated, constructive feedback from the Pigaiwang writing platform was a highly effective way to provide an opportunity for her to better monitor her pieces of written products as well as her evaluating skill development. In such a multimedia-mediated writing environment, Yu has apparently extended her understanding of self-monitoring during writing. She mentioned in the post-course interview that she was very impressed with her first writing practice in this course. When she submitted her first written product to her teacher, she not only got precious feedback from her teacher, but also got her peers’ suggestions in class as well as the feedback from the Pigaiwang writing platform. In this process, her written text was read at least three times by different readers. That was what she never thought about. Previously she thought the teacher would be her only reader of the written text. This experience in turn has triggered her to adjust her awareness of the perceived audience during her writing. She thought she must take a serious attitude towards these different readers’ suggestions or feedback. Throughout her composing, therefore, she was greatly motivated to keep trying to minimize her off-task behaviours. As she began to monitor these behaviours consciously, it seemed that
she became inspired to self-reflect upon her own writing process and to think carefully about how to use different useful strategies to complete the writing task. She wrote in her journal,

*Prior to this course, I took it for granted that only the English teacher would read my composition. But now I feel different. I get a lot of friends who sincerely help me. I am not alone in the process of learning to write in English. What’s more, thanks to the teacher’s correct guidance, I get a better understanding of how and when to use the multimedia tools appropriately to help me improve my writing. I cannot imagine I just turned a blind eye to the use of the multimedia tools. I even didn’t realize their real values to me. I am so lucky that I can participate in such an interactive writing community. With their help, I feel that I become more confident now.*

(JW16Yu20/12/2015)

In terms of evaluating strategies, Yu appeared to readily understand the importance and the usefulness of such composition writing strategies after the course. She tended to consider writing as a process rather than a single draft product when she realized the written product was in effect improved by revision. What’s more, Yu had apparently expanded her understanding of revision, which now included multiple dimensions from cosmetic changes to more global changes such as rewriting, adding, or deleting activities. Only by this way would the ideas be developed and evolved and the meanings would be constructed and clarified. She considered revision as “the core of the writing process” in the process of developing a high-quality written text, which she thought was the most significant change after the intervention. She recalled an impressive experience that her composition was singled out for praise by the teacher in her post-interview,

*I just couldn’t believe that my composition was chosen as an exemplar to be praised by the teacher in front of my classmates. As instructed by the teacher, I have formed*
a habit of using the regulatory evaluation checklist to check my composition from the linguistic aspects to the more global aspects. The use of computers also made my revision much easier. I usually did several rounds of revisions until I feel satisfied. It is even more amazing that my revisions had been recorded by the Pigaiwang writing platform. My teacher could “read” my efforts in improving my own composition. It seems that writing in English is not such a difficult task. I will keep the habit of making a self-evaluation after the course. I think it is very useful to the improvement of my writing ability.

(Int4Yu03/01/2016)

Overall, Yu has developed a clear picture of integrating different metacognitive strategies into facilitating her writing to achieve a written text of high quality. Besides those changes, Yu also mentioned that she appreciated the being able to keep journals in the process of the 16 weeks’ study. As an acquiescent student, she insisted on keeping journals, treating journals as an important way to communicate with her teacher. Keeping journals helped her to consciously monitor and reflect upon what she learned in class. The feedback in each journal in turn increased her systematic use of metacognitive strategies in her own writing and consequently, helped her become more of an independent writer.

7.4.2.2 Perceptions of the Use of Multimedia Tools in the Writing Process

Yu came to the writing course with the strong awareness of the importance of modern technology in her daily life. However, as a low proficiency learner, she had little awareness of how to integrate modern technology into promoting her language study. With multimedia tools being integrated extensively into the writing course, Yu’s perceptions of the use of modern technology in her learning process has had a drastic positive change throughout the entire process. She demonstrated that the differentiated instruction had provided opportunity for her learning along with the use of multimedia as a learning tool and had gradually related the tool
to her active interaction after the intervention. In particular, recalling her experiences in writing in multimedia environments in this semester, she reported that the writing course has yielded two major gains when she was oriented towards her own language learning: her newfound confidence in herself as a writer in the complex writing environments and her increasingly strong awareness of considering the readers in her writing process.

The first characteristic of Yu’s process of learning English writing was her recurrent reflections upon herself as a writer in the complex multimedia environments. At the early stage of the writing course, she analysed herself and her English learning problems and found that her main barrier was how to handle distractions in the complex writing environments. She reported that she did not feel apprehensive but got distracted easily from the work she was engaged in when she used computers for study. She wrote in her journal of the first week after the first course,

*I think the first class demonstrated a thoughtful, constructive, and insightful voice in my mind. The teacher challenged me to rethink myself. I was too much of a typical good-time girl to do any serious studying during my first year in the university while I killed a lot of time on the web. There sure were a lot of temptations on the Internet such as online shopping. I just could not help buying beautiful clothes for myself while I forgot to study. Looking back of my study in the high school, however, I don’t think I was a stupid guy. Otherwise I cannot enter the university under the fierce competition. The modern technology has provided such a convenient way for us to study. As the teacher told us in class, I must make full use of the technology to facilitate my study. There is a saying, “early birds get the worm”.*

(JW1Yu06/09/2015)

She was determined to find solutions to her problems in the intervention course. Inspired by the teacher’s modelling in the class, she finally developed a strong sense of cognitive maturity
in using strategies metacognitively to build up her confidence in such a complex multimedia-mediated writing environment. With the process of the writing course, she felt more engaged and involved when using multimedia tools as part of the writing process. She reported her concrete applications of various strategies in the post-interview, which were obviously distinct from what she reported in the pre-interview.

As instructed by the teacher, metacognition is indeed critical for successfully handling distractions and problem solving in my writing. I feel more confident now. I downloaded an app and installed it in my computer at the very beginning of the course. I made a planning sheet with goals and deadlines in the app. With the process of the course, the app served as an important assistant in reminding me of using time effectively and avoiding procrastination on my writing assignment. During writing, I improved my self-control ability by monitoring my moods to help me focus and stay on the writing task. To that end, I took a number of measures. For example, I created a popup window by using trigger words like “attention” to help me refocus attention and get more active in the writing process. I also used the rubric on the computer screen to monitor my writing progress. The clock on the computer screen had always reminded me of completing the writing task in a timely manner. Once I completed the writing task, I closely followed the regulatory checklist to perform a self-evaluation. The use of computers also led me to revise more easily and effectively.

(Int4Yu03/01/2016)

Besides the above-mentioned elements that contributed to the change of her internal states, she made a special mention of her teacher’s role in enriching her writing knowledge to rebuild her confidence in writing. According to her, the teacher in this course had played a constructive
and irreplaceable role in helping her improve the writing ability in the learning-to-write process.

She said,

_The very first person I want to say thank you is my loving and supporting English teacher in this course. She has taken on a lot more work than my previous English teachers have during these past few months. I feel so lucky for being in such a class. For example, I often feel that my vocabulary is a big problem. Given the convenience of the multimedia tools, this problem is comparatively easy to sort out by looking up the new words in the online dictionary and the Internet has afforded us “beautiful words” that merit attention. However, beyond the vocabulary, there are many other aspects such as the logical cohesion of the content, the sophisticated design of the organization, and the development of a pervasive argument that can never be done by the multimedia tools. All of these were taught by the English teacher in class._

(Int4Yu03/01/2016)

The second characteristic of Yu’s process of learning English writing referred to her increasingly strong awareness of considering the readers in her writing process, which contributed a lot to improving the quality of her writings. Yu summarized various readers of her written products in her journal of the last week.

_Previously, I didn’t think too much about who was going to read my composition because the teacher would definitely be my reader to give me a mark. However, in this course, I just realize that I have so many different readers. First, because we use the Pigaiwang writing platform to practise our writing, the platform is actually our first reader who can give us automated feedback in a timely manner. Second, when I click the “submit” button to the writing platform, my composition will be automatically distributed to my classmates for their reading. They will provide some useful suggestions to help me further improve my writing. And at the same time, I_
am also a reader of my classmates’ compositions. In this process, all the readers are anonymous. Through this interactive way, I gain a lot from my peers’ precious feedback. Third, the composition with repeated revisions will be submitted to the teacher for her final decision. The teacher has actually become my last reader.

(JW16Yu20/12/2015)

7.4.2.3 Summary

For Yu, participation in the writing intervention course seemed to stand out as one of the notable milestones in the process of her language study in school. As a low-proficiency writer coming to the class without much interest in English writing, Yu reported that she experienced most noticeably a change in this semester in her language study and expressed her satisfaction about her improvement in writing performance after the intervention course. Her changed perceptions of the writing strategy use as well as the use of multimedia tools in her learning-to-write process reflected the aspects of her metacognitive knowledge about learning English writing in the multimedia environments.

First, participation in the class seemed to have particularly enhanced her metacognitive person knowledge. She started to view writing as a process rather than merely a product, which enhanced her sense of revisions in her writing. She tended to be more confident in herself as a writer in the complex multimedia writing environments, which enabled her to make good use of the multimedia tools to facilitate her writing achievement. She developed an increasingly strong awareness of considering the readers in her writing process, which triggered her to show an optimal level of motivation for learning to write. Her teacher was really supportive and created an interactive, beneficial writing environment. Her consistent emphases on these factors indicates her more mature acquisition of metacognitive person knowledge in helping her make achievements in her English writing.
Second, with regard to strategic knowledge, Yu reported that the metacognitive strategy-based instruction presented a clear instructional procedure, which deeply affected her metacognitive strategic knowledge development. The results of data analysis show that she has developed a clear picture of metacognitive strategic actions taken in writing in multimedia environments. She set her writing goals at the very beginning of the intervention course with a genuine purpose to improve her English achievement. Throughout the course, she made great effort to invest her time in learning to write with the teacher’s guide and the assistance of multimedia tools. After the course, she evaluated what she learned in this semester. Despite her low efficiency in English language learning in previous school years, data collected from this semester did suggest that she had been very dedicated to her learning to write in this course, having become a metacognitively independent writer beyond simply being a teacher-dependent student.

Meanwhile, although she enjoyed the whole experience in learning to write in this semester, she admitted that she still had a strong instrumental propensity in English learning with a great external pressure to pass the CET-4 test at the end of the semester. In her end-of-course evaluation, she said that she should always strive to achieve more, however well she has done before. In her own words, “A slow sparrow should make an early start”.

7.5 SUMMARY OF FINDINGS AND DISCUSSION

Under the current education system, both participants reported that they had learned English for up to 7 years, which included 3 years of junior middle school education, 3 years of senior high school education, and 1 year in the university. When the study was conducted, they were year-two students studying in the participating university and English was their compulsory course in the university. Although there was no specific English writing course in their previous English learning, they were quite familiar with English writing because writing was a normal task of various English exams they had taken since their beginning of formal English education.
Both of them reported that this was the first time that they had attended a formal English writing course and the multimedia tools had been integrated extensively into the writing course. An examination of their protocols in the qualitative data showed that great changes have taken place in the two students’ writing achievement through comparing the data collected before and after the intervention.

### 7.5.1 Understanding the Utility of Metacognitive Strategies in EFL Writing Process

Writing is a very individual behaviour characterised with idiosyncrasies (Levy, 2013). Different writers may adopt different writing strategies. Stressing the importance of metacognition in EFL writing in this study in phase two, we have attempted to understand Chinese student writers’ metacognitive knowledge development in accordance with what Flavell (1979) terms *metacognitive strategic knowledge* by examining three perspectives of the two participants’ awareness of planning, monitoring, and evaluating on their writing processes. Based on the analyses of the qualitative data, the findings concerning the participants’ reported metacognitive strategic actions taken before and after the intervention course are summarized in the next sections.

*Pre-course strategic knowledge about EFL writing*

The two participants’ metacognitive strategic knowledge before they took the intervention course reflected their previous writing experiences, which informed us of a baseline condition of their understanding of and approaches to the EFL writing tasks. The qualitative data gathered from the pre-interview revealed that in general, before the intervention, none of the two participants showed a clear understanding of how to write other than having been presented with sporadic techniques related to metacognitive strategic knowledge. None of them reported having received any systematic instruction in EFL writing. They tended to conceptualise EFL writing as a highly-challenged language learning task and they demonstrated a very strong instrumental propensity in the process of learning to write. In this
regard, EFL writing had been in effect treated as merely a once-written product to be examined by their teachers rather than as a process of developing and expanding their ideas with the purpose of achieving a text of high quality. This finding appears to echo findings of prior research on the role of strategy use in Chinese EFL writers (Zhang, 2014; Ruan, 2005; You & Joe, 2001).

In terms of planning strategies, one of the major findings regarding the participants’ pre-course strategic knowledge was that due to a lack of metacognitive planning knowledge, they seemed to be blocked before they began to write. One reason might be that the kinds of English compositions they had written prior to this course mainly concerned exams and teachers’ assignments. In such contexts, they found it difficult to activate efficient planning strategies due to the time restriction imposed by the external agents, such as teachers or exams. Even though they had a plan, their planning activities were often very rudimentary.

On the one hand, both of them equated planning to linguistic knowledge preparation, whether by surfing online or by manoeuvring long-term memorization, overemphasizing the importance of linguistic knowledge with a particular reference to vocabulary and grammar. As reported in the literature (Gao & Ma, 2011; Gu, 2010), in learning to write English as a foreign language in China, students were taught by teachers who tended to emphasize the accumulation of vocabulary and correct use of grammar as the basic start in writing. Because students had limited out-of-class exposure to the targeted English language, a development in English vocabulary capability was often accepted as a critical factor to improve English writing ability so that memorization was encouraged and employed as a learning strategy in this stage as a pre-writing preparation.

On the other hand, as far as writing goals are concerned, setting up a measurable and attainable goal is believed to be a good indication for EFL writers to direct idea development during writing and thus can reduce their cognitive load during writing (Amani, 2014; Ong,
It seemed, however, that both Yin and Yu’s writing goals were unenforceable and did not direct or support their idea development. They equated the writing goal to gaining a good mark in exams. As for how to achieve a good mark in exams, they felt at a loss when they were in the competitive exam context. Starting with the airy plan before writing seemed to be a non-productive sort of settlement in helping them move forward during writing. This non-productive approach to writing appears to be already well accepted by researchers focusing on Chinese EFL learners (e.g., Liu & Ni, 2015; Zhang, 2010). Given its lack of authentic and meaningful practice opportunities outside of the foreign language classroom, writing for tests has long been a deep-rooted factor that shaped Chinese students’ perceptions of EFL writing.

With regard to monitoring strategies, the finding concerning the participants’ pre-course monitoring knowledge has revealed that both participants showed a weak sense of monitoring strategies during writing. The present results are significant in two major respects during the two participants’ writing process:

First, their accounts tended to centre on translation as a major strategy in their text generation. Admittedly, at the initial stage of English writing, translation was found to have certain advantages for second/foreign language learners. Prior studies had noted that L2 writers might use their mother tongue/translation as a useful tool to connect the mental thoughts, relieve the cognitive load, and get their thinking going (Bassnett, 2013; Wang, 2004). Wang and Wen (2002) also found that L2 writers were more likely to rely on their mother tongue/translation when generating and organizing ideas during L2 writing. However, the two participants in this study primarily used direct word-for-word translation that was traditionally taught in their English learning classroom. Such a process of generating a text was essentially unstructured, which could easily lead to translation gaffes or Chinglish sentences in their written products. Relying on such a mechanical word-for-word substitution strategy would not be of much help in promoting their L2 writing development. In fact, they were significantly
more difficult to monitor other aspects in a more global sense, such as text coherence, discourse organization, and functional sentences. As shown in the case of Yu, she typically wrote an English composition by using the direct mechanical word-for-word translation but due to her relatively low L2 proficiency, she was often trapped in difficulties of finding equivalent words in the target language in her process of producing texts. She followed a “postponing” approach to solve the difficulties, which might destroy the meaning construction and easily lead to a loose text without logical organization.

Second, both participants were found to have an overall lack of audience awareness in their English writing processes. That is, as a “high-level discourse goal” (Ruan, 2014, p. 82), the metacognitive awareness of considering the audience seemed to be missing in their repertoire of metacognitive knowledge during writing. This finding confirmed the previous studies (Ruan, 2014; Wang, 2004), indicating that by guiding the students to take the time to think about who would be reading what they wrote was not prevalent in the teaching of EFL writing in the Chinese context. In such a context, due to the fact that the students’ compositions were always addressed to the same reader — their English teachers, considering the audience when writing was never encouraged and perceived as a useful writing strategy in the teaching of writing in English class. As reported in the literature (Hyland, 2015, 2017; Yang & Gao, 2013), EFL writers need to consider their audience to help them focus their attention and determine what appropriate ideas to be included in the composition and how to convey the ideas most effectively. As far as audience awareness is concerned, it seems that gaining a greater awareness of considering the audience is not an easy task to perform for EFL writers. “It is only possible when a certain stage of cognitive development is achieved” (Carvalho, 2002, p. 272). For the EFL writers, considering the audience is not simply a cognitive decision but involves their metacognitively monitoring to adapt what they write for their audiences in a more professional manner. From the teaching standpoint, this finding points to a need that
teacher’s appropriate and clear instruction might be essential to further facilitate students’ gaining of audience awareness.

Regarding evaluating strategies, the most obvious finding to emerge from the analysis is that both participants appeared to have quite a limited use of evaluating strategies in their post-writing stage. Most of their re-reading activities, if they had, had been only undertaken as corrections of surface language problems, focusing on lexical and grammatical cleanliness of their written texts. There was also a noticeable difference between the ways in which the two participants employed the evaluating strategies. Yin had a dual attitude toward the revising strategies. On the one hand, she had a strong awareness of realizing the importance of revising in the writing process. On the other, it seemed that she showed an insufficient ability to transfer such awareness to real action due to the lack of explicit instruction in the traditional product-focused and test-driven classes. Whereas Yu held a weak awareness of revising the produced text. For her, revision was such a demanding task that she would rather jump straight into ending of writing when the writing time expired.

Furthermore, both of them believed that they had a more limited knowledge of English while their teachers’ knowledge was superior to their own knowledge and their English proficiency was not yet on par with the requirement of a high-quality written text. Therefore, as we can see, they had not yet started developing a self-assessment ability. On the contrary, both of them attached great importance to their English teachers’ feedback, which as they argued, was more persuasive and professional. This could be also attributed to the teaching practices that they had acquired in English language classrooms, in which traditional teacher-centred instructional practices were predominant in evaluating the written texts that student writers submitted. This finding echoes much previous research (e.g., Lee, 2014; Yang, Badger & Yu, 2006; Zhao, 2014), showing that first, having been exposed to teacher-centred classes, student writers in tertiary education in China tended to be passive and reticent learners.
throughout the post-writing process while their predominant foci were usually on superficial errors as well as exam scores (Lee, 2014). Secondly, possibly because of Confucian cultures, Chinese EFL writers/learners seemed to ascribe a particularly high status to their teachers, who served as “the sole assessment agent” (Zhao, 2014, p. 156) in their learning activities in and out of class.

**Post-course strategic knowledge about EFL writing**

To see the development of the participants’ metacognitive strategic knowledge over the writing course, comparisons were made by referring to the results that the two participants reported before and after the intervention. The findings suggest that the two participants tended to conceptualise EFL writing as a process rather than merely a product, which might be the most evident change in their learning-to-write process in this semester. It has produced a profound effect upon the two participants’ use of strategies in their writing. Both of them reported using a repertoire of metacognitive strategies to facilitate their effectiveness in increasing the writing achievement. Typically, these differences played out in their use of metacognitive strategies for planning, organizing, evaluating, and resourcing, which were often associated with the characteristics of the experienced and skilled L2/EFL writers. This might be attributed to the positive effect of the intervention course in which the systematic metacognitive strategy instruction may have successfully been implemented. The instruction appeared to guide the writers in the experimental group to make more effective use of metacognitive strategies across language proficiency levels (both high-level and low-level English proficiency writers, such as Yin and Yu) in order to achieve their goals in EFL writing in multimedia environments. These results corroborate the ideas of Wei, Chen, and Adawu (2014), who claimed the importance of L2/EFL writers’ metacognitive control over successful orchestration of strategy deployment in computer-based learning environments.
To begin with, the two cases displayed various differences in the use of planning strategies in terms of generating, organizing, and goal-setting sub-processes after the intervention. As evidenced in the pre-course protocol, both participants tended to overemphasize the importance of linguistic knowledge preparation in their planning activities before writing. However, after the intervention, they became more engaged in using planning strategies in a more global manner. For instance, in the pre-writing stage, both of them appeared to increase the incubation time to pay close attention to making outlines as a scaffolding to help them take clear developing thoughts in the following writing activities. This finding corroborates the quantitative results collected from the questionnaire in Phase 2 in this study, consistently showing the positive effects of the teacher’s instruction on enriching the participants’ metacognitive planning knowledge. What’s more, with respect to goal-setting processes of the two participants, although both of them admitted to maintain an instrumental propensity in their goal-setting process, that is, passing tests/getting high marks was still considered as their practical writing goals, they reported to make great self-adjustments in their writing goals with distinct characteristics. In Yin’s case, she not only maintained her high intrinsic interest in learning to write in English but also expanded her view of setting up goals. Her greater extrinsic goal orientation such as practising writing for real communication with native language speakers appeared to provide prolonged self-efficacy for her to cultivate more confidence in writing task performance. She became more proactive and more self-efficacious in practising her English writing and improving her language ability after the intervention. The same positive development also occurred in Yu’s case. For her, she kept moving towards a determined goal by taking specific feasible measures, focusing on steady improvement of her language ability. These included breaking down the complex writing task into very specific procedures that she could carry out, setting feasible goals for language knowledge preparation, and conducting timely self-assessment of the anticipating goals. The interactive effect of goal
setting, strategy use and language performance lends support to the previous claim that preparing ahead of time with a measurable and attainable goal would help students delineate a clear focus on how to manipulate a writing task during writing to ensure a satisfying outcome of the writing performance (Hyland, 2015; Ong, 2014).

Secondly, the qualitative data further reveal the beneficial effect of integrating metacognitive monitoring strategies into the instruction for developing independent, self-monitoring EFL writers. After the intervention, both participants shared in common a tendency to deploy a high level of self-monitoring strategies to monitor, evaluate and modify strategies skilfully to solve the problems they encountered, which, as they reported, permeated throughout the whole writing process. In particular, Yin, with high linguistic proficiency, demonstrated skilful orchestration of the metacognitive monitoring strategies such as “mind monitoring” in overcoming difficulties to ensure the successful accomplishment of the complex writing task on the one hand. Based on the analysis of her problems in writing, she was actively engaged in monitoring her writing by skilfully using online resources to develop the composition content more elaborately, demonstrating a certain capability to be a successful multimedia writer. Likewise, Yu also reported her great changes in her self-monitoring process together with her apparent improvement in writing test scores in the post- and delayed post-tests. Having realized that writing was a multiple drafting process, she acquired metacognitive monitoring strategic knowledge such as “the content and coherence monitoring” pertinent to the process approach towards producing a text with high quality as the writing goal. This kind of monitoring knowledge has in turn helped her effectively manage the higher-order processes during writing to achieve her writing goal in the multimedia-mediated writing environment. Meanwhile, the findings also revealed a qualitative change in their motivational attitudes, beliefs, and mindset during their writing process. That is, motivation, as a significant factor,
played an essential role in improving their writing outcomes and promoting their self-efficacy, as many researchers (e.g., Dörnyei, Henry, & Muir, 2016) argued.

Finally, the qualitative findings have led us to believe that both participants have demonstrated a high level of evaluating awareness and developed such awareness into real action via revising, reviewing, assessing, and reflecting metacognitive activities. In particular, the findings revealed that the two cases had changed their evaluating strategy use in at least three ways. First, there was a noticeable difference between the ways they dealt with their written products. In sharp contrast with their prior superficial linguistic correction of language problems, both of them tended to make revisions on more global aspects that aimed to enhance the produced text quality. This means that they paid special attention to re-examining the completion of the writing goal, re-considering the fulfilment of the writing task requirement, and refining the idea development, among many other things. These activities were generally considered as the characteristics of experienced and skilled expert writers (Zhang, 2014). They both attributed these positive changes to the metacognitive strategy-based instruction, which focused on developing advanced L2 writers. As they reported, the teacher in class consistently provided expert guidance for how to revise and review the written products as they moved on to this stage. As a distinctive feature, the results supported previous research findings about the teacher’s role in EFL teaching and learning context. For example, Zhang and Zhang (2018) reported that teacher’s modelling played a crucial role in facilitating the internalisation of the students’ metacognitive knowledge and promoted their self-evaluation.

Second, the analysis of post-data protocol presented another important change. The two participants frequently mentioned the importance of the application of multimedia tools in helping them evaluate their written products, with a particular regard to the functions of the *Pigaiwang* writing platform. As the course went along, we noticed that the two participants became much more accustomed to integrating this writing platform into their self-assessment
processes to help improve their writing performance. This finding is significant in that it reflected the interactive nature of metacognitive strategic learning, which involved the flexible use of external aids to support learners’ learning in multimedia-mediated learning environments. The results seem to be in line with those of previous studies which corroborated the benefits of various multimedia tools in facilitating EFL learner performance improvement in second language acquisition research (e.g., Mayer, 2014; Oxford & Lin, 2011; Pennington, 2003; Rodicio & Sanchez, 2012).

Third, the qualitative data further revealed that the two participants seemed to develop a new habit of writing reflective journals as one of the most important learning activities after the intervention. Journals in this study not only provided us with an important approach to explore the participants’ metacognitive strategy use in the process of their writing, but also had become a useful tool for the participants to facilitate their reflection and reflective writing. Used in the purposeful instructional context in this study, the very nature of journal writing had worked as an important trigger. Both participants reported that they had developed a habit of writing journals and benefited a lot from keeping writing journals in this semester. In this process, they could not only think back on their writing activities and enhance what they had learned in class, but also could evaluate their writing practice in light of what they learned to monitor their writing improvement. The positive effects of engaging student writers in writing reflective journals have been widely documented in second/foreign language writing research (see e.g. Cheng, 2017; Dabbagh, 2017; Hyland, 2015). The finding further provides evidence to support reflective journals as an effective metacognitive approach to facilitate the student writers’ self-assessment ability.

### 7.5.2 Understanding the Utility of Multimedia Tools in the EFL Writing Programme

Given that the study in phase two was conducted in multimedia environments, there is a need to zoom our lens in on the effects of the application of multimedia tools in the technology-
supported intervention programme. Similar to the arguments we made for the two participants’ metacognitive strategy development, the qualitative data revealed that there was also a noticeable difference of the two participants’ perceptions about the use of multimedia tools before and after the intervention course. Major findings are summarized as follows.

Pre-course perceptions of the use of multimedia tools

With the development of information technology and China’s rapid economic growth in recent years, applications of multimedia and digital technology have been flourishing in the Chinese EFL teaching and learning context (Jiang, Renandya, & Zhang, 2017). In Chinese university settings, students are also encouraged to learn English via multimedia tools. However, despite the fact that previous studies have shown the technology-supported beneficial effects in student language gains in Chinese university settings (e.g., Chen & Liu, 2012; Cheng, 2017; Zhan, Li, & Nie, 2011; Xu, 2010), there is still a lack of definitive answers to how technology can and should be appropriately used in promoting student language learning. In this study, the qualitative data gathered from the pre-course protocols revealed that in general, before the intervention, none of the two participants showed a clear understanding of how to integrate modern technology effectively into their own language learning. Both of them reported that there was a dearth of explicit instructional support in guiding them to achieve successful writing/learning in the complex multimedia environments. Yin, as a high linguistic proficiency writer, admitted that her high scores were deeply rooted in traditional classroom practices in which her ultimate goal of learning to write in English was to pass the test. As far as multimedia and digital technology are concerned, she would prefer to consider them as remedial tools without a clear understanding of how to effectively integrate them into her own learning. Yu, as a low linguistic proficiency writer, showed her great enthusiasm in using computers and the Internet for the convenience in her daily routines while complained that playing video and computer games had affected her study. It seemed that the reason for
her low-achieving language performance was not simply because of her limited language barrier, but also because of her lack of appropriate language learning strategy guidance to help her cope with the demands of writing/learning in multimedia environments.

These results may reflect the status quo of the use of multimedia and digital technology in Chinese university settings. With China’s rapid economic development, multimedia and digital technology have burst into university classrooms and beyond in recent years. However, at this critical time, teachers’ and researchers’ expectations of successful technology integration and student engagement have not been fulfilled. Issues emerging from the findings in our study relate specifically to pedagogical reflections/proposals in helping writers to foster their engagement in multimedia writing environments. The question can thus be raised in the Chinese EFL teaching and learning context: How can we (as language teachers) utilise the multimedia tools efficiently to promote the language learners’ proficiency in the complex multimedia environments?

Post-course perceptions of the use of multimedia tools

Apart from the two participants’ shift in the use of metacognitive strategies from the pre-intervention stage to the post-intervention stage, there are also noticeable changes of the two cases’ use of multimedia and digital technology over the intervention course. The findings reveal that the interactive relationship between the use of multimedia tools and the metacognitive strategic awareness development appeared to contribute to the improvement of the two participants’ writing performance, as reflected in an increase in their writing test scores at the post-and delayed post-tests. Analyses of data gleaned from the post-intervention stage suggested that the two participants have benefited from the intervention course in the following aspects.

First and foremost, both of them made significant progress toward the use of multimedia tools after the intervention. As the intervention proceeded, we saw a shift from
disengaging feelings and devalued use of the multimedia tools to the independent, interactive use of the multimedia tools in a more flexible and effective fashion. In this process, a metacognitive attitude appeared to bring the two participants to develop a strong awareness towards the use of multimedia tools through which adequate strategies were employed. Both of them reported that they felt more engaged and involved when using multimedia tools in and out of class as an inseparable part of the writing process after the intervention. As a result, the “successful multimedia writer” (Mayer, 2014, p. 38) has become their mutual goal they set out to fulfil in their learning-to-write process. For example, when reflecting on her experience with the multimedia tools in writing, Yin mentioned that she allocated more time to the actual evaluating process of her produced text with the help of the timely and efficient feedback from the automatic writing platform — the use of the Pigaiwang writing platform. Also, when she submitted her composition, the teacher and her peers were able to provide timely feedback and support using the same platform. This effective interaction between the teacher instruction and the student engagement through the media of this multimedia platform appeared to contribute to her apparent improvement of writing performance as reflected in her writing test scores at the post-and delayed post-test. This formed a sharp contrast with the finding of pre-course revising, which was predominantly concerned with the teacher’s holistic score as the only feedback of her written products while this kind of feedback only led to dampen and discourage the perpetual enthusiasm of her language study. Similar improvement occurred with the other participant — Yu. After the intervention, she mentioned that on the simplest level, the electronic tools were used to save time previously spent revising cosmetic language problems such as spelling and grammar mistakes so that her cognitive energy could transfer to other larger aspects of writing such as coherence and organization. On more advanced level, involving the use of external aids during the actual writing, she was actually socialized into a virtual community, in which she felt that supervision was everywhere. She claimed that it
seemed to be a supervisor close at hand who constantly reminded her of the off-task activities in the virtual community when she used the Pigaiwang writing platform for writing.

In addition, by comparing the two participants’ pre- and post-instruction writing performance, it should be pointed out that the teacher with new pedagogy has played a crucial role in promoting the two participants’ continuous improvements in their multimedia-mediated EFL writing/learning. As Chen and Liu (2012) pointed out, before we could expect students to use the multimedia tools efficiently, they would need explicit and strategic instruction in helping them cope with the demands of how to use the multimedia tools effectively. In Chinese universities, recent years has seen an upsurge in student numbers who have access to laptops and other digital devices for practising EFL writing. Teachers also show their enthusiasm for incorporating multimedia elements into their instructional practices in the classroom and beyond. In such a context, pedagogy rooted in traditional classroom practices seems to be hard to adapt to the new environment. “The language teaching-learning process ought to involve a change of perspective” (Ruiz-Madrid & Sanz-Gil, 2007, p. 63). Stressing the importance of metacognition in writing in multimedia environments in the intervention course, the instruction seemed to help foster the two participants with an enterprising mindset to make more effective use of multimedia tools in facilitating their writing achievement. Also, both of the two participants demonstrated that they would attribute their improvements to the positive effect of the teacher’s instruction. The findings provide more empirical evidence to the positive effects of metacognitive process in EFL writing in multimedia environments as discovered in some previous studies in the field of second/foreign language acquisition (e.g., Elzarka, Beltran, Decker, Matzaganian, & Walker, 2015; Li, 2005; Wei, Chen, & Adawu, 2014).

Last but not the least, an important finding concerned the perceived changes of the two participants’ sense of audience. After the intervention, both of them reported that they had widened and enhanced their sense of audience. They demonstrated that writing was not just for
their teachers, but also for a larger group of readers including teachers, peers and even computers, which were beneficial for them to be independent writers in the multimedia environments. The reasons may be twofold: First, with the intervention course proceeded, teacher feedback, peer feedback and computerised feedback, had been frequently used in the writing class. Such an interactive mechanism seemed to establish a solid base to help the two participants out of their constrained cognition and make some sense in a larger point of the audiences who would read their written products. Second, the multimedia tools in the networked environment with a particular reference to the use of the Pigaiwang writing platform appeared to bring great convenience to help the two participants raise greater audience awareness. That is, the electronic means of communicating with multimedia tools may have facilitated their writing activities to be a strategic multi-draft process, given that the prompt and timely computerized feedback would be the two participants’ first “reader” who had automatically added a new dimension to their writing. This finding concerning the increasing audience awareness when writing in the multimedia environments added new evidence for research on the benefits of multimedia language learning in previous research in the field of second/foreign language acquisition (e.g., Chen, 2016; Cheng, 2017; Lawley, 2016).
CHAPTER EIGHT

GENERAL DISCUSSION

8.1 CHAPTER OVERVIEW

This chapter provides an overall discussion of the main study, through which a clear link between the availability and adequacy of metacognitive knowledge and the student participants’ writing performance is demonstrated. First, it discusses the research findings in Phase 1 that show characteristics of effective and ineffective Chinese EFL writers against the backdrops of EFL teaching and learning in modern multimedia environments. Second, it discusses the research findings in Phase 2 that explore how metacognitive strategy-based writing intervention affected the writers’ reported use of metacognitive strategies, motivational awareness and their writing performance in multimedia environments. A brief summary follows to conclude the chapter.

8.2 SIGNIFICANCE OF MULTIMEDIA AND METACOGNITION IN EFLWRITING

With technological advances and infrastructure developments in this era, multimedia, including internet technology, has been widely used in language teaching and learning in China. Gone are the days when EFL instructors could simply rely on printed textbooks and handouts to deliver their lessons. It is now flourishing among instructors to adopt multimedia facilities (e.g., computers, projectors, etc.) to assist or complement their instructions in the Chinese university English language teaching (ELT) context (Jiang, Renandya, & Zhang, 2017). Also, due to the affordability of personal computers and laptops, students begin to learn English via multimedia as well as other digital technology in and out of classrooms.

In the Chinese university ELT context, in fact, as early as ten years ago, the Ministry of Education of China (MOE, 2007) officially urged colleges and universities to integrate
multimedia and digital technologies into their teaching with the purpose of promoting the quality of English teaching and learning. However, despite the fact that the policy has been in effect for about ten years, there is still a growing demand for the teachers to embed these tools into their teaching practices to carry over the beneficial effects in language gains to meet the constantly changing learning needs of their students. On the one hand, multimedia tools have indeed brought great convenience to language learners in many aspects, who can do automatic spelling and grammar check, edit and revise their texts, and search for online resources, among many others. On the other hand, the increasing complexity of multimedia contexts to which learners have access, in fact, also leads to increasingly heavy cognitive load in their effort to deal with multitudes of interactions in order to learn effectively. Such situations require that learners in this era be fully ready for meeting these challenges.

Successful learning needs to involve learners’ clear understanding of the what, how, why and when of their learning, or “the use of numerous self-regulatory processes such as planning, knowledge activation, metacognitive monitoring and regulation, and reflection” (Azevedo, 2007, p. 57). These are the essential components of one’s metacognition (Flavell, 1979; Zhang & Zhang, 2018). Admittedly, multimedia has an important role to play in this process. While the majority of available research in L2 education have investigated the beneficial effects of multimedia tools or raising students’ metacognitive awareness on their writing, limited studies have focused on the relationships between students’ metacognition of their L2 writing processes and multimedia use; nor has any substantial study reported the effects of students’ metacognitive awareness and multimedia use on their EFL writing. Given the significant role of metacognition and digital media in the learning of L2 writing, there is an urgent need to investigate this intersection. The following section has addressed the role of learner metacognition of EFL writing in multimedia-mediated environments so as to fill in this lacuna.
8.2.1 Chinese EFL Writers’ Perceived Metacognitive Awareness

The large-scale questionnaire was administered at the beginning of a new academic year, when the students had just entered their second year in their academic study. As was mentioned in Chapter 3, they would sit for a high-stake national English test (CET-4) in the year. Under these circumstances, analysis of the data gleaned from the questionnaire that were relevant to address our first research question may provide noteworthy insights into the relationship between metacognitive awareness and L2 writing performance as well as English language proficiency. What’s more, the results suggest a need to create a firmly supportive understanding for how to design a course to enhance metacognitive awareness within the complex multimedia-mediated EFL writing instruction context to help improve the students’ writing achievement.

The findings of the questionnaire can inform us of the nature of the Chinese student writers’ metacognitive awareness in learning to write in English in multimedia environments and reflect their performance in similar writing tasks in the past. Based on established theories, the student writers’ perceptions and conceptualization about metacognition were examined and descriptive statistics were presented. In this stage, the latent features of metacognition were manifested from three domains: metacognitive knowledge, metacognitive experience, and metacognitive regulatory functions, which was congruent with some previous findings conducted in L2 contexts (e.g., Vandergrift & Goh, 2012; Wu, 2006). The descriptive analysis shows that the participants reported perceptions and beliefs in terms of the three individual components of the metacognitive model for multimedia-mediated writing which indicate a somewhat unbalanced awareness of important components of metacognition.

With regard to metacognitive knowledge categories, this study has examined the knowledge base in relation to person, task, and strategy variables, corresponding to some previous studies in L2 contexts (e.g., Kasper, 1997; Maftoon, et al., 2014; Ruan, 2014). As was
discussed in the section 4.3.1, Chinese tertiary student writers in this study, however, have their own characteristics in each subcategory in their metacognitive knowledge systems.

As Kim, Brown, and Fong (2017) observed, since the economic reforms that began in the 1980s, China experienced rapid transition from a state to market economy and rapid marketization, urbanization, modernization, and globalization. In the newly competitive education system, students in Chinese universities nowadays have been able to learn through all kinds of ways, such as the Internet and digital technology. They have more and better opportunities for education. Under the influence of such a trend that has dominated modern Chinese university students in their mind in educational context, the participants tended to show a great awareness of themselves as writers in recognition of their own shortcomings, have a strong sense of the importance of developing linguistic accuracy in writing tasks, and access their own repertoires of strategies that they can use to achieve writing goals. This is very encouraging for a start to the intervention course, which aims to integrate multimedia tools efficiently into helping the participants develop their EFL writing performance towards greater success. However, the participants’ responses to the changing contextual conditions, in which the results of examining the use of computers as metacognitive tools for enhancing writing did not show positive self-perceptions about the use of multimedia environments. In comparison, they tended to resort frequently to translating key words or sentence structures by means of the convenient use of online dictionaries. Such a text-generating process may be attributed to the instructions they had received in Chinese universities. Although a multimedia rich environment has been provided nowadays in educational settings, text-oriented and teacher-centred classroom environments continue to dominate instruction and classrooms (Ruan, 2014). In this way, there is little motivation for teachers to make use of computers as an integral part of writing instructions for facilitating the students’ learning and writing. Furthermore, Hu (2014) has postulated that affected by the Confucian values, teachers have been kept at a centre stage
in classrooms as the authority and the expert (see also Zhang, 2008), which can frustrate the students in their active involvement in meaning making towards English writing in multimedia environments.

Metacognitive experiences are comprised of metacognitive feelings such as feeling of difficulty, feeling of confidence, and feeling of satisfaction as well as metacognitive judgements such as judgement of learning and estimate of time on a task (Efklides & Vlachopoulos, 2012). As the affective mood, they “can occur at any time before, after, or during a cognitive enterprise” (Flavell, 1979, p. 908). Regarding the metacognitive experience categories, however, little attention has been received in the past decades in research into metacognition (Efklides, 2009). This study is an attempt to bridge the gap through investigating the participants’ subjective experiences in their process of monitoring L2 writing in multimedia environments. The descriptive statistics have shown that the participants perceived quite a range of metacognitive experiences. For example, when they completed a satisfactory written text, they felt a sense of achievement whereas when they failed to achieve the goal of accomplishing a compulsory writing task assigned by the teacher, they felt a sense of frustration. Data analysis revealed that those responses were categorized into two types of metacognitive feelings — metacognitive positive experience responses and metacognitive negative ones. This finding lends empirical support to Efklides’ (2006b, 2009, 2012) theoretical claim, enriching our knowledge of how writers with different proficiency levels experienced and reacted to frustrations during their writing process. What is noteworthy in my study, however, is that the participants tended to associate their feelings of satisfaction in writing tasks with their teachers whose rewards could justify their expenditure of effort. This finding may indicate that when integrated tools from the multimedia environments into the students’ writing, the teacher’s role would be crucial.
In the Chinese ELT context, the teacher may serve as the authority to guide the students’ writing success in multimedia environments by giving them psychological support. Another concern that is present in the situation is the participants’ various self-reported negative experiences, which may explain their disengagement attitudes towards English writing in multimedia context. The negative experiences may have a negative effect on student L2 writing success in multimedia environments. For example, a student may not be familiar with the keyboard layout. He or she may type English words very slowly. The negative experience would prevent the writing task processing from running smoothly. This negative affect may trigger the student to adopt an avoiding strategy to make use of computers for practising writing. In this regard, it is important to mention that to minimize the negative effect may be beneficial to the students’ success in multimedia EFL writing.

With respect to metacognitive regulation categories, this study identifies all three components of metacognitive strategies as important in the multimedia environments, including planning, monitoring and evaluating their strategy use. Evidence from this study shows that the participants tended to have a plan before writing. They also monitored their cognitive processes during writing and evaluated their performance through estimating a holistic mark after writing. All three components of metacognitive strategies were identified notwithstanding, a closer examination of the participants’ repertoire of metacognitive strategy use revealed significantly distinctive traits of their own, as observed by some earlier findings (e.g., Yeh, 2015).

Firstly, following the findings in the planning subcategory, before the students started their writing, they tended to have a plan in mind. However, this period of planning was characterized by a low level of specific writing knowledge such as rote memorization of words and sentences with little involvement in meaning-construction. Also, they did not seem to be ready for engaging in writing in the complex multimedia environments. Negatively-related
feelings were typical at this stage, such as feeling of anxiety, feeling at a loss and lack of writing motivation. This may be attributed to the pedagogical contextual factor in the Chinese ELT context. For some time now, the teacher-centred classroom environments and the product-oriented writing instruction have been prevalent in English class. Traditionally, EFL writing was usually perceived as a mundane task imposed by the teacher and tested by exams. The teaching of writing overemphasized the importance of linguistic knowledge with a particular reference to linguistic accuracy and grammar correctness while the global aspects of planning such as organization, sequence, and relevance to the topic seemed to be missing (Zhang, 2010). In this regard, it may also enhance our understanding that given their dependence on teacher’s guidance and exam-oriented writing purpose, such lack-of-global planning writers, in Cumming’s (1998) words, the “emergent planners”, tended to announce their clear goals as passing or getting high marks in writing exams to conceptualise their knowledge of writing goals, as was shown in the findings. Therefore, there is a need for a number of improvements in the professional development of EFL writing teachers to help them shift their focus of writing instruction to teach these student writers “the value of these strategies and how to apply them in their learning processes in a regular writing course in China” (Teng, 2016, p. 167).

Secondly, another concern that arises in tandem with metacognitive strategy use is the participants’ monitoring processes, which was clustered as the monitoring subcategory. The descriptive statistics indicated that, on the whole, the participants seemed to be an awareness of monitoring their performance when writing from the complex multimedia environments, which permeated throughout the whole L2 writing processes. This may provide a useful starting point for conducting the teaching of L2 writing to the students given the crucial role of metacognitive monitoring when developing the student writers’ potentials. However, it is important to note that the participants in this study tended to underestimate the actual potential use of multimedia tools in regulating their cognitions when writing in the complex multimedia
context although they appeared to hold a positive view on it. As Mayer (2009) argued, successful multimedia writers tended to foster the necessary metacognitive strategies in a flexible and effective fashion to access the multimedia tools and have a better understanding of when to use, how to coordinate, and how to monitor various skills in multimedia environments. The use of metacognitive strategies and the use of multimedia tools were de facto inseparable in practice, which interacted with each other to inhibit or facilitate the students’ EFL multimedia-mediated writing achievement. Given the various potential benefits of multimedia tools (Mayer, 2014), pedagogical attention should be given to support and guide the students to be actively monitoring their writing processes in both the choice of specific writing strategies and the identification of optimal use of multimedia tools as related to their likelihood of L2 writing success in multimedia environments.

Thirdly, when it comes to the evaluating subcategory, the findings lead us to believe that the participants tended to have a high level of evaluating awareness emerging from their self-correction, self-assessment, and self-expectation. The results, however, indicate different priorities for what they actually did. The supported observations favoured that they tended to associate their L2 writing success with practical goals, such as passing the high-stakes national CET test, which they have espoused in their English learning. One possible reason is that these participants may have been accustomed to an exam-oriented education culture, which prevails in the Chinese educational context (Hu & West, 2015). Their use of evaluating strategies shows a comparatively low level of the approach they adopted, in which they seemed to be dependent on the external provocation and guidance rather than actively being involved in the evaluation of the performance of their L2 writing tasks. In this regard, with time, they would develop greater automaticity towards completing a L2 writing task in anticipation of passing tests. However, such a text generation process can be particularly challenging. As the process occurs unconsciously, there is a risk in hindering students’ high-level metacognitive processes owing
to the lack of particularly deeper levels of deploying metacognitive strategies, such as self-
reflection and motivational regulation while writing in multimedia-rich environments. Although building efficient connections between L2 writing and the use of multimedia tools is an important step in students’ self-correction, given the close linkage between positive self-concept and language learning success, there is a need to promote students’ innate self-expectation towards greater academic success, which requires giving them a sense of individual agency in nature (Bandura, 2001). That is, according to the Chinese educational philosophy, “变要我学为我要学” (Converting from being compelled to learn to being inspired to learn) should always be an important awareness of Chinese students when they are engaged in language writing/learning in multimedia environments.

8.2.2 The Inter-group Differences

Overall, the results revealed that the high writing-proficiency students appeared to outperform their lower counterparts in the study, touching on all the three types of metacognitive awareness. The findings were synthesized from previous L2 writing strategy research (e.g., Kasper, 1997; Raoofi, et al., 2014). Beyond that, several key findings emerged from the comparison.

First of all, the significant difference between the two proficiency groups in metacognitive knowledge domain in terms of person, task, and strategy(C/S) variables indicates that writers with a high proficiency level are likely to perform better with evidenced higher levels of metacognitive knowledge. These participants tended to develop a stronger awareness of their strengths as writers, attach more importance to linguistic ability, hold a better understanding of a good writing and emphasize the importance of help seeking when encountered difficulties in the complex multimedia environments. Such findings lend support to the previous findings in multimedia learning contexts (e.g., Moos, 2014; Behnagh, 2014). However, their awareness of considering the audience, which was usually accepted as characteristic of skilled L2 writers (Silva & Leki, 2004), did not show significant difference,
which was not fully consistent with previous research in L2 writing contexts (e.g. Amani, 2014; Foster, 2010; Hyland, 2010; Silva & Leki, 2004). This may be attributed to the predominant teacher-centred instruction in China. Most students may have the default option that their teachers were their only audience who were going to read their written products. In contrast, other more extensive factors such as peer review and interactive multimedia writing platform that might be attributed to their regulatory L2 writing skills have been neglected in the Chinese context.

Secondly, metacognitive experience, as a key factor in affecting the students’ writing performance, also showed its interpersonal variations between the two proficiency groups. This study found that the high writing-proficiency students tended to have a richer and more complex experience than the low writing-proficiency students. As Flavell (1979) argued, “metacognitive experiences are especially likely to occur in situations that stimulate a lot of careful, highly conscious thinking” (p. 908). In such a complicated L2 multimedia-mediated writing context, this means that the students with advanced writing proficiency tended to have more confidence in and positive attitudes towards L2 writing that was closely associated with their excellent performance in writing. Even when they encountered frustrations arising from the external uncontrollable factors, such as the new writing environment, they seemed to be more manageable to be acclimatized to the new surroundings due to their “highly conscious thinking”. The low writing-proficiency students, on the other hand, tended to show a great concern of their performance due to the effects of their long-term low achievements in L2 writing, when completing the assigned writing tasks. In contrast to their high writing-proficiency counterparts, they might have scarce experience of feeling a sense of achievement and confidence, leading to their strong negative feelings in the writing process. This result supports previous research (e.g., Ruan, 2014), suggesting that low-proficient writers have a
tendency to show disengaged attitudes towards writing in EFL context so that a low-level of the use of multimedia environment might appear.

Thirdly, the high writing proficiency students demonstrated greater preference for metacognitive strategy use in terms of planning, monitoring, and evaluating than their low-proficiency counterparts, particularly with regard to evaluating strategies, which had produced large effect sizes between the two groups. The significant difference between the two proficiency groups in terms of using planning strategies indicates that the high writing-proficiency students attached more importance to the advanced planning and linguistic and psychological preparation and organization before writing, particularly with regard to making an outline, thinking of essay structures, and taking idea generation into consideration. The low writing-proficiency students might jump to the writing stage directly as a time-saving strategy. Previous studies have reported consistent findings regarding the importance of planning in L2 writing in general L2 writing contexts (Amani, 2014; O’Malley & Chamot, 1990; Ong & Zhang, 2013; Sasaki, 2002). This study also found that in order to adapt to the complex multimedia-mediated writing context, the high-proficiency writers tended to regularly monitor their emerging difficulties such as “time allocation”, “distraction removal”, and “optimal use of multimedia tools” as well as the relevancy of “prior-knowledge transfer” during writing. This appears to demonstrate their proven ability to identify themselves through adaptive adjustments to satisfy the needs of their cognitive, metacognitive, as well as social affective processes. While in the same situation, although they were provided with a multimedia-rich environment, the low-writing proficiency students tended to have more concerns on surface linguistic corrections which might be prompted by computers, such as “error modification”, “marking mistakes”, and “minimal content changes” without a clear awareness of their writing goals. These results supported observations that given the different language proficiency levels, student individual differences in metacognitive monitoring might vary in the process of
struggling to complete the L2 writing tasks, indicating the complex nature of learning within the multimedia environments (Antonietti, et al., 2008; Moos, 2014).

Additionally, the findings showed that given their advanced linguistic abilities, most high-proficient writers preferred to evaluate their comprehension of the writing tasks to ensure fluency after composing, indicating that effective writers tended to be adept at using appropriate strategies within this complex environment to enhance their learning achievement through self-correction, self-assessment, and self-expectation. On the other hand, most low-proficient writers might not have sufficient time to think out their cognitive processes in multimedia writing due to the worries of their limited linguistic regulations. Similar findings have been reported in previous studies of L2 writing in general learning contexts (e.g. Brown, 1987; Jiang, 2003) as well as multimedia and hypermedia learning contexts (e.g., Azevedo & Aleven, 2013; Behnagh, 2014; Moos, 2014).

8.2.3 Effects of the Metacognitive Strategy-based Writing Instruction

Phase 2 of the research as presented in Chapter 6 evaluated the impact of a metacognitive strategy-based EFL writing instructional programme in multimedia environments. An experimental-control group design was used for comparison in the study, hypothesising that the experimental treatment would improve the participants’ awareness of metacognitive strategy use as well as improved their L2 writing achievement. Data were collected from a questionnaire survey and the pre-, post-, and delayed post- writing tests. The quantitative data together lend strong empirical evidence to the effectiveness of such an instructional intervention programme.

Firstly, the findings showed that teaching metacognitive strategies in multimedia environments could result in significant improvement in the writers’ metacognitive strategy use and the L2 writing performance. As noted in previous research (Cuevas, Fiore, Bowers &
Salas, 2004; De Silva, 2015), fostering metacognitive strategy instruction in the multimedia-based writing environments appeared to enhance the quality of the learners’ online planning, effective management of their higher-order processes with the integration of multimedia tools for optimal use, and engaged in the systematic evaluation of their whole writing processes. This study supports the research encouraging the implementation of metacognitive strategy training for L2 writing development (e.g. Elzarka, Beltran, Decker, Matzaganian, & Walker, 2015; Zhang, Aryadoust, & Zhang, 2016). This is not surprising because the regular traditional, teacher-centred mode of language instruction would be expected to result in an increase in the reported use of some strategies, such as those involving the use of some relatively easier strategies that typically represent surface features of learning. It would appear that the experimental group, through being interactively involved in multimedia-mediated writing, was more aware of metacognitive strategies to enhance L2 writing within their EFL learning programme.

The results showed an increase in the control groups’ score for reported use of the “mechanics”. This is not surprising, either. Given that both groups were studying the same English programme within a multimedia environment, as Mackey and Gass (2015) have argued, computer-based writing might “amplify opportunities for students to pay attention to linguistic form” (p. 75). That is, when writing on a computer writers can more readily engage in revisions of linguistic mechanics, such as spelling, punctuation, and capitalization. Previous research in Chinese EFL contexts has also reported that traditional English writing courses focus on linguistic knowledge and the editing of surface-level features, that is, the mechanics of writing (Wang, 2011; Wang & Li, 2014).

Secondly, research has focused on numerous beneficial aspects of providing multimedia during the process of teaching and learning in the EFL classroom (Chen, 2006; Chen & Zhang, 2014; Ngoc, 2014; Pennington, 2003; Wei, Chen, & Adawu, 2014). To reap
the benefits of multimedia in such an advanced technological society, the findings in this study suggest a crucial role of the instructor as a facilitator in promoting the learners’ effective interaction with multimedia-mediated learning. In this study, what is evident from the results is that although the two groups shared the same multimedia environments, there were significantly differences between the two groups. The more effectively the instructor scaffolded integration of metacognitive strategies in multimedia environments, the more likely the students could gain improvements in their academic outcomes. The findings provide some empirical support to Ruiz-Madrid and Sanz-Gil (2007) claim that “it is not what teachers expect from technology what matters, but what teachers can do with technology” (p. 67) to promote learner development in EFL teaching and learning contexts.

8.3 SUMMARY
This chapter discusses the findings with reference to the theoretical framework adopted for this study. Stressing the importance of metacognition in EFL writing in multimedia environments, this study demonstrates an initial exploration into the relationship between metacognition and EFL writing performance in a multimedia environment amongst Chinese university students. The findings of the present study provide evidence that the role of the participants’ metacognition, influenced by metacognitive training in the multimedia environment, can play significantly in contributing to their writing performance. A crucial point gleaned from the data seems to be that in order to be effective writers, the Chinese EFL writers must nestle and reframe a cognitive view of language acquisition within a triadic reciprocity loop, in which their writing behaviours, the metacognitive regulation of strategy use, and other environmental factors such as multimedia and digital technology operates as interacting determinants of each other to collectively facilitate their writing/learning achievement. The next chapter suggests directions for future research as well as the theoretical and pedagogical implications of this study in the Chinese university ELT context.
CHAPTER NINE

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

9.1 CHAPTER OVERVIEW

As the final part of the thesis, this chapter concludes the study. First, it provides a summary of the major findings of the study, followed by a brief conclusion. Next, it presents the theoretical and methodological contributions as well as the pedagogical implications. Finally, the chapter examines the limitations of the study and closes with recommendations for future research.

9.2 SUMMARY OF MAJOR FINDINGS

With an aim to foster metacognitively-strong EFL writers in multimedia environments (Zhang, 2007, 2011), this study set two related research goals. The first concerned the investigation into the nature of Chinese EFL writers’ general metacognitive knowledge and beliefs about English writing in multimedia environments, with a view to identifying whether they were psychologically prepared for successful writing with strong metacognitive awareness in the complex multimedia environments. This served a good starting point for the following instructional designs. The second focused on examining how the instructional intervention influences students’ metacognitive knowledge development as well as their EFL writing improvement in multimedia environments.

By virtue of the research purposes, the study was divided into two phases. Findings in Phase 1 revealed that with regard to modern Chinese university EFL writers, their reported metacognitive knowledge systems in multimedia environments offered valuable insights into what Flavell (1979) had termed “metacognition” in learning processes, including person, task, and strategy knowledge as well as metacognitive experiences, as discussed in Chapter 2 and
Chapter 4. However, the results suggested that Chinese EFL students’ metacognitive knowledge systems about EFL writing in multimedia environments were distinctive in at least three ways. First, changing the EFL writing from using traditional pen-and-paper method to using modern computer method, participants in this study did not seem to have been psychologically prepared for such a change. They reported insufficient metacognitive knowledge about themselves as writers and limited strategic resources that they could activate for solving problems in the complex multimedia-mediated writing environments. Second, the centrality of the teacher was the norm in the Chinese traditional teaching and learning classrooms for a long time, which had a great influence on the participant metacognitive experiences when they were learning to write in the Chinese university context. Third, their perceived use of metacognitive strategies appeared to stay in a low level of idea generation with little involvement in meaning-construction in their writing processes from the perspectives of planning, monitoring, and evaluating. The quantitative results also found that the use of metacognitive strategies generated a large predictive effect on students’ writing performance in the multimedia environments.

Phase 2 of the main study was an intervention programme, aiming to develop metacognitive writers in multimedia environments by implementing the metacognitive strategy-based instruction. This was a quasi-experimental research design, using both quantitative and qualitative data. The quantitative data were collected from the pre-and post-questionnaires and the pre-, post-and delayed post-writing tests. Analyses of the quantitative data suggest that students from the experimental group benefited from the metacognitive strategy-based instruction in the following aspects: First, they gained more awareness of the effectiveness of metacognitive strategies such as planning, monitoring and evaluating in helping them solve problems in EFL writing; Second, they gained more awareness of the effectiveness of multimedia tools such as the use of the Pigaiwang writing platform in helping
them reinforce their on-task motivation and engagement in the learning-to-write process; Third, their writing performance significantly improved from the pre-intervention to the post-intervention, particularly in their ability to reconsider the produced texts beyond the linguistic aspects such as generating ideas, organizing composition structures, and evaluating the written products progressively. In addition to the improvements of the course participants seen as a group, the individual characteristics of the participants throughout their participation in the intervention course were also explored. Data were collected by means of qualitative instruments, including semi-structured interviews and journals. The qualitative data further revealed the positive effect of the intervention course, i.e., with instructional intervention, the two cases’ metacognitive EFL writing strategy use had been reinforced, leading to significant progress in their perceived strategy use and writing performance improvement in the multimedia environments. Motivated and attentive, the two cases seemed to change their habitual way of writing after the intervention, forming a sharp contrast with their previous performance before the intervention.

9.3 CONCLUSIONS

The present research was set up within a metacognition framework to investigate the nature of Chinese university student writers’ metacognitive knowledge about EFL writing in multimedia environments, and explore the possible effects of the metacognitive strategy-based writing instruction on their development of this knowledge as well as writing improvement within a Chinese university English language teaching (ELT) context. Following a mixed methods design, the study has provided insights into the nature of EFL writing in the context of multimedia classrooms and has demonstrated the positive influence of metacognitive instruction on L2/EFL writers’ mastery of writing skills as well as writing performance development. Given that English is not used much in the non-academic contexts in China, Chinese EFL language writers/learners face many challenges when learning how to write. The
findings in this study suggest that multimedia and digital technology with a particular reference to the use of the Pigaiwang writing platform in this study could play a role in assisting the writers in developing the ability to write. However, in the final analysis, the success of these technologies was believed to rely on a combination of explicit metacognitive writing strategy instruction in terms of planning, monitoring, and evaluating as well as effective implementation in which the teacher might play a crucial role. Teaching specific planning, monitoring, and evaluating strategies was shown to have successfully nurtured the EFL writers’ writing development.

On the whole, metacognition, as a crucial factor in relation to self-regulated learning when planning and executing learner development programmes, has emerged as an important area of academic and pedagogical inquiry in L2/EFL writing (Zhang, 2016b). This study responded to Elzarka, Beltran, Decker, Matzaganian, and Walker’s (2015) call to apply metacognition in the instructional approach in multimedia-mediated writing/learning environments. The effects of the writing intervention course on the acquisition of metacognitive strategies and writing proficiency were examined in the multimedia environments. The results revealed that following the explicit instruction, the EFL student writers in the Chinese ELT context were able to apply successfully metacognitive strategies to improve their writing performance in multimedia environments.

Based on close attention to the analysis of the findings, it can be concluded that this study can provide valuable information about the relationship between the development of metacognitive strategy knowledge and writing performance in multimedia environments. This study can also serve as a foundation for teachers, researchers, and curriculum developers to meet the needs of modern university language students who are expecting to practise and develop their L2/EFL writing ability in multimedia environments.
9.4 CONTRIBUTIONS OF THE STUDY

The study potentially would help advance our understanding of L2 writing development in adult language learners in university settings. It also possibly would help us to diversify the research methodology in investigating the issue under discussion. These are discussed below under the headings of “Theoretical Contributions” and “Methodological Contributions”.

9.4.1 Theoretical Contributions

The present study makes several noteworthy theoretical contributions to the SLA field as well as the interdisciplinary field when accomplishing the effective integration of multimedia into writing/language teaching and learning in the Chinese ELT context.

First and foremost, this study has provided empirical support for clarifying a clear construct of metacognition in general. So far, due to the absence of an agreed definition and coherent operationalisation of what metacognition is (Tarricone, 2011; Efklides, 2008; Tobias & Everson, 2009; Zhang, 2016b; Zhang & Zhang, 2018), “research in the realm of metacognition and metacognitive knowledge has been somewhat fragmented” (Kim, 2013, p. 103). Such a perspective reveals the complexity and multifaceted nature of metacognition in the field of general psychology and educational psychology, which may easily lead to “false beliefs, unproductive self-monitoring, and strategy choice dilemmas” (Zhang, 2010, p. 344). Based on the research findings and the discussion presented in the preceding sections, the present study proposes a metacognitive model in EFL writing and language learning in general.

Metacognition includes a range of beliefs, understandings, behaviours, and strategies. Within this model, in essence, it can be refined into three large variables involving a complex interaction among them: metacognitive knowledge, metacognitive experience, and metacognitive regulation. In this refined knowledge system, the three sets of sub-knowledge can be further present in more detailed categories. The first facet of metacognition, namely the metacognitive knowledge type, as the static variables stored in the writers’/learners’ brain, is
the declarative knowledge manifested in person, task and strategy variables (both cognitive and socio-affective). The second facet of metacognition, namely the metacognitive experiences, comprises metacognitive positive and negative feelings. As Efklides (2009) points out, fluency in problem solving is usually associated with positive affect while lack of fluency is associated with negative affect. The third facet of metacognition, namely the metacognitive regulations, which is directly involved in the control of cognition, consists of planning, monitoring, and evaluating strategies. In relation to L2/EFL writing/learning, Zhang (2010, 2013, 2016b) has posited that writers’/learners’ metacognitive awareness of strategy use enables them to participate actively in planning for the learning tasks, monitoring their own learning processes, and evaluating the utility and effectiveness of their strategies. This process manifests the dynamism of learners’ metacognitive knowledge systems (Zhang, 2010). Figure 9.1 shows the tripartite classification of the construct of metacognition.

Figure 9.1

*A Metacognitive Model in EFL Writing and Learning*
With such a tripartite classification, this empirical research lends credence to Flavell’s (1979) theoretical framework, managing to capture the three key concepts, metacognitive knowledge, metacognitive experiences, and strategy use. This is important for teachers to have a better understanding of their students more holistically. The significant predictive correlations of metacognitive strategies, experiences and the knowledge system on EFL writing performance in this study reveal the interactive nature of the metacognitive process: Metacognitive knowledge can guide writers’/learners’ metacognitive experiences; their metacognitive experiences can help trigger and revise their metacognitive knowledge; and their understanding of metacognitive knowledge further enables them to select appropriate strategies for a successful completion of their writing/learning tasks (Oxford, 2017; Tarricone, 2011; Zhang & Zhang, 2018).

Furthermore, the empirical findings in this study provide a new understanding of the use of metacognitive strategies in student writing in multimedia environments. Based on the research findings, a theoretical framework is proposed for Chinese university EFL writing instruction in multimedia environments. Figure 9.2 illustrates the key components in the instructional framework.

Firstly, the successful application of the metacognitive instructional model reveals the characteristics of the metacognitive process when the EFL writers were engaged in their writing tasks. That is, within the three writing stages (pre-, during, and post-writing), the significant effect of the instructional model reflects the control or executive aspects of metacognition related to writer’s conscious monitoring of their cognitive processes to achieve the writing goals in multimedia environments. To be specific, before writing, they made some necessary preparations in advance, such as planning the structure of the writing task, setting meaningful goals, or allocating appropriate writing time. During writing, they monitored their writing process, assessing particular strategies and made appropriate judgements to ensure that the
writing goals would be achieved. After writing, they performed the self-evaluation about the written products, evaluated their use of writing strategies, and rethought how to transfer the skills they required in this process to other contexts. In the triadic reciprocity loop, following their positive experiences that arose from the improving writing performance, the writers will reconstruct their knowledge and beliefs about themselves as writers, writing processes and writing strategy use, which are beneficial to facilitate and support their subsequent writing activities.

Figure 9.2

*Key Components in the Instructional Framework*

Secondly, the analysis of the two cases undertaken in this study has extended our knowledge of metacognition, suggesting a role for motivational components in promoting their writing performance. From this perspective, their appropriate uses of metacognitive strategies are
closely related to the reconstruction of the motivational awareness. The findings reveal that after the intervention, there was a clear change in the case participants’ effort, persistence, nature of goals, and choices of strategies, which all signalled a qualitative change in their motivational attitudes, beliefs and mindset. Thus, a more consistent understanding of the construct of metacognition is invaluable. In conjunction to metacognitive awareness, the empirical findings in this study supports an increasingly strong argument for viewing motivational regulation as a prominent facet for facilitating writers’/learners’ access to the full repertoire of metacognitive strategies. Given that multimedia played an important role in the intervention programme, this study, theoretically, increases the degree to the understanding of the construct of metacognition by applying scrutiny to the motivational components. Motivational variables play an essential role in promoting the development of metacognitive commitment. When the construct of metacognition is influenced by multifarious factors of motivational components, EFL students’ metacognition as dynamic systems can be said to be systematically and holistically constructed. Accordingly, this theoretical base will pave the way for future large-scale syntheses in metacognitive research.

9.4.2 Methodological Contributions

The findings of this study also have important methodological contributions for multimedia-supported language teaching and learning, especially EFL writing in similar contexts. Aiming at revealing the relationship between EFL students’ metacognitive knowledge and L2 writing achievement in multimedia environments, multiple instruments have been employed to conduct this study, including questionnaires, writing tests, journals, interviews, and the Pigaiwang writing platform. In the light of what has been stated, it seems clear that the findings give language teachers and educators involved in EFL education in Chinese universities an impetus for taking steps towards enlivening metacognitive instructional programme in promoting student writing/language learning development in multimedia environments. In this
process, the instruments used in this study lend themselves to some methodological contributions.

First of all, regarding the newly-developed questionnaire (MAIME) used in Phase 1 in this study, it is worthy of inclusion as an integral part of language teaching and learning in the Chinese ELT context to help support both students and teachers, that is, those students who wish to practise and improve their writing ability in English and those teachers who lack pedagogical expertise and wish to improve their teaching for implementing successful intervention. For students, the instrument might be used as a useful self-assessment tool to appraise the degree of their metacognitive knowledge development from a holistic perspective. Cued by the questions designed in the questionnaire, they might increase their knowledge about writing task, strategy use, and themselves as L2/EFL writers and at the same time, they might adjust or conduct more metacognitive strategies when they are cultivated such an awareness in the complex multimedia environments so that they might tend to become more goal-directed, self-regulatory, and reflective in writing. For teachers, the instrument might be used as an effective diagnostic tool to conduct needs analysis of the student writers. In this process, the strengths and weaknesses of students’ deployment of metacognitive strategies might be examined anew to see in what ways improvements can be made so that proper components of writing strategy instruction are tailored into the instructional programmes. In the long run, the questionnaire, as a diagnostic tool, will be expected to form part of any curricular design action, which is beneficial for both teachers and students upon completing their own goals.

In addition, the finding further provides evidence to support reflective journals as an effective metacognitive approach to facilitate the student writers’ self-assessment ability. In Phase 2 in this study, the journals were not only used as a research tool for collecting data, but also more importantly used as convenient access to communicate with the instructor as well as the researcher. In this interactive process, teachers can clearly understand what the students’
real problems are and help them to incorporate metacognitive procedures into their writing process in an efficient way. Students, meanwhile, can get ample opportunities to reflect on what they have learned in class to activate the right schema knowledge to solve their own problems. From the practical practice, keeping journals, therefore, is advised to be an effective teaching tip prior to writing instruction.

Thirdly, the use of multimedia tools such as the Pigaiwang writing platform should be given due attention. While the role of modern technology in education is rapidly increasing and updating, teachers and educators in China are expected to unlearn the old ways in traditional paper-and-pen writing and have to confront new ways in integrating multimedia and digital technology into the English-teaching curriculum in classrooms. This study provides empirical evidence in favour of developing full potential of using multimedia tools. In cases of the successful integration of the writing platform into the EFL classroom, pedagogical attention should be given to support and guide the students to engage in more in-depth academic writing processes that lead to large future L2/EFL writing success in multimedia environments. For example, students who experienced no sense of readers in their writing process might develop a strong sense of considering the audience when using the writing platform to practise writing. Thus, more strategic process with their readers in mind might enable them to incorporate process-oriented activities for reaching their textual goals in multimedia environments.

9.5 PEDAGOGICAL IMPLICATIONS

The present study should prove to be particularly valuable to teachers who are interested in promoting EFL learners’ strategy use in learning to write. In pedagogical practices, teachers may need to raise students’ metacognitive awareness through modelling specific metacognitive strategies that involve EFL learners in planning, monitoring, and evaluating their writing, which will in turn strengthen their competence to achieve advanced-level L2 abilities in the long run (Hinkel, 2009, 2011; Zhang, 2016). In sum, the findings of the present study produce
a number of pedagogical implications for teachers’ reflection, students’ classroom practice, and policy makers’ reference.

First, the current instructional intervention programme was to teach the student metacognitive strategies pertaining to EFL writing in multimedia environments. The study provides empirical evidence as to the feasibility and usefulness of the metacognitive strategy-based instruction model in EFL writing in multimedia settings. The quantitative and qualitative data point to a need to formulate a specific curriculum, where explicit metacognitive instruction can be a design feature in teaching the Chinese university EFL writers how to write productively. Specially, the following two areas deserve teachers’ explicit attention in language classroom instruction. First of all, given that EFL learning and teaching is mainly classroom-oriented in education in China, it is important to stress that teachers’ role of scaffolding in the classroom is deemed essential in the process of training student writers, during which a thorough reflection on their own knowledge and practices might be helpful to enable them to implement a metacognitively oriented pedagogy. Also, although the advent of educational technology, notably multimedia and digital technology, has helped student writers to become more autonomous in modern classrooms, “learner autonomy is far from minimising the teacher’s role” (Ruiz-Madrid & Sanz-Gil, 2007, p. 79). In this regard, practical EFL instructors are advised to construct a variety of explicit instructional practices to their regular writing courses, including direct instruction, teacher modelling, reflection on the part of student writers, and group discussions (Amani, 2014). That is, in the new multimedia setting, what is required is in effect more metacognitively experienced teachers. They need to learn how to monitor, evaluate, and regulate their own teaching activities and how to solve technical and pedagogical problems linked to the integration of multimedia and digital technology into the language classrooms in order to gain full benefits from the new tools. Meanwhile, those students whose teachers were pedagogically better trained would have benefited from the modern technology,
and this experience may help them make metacognitive judgements of when, why, how, and where to use strategies for achieving the expected goal. In this sense, there are high potentials to energize metacognitive teaching and learning in multimedia environments.

What’s more, at the level of the curriculum and course design, the actual concern is that there is no specific English writing course in the school curriculum from primary school until university in China (see Chapter 1 for reference). In the Chinese ELT context, the centrality of the exam-oriented language teaching and learning has been the norm in the Chinese education system for a long time. When compounded by the disinterest of educational policy makers in the enhancement of writing skills, the entire exercise of teaching writing at university has inevitably become a great challenge and more demanding for teachers and educators. Therefore, the current situation in which EFL writers follow should be changed. Up to this point, it is highly recommended that the curriculum at university be adjusted and rearranged to add writing to the English language learning course. With just this measure, the repertoire of metacognitive strategy instruction can get a chance to be systematically incorporated in the specific writing classroom, which might be a better means to help students achieve expected EFL writing proficiency and develop into more competent EFL writers in multimedia environments.

Second, with China’s rapid economic development, more and more universities equipped all or most of their classrooms with computers and multimedia equipment to provide faculty staff with the multimedia tools for all their instructional needs in recent years (Liang, Liu & Fulmer, 2017). However, at this critical time, teachers’ and researchers’ expectations of successful technology integration and student engagement have not been fulfilled. Issues emerging from the findings in our study relate specifically to pedagogical reflections. From our point of view, teachers must shift their role within the traditional classrooms to take seriously into account modern university student needs in the current society, which may require teachers to take a step forward to foster student engagement and favour the language development of
EFL writers/learners in multimedia environments. On the one hand, the findings in this study show that multimedia can play a role in helping writers confront the challenges in their completing writing tasks. For example, by virtue of multimedia tools, the writers could do automatic spelling and grammar checks, edit and revise their written texts, and search for online resources, among many other things. However, technology alone does not ensure the effectiveness of using writing strategies and for good writing outcomes. This means that pedagogy in EFL writing in the 21st century has to go beyond focusing on the language aspects such as word spelling and grammar use. Instructional efforts in EFL writing are advised to be redirected to a dramatic system shift, which includes not only changing the traditional pedagogy, but more importantly encouraging the student writers to engage in more global processing activities such as the content and organizational aspects in writing learning and practice.

Meanwhile, the findings from this study also suggest that the current EFL writing instructional practice of organizing classroom activities around the “pre-writing”, “during-writing”, and “post-writing” cycle is pertinent to the Chinese EFL writers’ needs. In the complex multimedia settings, it might make more pedagogical sense in guiding students’ mental capacity to a higher level of metacognitive processes in planning, monitoring and evaluating their writing in a flexible fashion in different writing stages around the abovementioned cycle.

On the other hand, China has boasted of the largest number of EFL learners (Zhang, 2016b). In such a context, educational policy-makers have launched an intensive top-down reform since 2007, aiming to enhance the effective teaching and learning of English in Chinese universities through integrating multimedia and digital technology into the English-teaching curriculum in classrooms. Following the new trend, Chinese universities have accelerated their infrastructure investments. As the research findings have shown in this study, however, the full
potential of educational technology has not been realized. There can be various reasons. However, a tentative reason for this may be the fact that far less attention has ever been given to the pedagogical improvements when confronted the changing multimedia learning environments, as argued by some researchers (e.g., Chen & Liu, 2012; Chen & Zhang, 2014; Cheng, 2017). A new perspective on how to use technologies to improve language learning and writing among EFL students might have to be considered. This study offers up significant implications for language teachers to consider integrating multimedia and digital technology into helping student writers develop better metacognition and eventual higher writing achievement in an effective and meaningful fashion. An important instructional principle thus is to create a writing environment in which students are provided with sufficient opportunities for actively using different writing strategies of how to plan, monitor, and evaluate their writing, and how to enhance their writing values through the optimal use of multimedia tools. These aspects — the use of writing strategies and the use of multimedia tools — are de facto inseparable in practice, which may interact with each other to facilitate the students’ EFL multimedia-mediated writing.

9.6 LIMITATIONS

In the light of what has been stated, it seems clear that the metacognitive strategy-based instruction can help Chinese EFL student writers become better strategy users and more efficient writers in multimedia environments. The study, however, being exploratory in nature, did contain several limitations regarding the interpretation and generalisability of the findings, which need to be pointed out.

First, the study was designed to investigate the writing processes in multimedia environments and the effect of the intervention programme in relation to the metacognitive knowledge systems of Mainland Chinese university EFL writers who were at the beginning of the sophomore programme. The participants were recruited through a convenient and
purposive sampling method. They were in the second year of academic study at university. However, the second year was often seen as an important stage, given that all of the year-two students were required to sit for a nation-wide standardized English proficiency test, College English Test (CET-4) for non-English-language majors. The pressure of passing CET-4 might have an impact on participants’ engagement in English language learning. Although the contextual influences were not intended to be investigated in this study, it is important to acknowledge that they could have had a potential and relevant influence on the generated findings in the present research programme. Therefore, the findings gained in this study might not be easily generalizable or broadly transferable across L2/EFL writing contexts. Moreover, the narrow focus on year-two university participants also limited the findings to other populations in terms of different grades and English levels.

Second, the research was conducted in a multimedia environment with a particular reference to using the Pigaiwang as the writing platform. The participating university was provided with sufficient top-class hardware facility scaffolding for the students to do the language learning tasks, including the availability of the purchased software site licensing in the foreign language faculty – the Pigaiwang writing platform, the wireless network (Wi-Fi) coverage across the campus, and the availability of multimedia classrooms/labs. Also, the participants in this study had some experience in computer/electronic literacy. All of these ensured the smooth conduct of the current study. However, the investment in hardware facilities at university is actually a huge financial commitment. Given the unbalanced economic development between eastern and western provinces in China, the participants, taken from the participating university through the convenience sampling method, did not necessarily represent all the university student population across Chinese tertiary education sector. In turn, the participants who did volunteer in this study might have a vested interest in multimedia-mediated L2 writing, may or may not represent the total student population of more than 6,000
students who were studying at the participating university under study. In a word, constrained by the specific social-economic background, it should be cautious to generalize the findings in this study beyond the specific contexts and the specific EFL writers.

Third, in regard to the instruments we employed in this study, three limitations need to be acknowledged. The first has to do with the single method of strategy evaluation through a self-reported questionnaire conducted in Phase 1 in the study. While the self-reported questionnaire analysis is useful as a data collection technique, the instrument itself also has unavoidable flaws. Given the individual participant emotional state and their degree of self-confidence at the time they accomplished the survey, the participants might forget some strategies they used in the past or they might report using some strategies that they had never used before. The self-reported answers might be exaggerated or undermined. As a result, the present study might fail to provide all possible or accurate strategies used in EFL writing processes in multimedia environments. The second has to do with the EFL writing performance test. The study in Phase 2 adopted a writing test method with the given-topic that mocked the CET-4 writing genre to assess the participants’ writing performance. Given that the participants would sit for the CET-4 test at the end of this semester with the writing part testing one genre — the argumentative text type, it was far from being a reality to do free writing when they participated in the intervention course with us. On the one hand, a need to please the participants might have influenced their responses while they were completing the writing tasks assigned to them at the pre-, post-, and delayed post-tests. On the other, although an attempt was made to establish comparisons of writing achievements between and within groups of the participants, the narrow focus on writing tasks in one genre in the Chinese ELT class make it impossible to examine the effect of different forms of writing such as descriptive, narrative and expository text types on the effectiveness of the intervention programme. The third has to do with the case study. Although great care had been taken in coding and categorising of the
interview and the journal accounts of the two cases and valuable information had been revealed, the adoption of the purposive sampling with only two cases might be far from enough to reflect all the participants as well as the student population at the university. The adoption of the self-reflective face-to-face semi-structured interviews and the self-reflective journals as the sources of data also limited the generalizability of the generated qualitative data.

Fourth, due to time and resource constraints of a doctorate programme, the study in Phase 2 was only able to examine the effectiveness of the metacognitive training in multimedia environments within a limited period of time. Although positive developments including significant metacognitive strategy developments and writing improvements in quality were shown to have been realized after the 16-week intervention in the study in Phase 2, the time span might not be long enough to guarantee to draw any generalizable conclusion in a systematic change in the student metacognitive process when writing in the multimedia environments.

Finally, some issues about individual differences (e.g., gender, different grades at university, different electronic literacies, or different social-cultural contexts) were not taken into consideration. After all, as many researchers (e.g. Cumming, 2001; Leki, Cumming, & Silva, 2010; Liu & Ni, 2015) pointed out, writing, as a quite cognitively complex process, could not be conducted in a social/cultural vacuum. The absences of social and cultural contexts inevitably limited the generalizability of the generated findings in this study.

9.7 RECOMMENDATIONS FOR FURTHER RESEARCH

Despite those limitations, this study, as one of the few attempts to conduct research with Chinese university students in EFL writing in multimedia environments, can provide teachers and curriculum designers with useful information for promoting student language proficiency development when appropriate instructional scaffolding is offered. There are a number of
potential avenues for future research on multimedia and digital technology integration and engagement in the EFL writing classroom.

First, further studies are recommended for expanding the sampling methods and participant pool, for example, students of different genders, different levels of English proficiency, different age groups, different levels of electronic literacy, or students in different social-cultural contexts. Attention to such systematic and contextual factors of metacognition in L2/EFL writing will open many new prospects for further investigation in the field of second/foreign language education. Any further research that includes all these abovementioned dimensions will increase the generalizability of its findings and better understand the dynamic nature of metacognition.

Second, employing multiple methods for data collection and analysis on multimedia integration and student engagement in other contexts would be a worthwhile inquiry, which could produce more comprehensive assessment of metacognitive strategies and add strength to the data triangulation. For example, in L2/EFL writing research, think-aloud methods have been recognized as an important way to obtain online data for studying and elaborating the students’ writing processes (Hyland, 2016). Also, by virtue of the modern technology, tracking the writers’ eye movement and the keystroke logging can produce a large amount of data to inform a better understanding of the cognitive and metacognitive processes that underlie the student written text production. Future investigations are expected to better delineate the developmental trends in L2/EFL written competence via employing multi-methods for data collection.

Third, a great deal remains to be learned about the breadth and depth of the students’ metacognitive strategy use in the intervention programme. Future studies may include different writing tasks and writing genres to measure students’ writing competence. For addressing the effectiveness of strategy instruction in a full-scale measure, more studies need to be executed
to identify more precisely the effects of the instructional intervention on students’ development of metacognitive knowledge and writing proficiency. As teachers and researchers, we need to consider the optimal benefits of multimedia and digital technology as they turned out to be an important factor in facilitating student writing development in this study. The usefulness and effectiveness of technology integration into language learning may be of significance and be worthy of elaboration in future research. For example, by adding the comparison between the pen and paper-based writing and the multimedia-mediated writing, researchers may be able to identify compelling evidence about the relationship between the development of writing performance and the effective technology integration while learning a second/foreign language in multimedia environments.

Fourth, there is clearly a need for more longitudinal studies. Because the duration of the intervention programme in Phase 2 was only one semester (16 weeks), this could well be too short for us to see significant benefits. Raising students’ awareness of strategy use, as claimed by many researchers (e.g. Cohen & Griffiths, 2015; Oxford, 2017), requires a degree of sophistication and takes time. Future investigations are expected to focus on a longitudinal investigation into the effect of metacognitive strategy instruction over a much longer period of time for a comprehensive understanding of L2 learners’ writing processes in multimedia environments. Also, by virtue of multimedia and digital technology development, conducting strategy instruction via online is expected to bring new insights into the field of SLA, which may make the teaching of language as effective and enjoyable as possible.

*Reflecting on our best practices through research and sharing them with others through publication, is both a noble and satisfying pursuit.*

— Ken Beatty
Appendix A  Participant Information Sheet
(For Students in Phase 1)

Project title: Metacognitive Perspectives on Learning to Write in English as a Foreign Language (EFL) in Multimedia Environments at the Tertiary Level in China

Name(s) of Researcher(s): Limin Qin

Researcher introduction

My name is Limin Qin. I am currently pursuing my PhD studies in the School of Curriculum and Pedagogy (CURRPD) within the Faculty of Education at the University of Auckland (UOA), New Zealand. My major is language teaching and learning. I will conduct a research project on “Learning to Write in English as a Foreign Language (EFL) in Multimedia Environments at the Tertiary Level in China: Metacognitive Perspectives”, and would like to invite you to participate.

Project description and invitation

In order to find out the problems we have in our teaching of English, I would like to ask you to help me by participating in a questionnaire. I am interested in what you do as a learner when you use computers for writing in English. I need you for only 20 minutes to finish the questionnaire. There are no further obligations. Your precious time would be most appreciated. Here is the brief introduction of the questionnaire:

The questionnaire is divided into two parts: Part 1 is the value of getting to know some information related to your background and beliefs about writing. Your personal bio-data will provide us with many insights into your writing behaviours; Part 2 is the survey part. It is not a test so there is no “right” or “wrong” answers. Please think about your own situation in English writing, and tick the number that is most appropriate for your situation for each
statement according to your own writing experience and beliefs. I would be grateful if you would take a little while to fill in the following items. The results of the survey will be used only for research purpose. The information you provide will be kept exclusively confidential. So please give your answers sincerely.

Project Procedures

If you decide to participate in the survey, a questionnaire will be administered to you for completion within a week. For your convenience, I have prepared a hard copy of the questionnaire. The hard copy is placed on the table outside of the department secretary’s office. When you finish it, you just need to drop the questionnaire into the secure post box on the table. The post box will be kept there for a week. You can drop this survey off at any time within this week. Thanks for your precious time.

Right to Withdraw from Participation

Participation in the questionnaire is totally voluntary and anonymous. Needless to say, you do not have to be in this survey.

Anonymity and Confidentiality

The questionnaire is totally voluntary and anonymous. However, I kindly remind you of the fact that if you complete and return it in the post box, it implies consent to participate in my survey. I will keep your records private to the extent allowed by law. I will use a research code on my study records.

Only my supervisors and I will have access to the information you provide. Any personal information that might point to you will not appear when I present this study or publish it results.
Contact Details and Approval Wording

If you would like further information about this project, please feel free to contact me or my supervisors through our contact details below:

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Main Supervisor</th>
<th>Co-Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limin Qin</td>
<td>Professor Lawrence Jun Zhang</td>
<td>Associate Professor Richard Joseph Hamilton</td>
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<tr>
<td>School of Curriculum and Pedagogy, Faculty of Education and Social work, The University of Auckland</td>
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<tr>
<td>Email: <a href="mailto:limin.qin@auckland.ac.nz">limin.qin@auckland.ac.nz</a></td>
<td>Email: <a href="mailto:lj.zhang@auckland.ac.nz">lj.zhang@auckland.ac.nz</a></td>
<td>Email: <a href="mailto:rj.hamilton@auckland.ac.nz">rj.hamilton@auckland.ac.nz</a></td>
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</tbody>
</table>

Chair contact details: – For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: ro-ethics@auckland.ac.nz.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 4 May 2015 for (3) years, Reference Number 013976.
Appendix B  Recruiting Sheet

(For Students in Phase 2)

This study has another phase, Phase 2. It is about the teaching instruction, aiming to help you improve your writing in English. To participate, you will be asked to attend 16 sessions over a semester. A session will last 50 minutes. A supermarket $50 (RMB ¥ 250) gift card will be awarded as the compensation for your time if you participate in the 16 sessions and sit for three writing tests. I sincerely invite you to participate in it. If you are willing to participate in it, please tick (√) here____________ and leave your contact information, such as E-mail:__________, QQ:__________, or WeChat:__________ so that I can send you another separate Participant Information Sheet (PIS), where all the information about the second phase is described in detail.

Chair contact details: — For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: ro-ethics@auckland.ac.nz.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 4 May 2015 for (3) years, Reference Number 013976.
Appendix C  Participant Information Sheet
(For Students in Phase 2)

Project title: Metacognitive Perspectives on Learning to Write in English as a Foreign Language (EFL) in Multimedia Environments at the Tertiary Level in China

Name(s) of Researcher(s): Limin Qin

Researcher introduction

My name is Limin Qin. I am currently pursuing my PhD studies in Curriculum and Pedagogy (CURRPD) within the Faculty of Education at the University of Auckland (UOA), New Zealand. My major is language teaching and learning. I will conduct a research project on “Learning to Write in English as a Foreign Language (EFL) in Multimedia Environments at the Tertiary Level in China: Metacognitive Perspectives”, and would like to invite you to participate.

Project description and invitation

This is the second phase of my study, investigating how your writing achievement might be related to your metacognitive system and the impact of the teaching instruction. In this phase, I will invite 64 participants to participate in a training course. You will be randomly divided into two classes with each 32 participants. The course will last from September 2015 to January 2016. To participate, you will be asked to attend 16 sessions over a semester. A session lasts 50 minutes. I sincerely invite you to participate in it. As the compensation for your time, a supermarket $50 gift card will be awarded to you. The 16 instructional sessions are quite similar. The overall structure for each session is the instructional focus, the problems targeted, the instructional material, the process goal, and the cognitive as well as the metacognitive strategies’ training.
Project Procedures

If you decide to participate in the training session, you will receive a metacognitive strategy-oriented Basic English writing course. What you need to do in this course is listed as follows:

1) Writing tests: You will be asked to take three writing tests: pre-writing test, post-writing test and maintained writing test. Each test will last half an hour. The topic is closely related to your daily life. The design of the test is closely related to the national College English Test Band 4 (CET-4). Thus, the tests are quite beneficial for your preparing for the national English test. All the tests will be done on a computer in the university’s writing lab. All the test results are only used for research purpose. The test results are irrelevant to your academic performance in the university.

2) Interviews: Some of you will be interviewed before, during and after your writing course learning in the semester by random selection. Needless to say, each interview will be arranged outside the class time. We would like to choose three of you in each interview. We would also like to audio record the interviews if you give permission. It is certain that even if you agree to be being audio-recorded for your interview, you can always ask us to turn off the recorder at any time. We expect there to be up to 10 minutes for each conversation. The whole three interviews will take about 30 minutes. We ensure that these conversations will only concern learning about writing in English as a Foreign Language.

3) Writing diaries: You will be asked to write a diary concerning your experiences of learning writing in English during the whole semester once a week (see the attached guidance of My Weekly Learning Diary). Each diary is anticipated to take approximately 15 minutes for you to complete. Your diary will be collected by the researcher each week after the writing class and will only be used for research purpose. Your time and effort will be greatly appreciated.
In all these learning processes, the only person you will interact with is the instructor who has been trained by me. Thus, you will not have any more risks than you would in a normal day of college life. Your participation would be a helpful experience for you to practice your English writing to help you gain gradual but greater writing achievement as well as English language learning success in the future. I will ensure that your choice to participate or not participate in any of the activities will in no way affect your academic assessment in this university. Data collected as part of the study will only be used for research purpose but never be used to inform the course assessment.

**Right to Withdraw from Participation**

Participation in the study is totally voluntary. Needless to say, you do not have to be in any of the activities in this study. If you decide to change your mind in the study, you have the right to drop out at any time during this semester. If you do not want me to collect any of your personal information, you can withdraw your data up to 2 weeks after the maintenance test. Without noticing, your decision to remove the participation can be at any time in this semester.

In addition, I will seek for the dean’s assurance that your participation or non-participation in the process will not affect your standing with the teaching staff, your progress in your course of study, and your relationship with the school.

**Anonymity and Confidentiality**

Because of the characteristics of the teaching experiment, the identity of you as a participant in the study is inevitably to be known to all other participants in the same class and likely to others as well. I kindly remind you of this risk. Please be aware that your classmates will see you in the same class. If you do not want your identity to be known to the others, you can withdraw from the writing session at any time. However, I will try my best to keep your records private to the extent allowed by law. I will use a research code rather than your name.
on study records. Only my supervisors and I will have access to the information you provide. Test materials will be stored in locked cabinets. Data will be entered into password-and firewall-protected computer. The key (code sheet) to identify the research participant will be stored separately from the data to protect privacy and will be destroyed when this protocol expires. Your name and other facts that might point to you will not appear when I present this study or publish its results. The findings will be summarized and reported in group form. If the individual case study is mentioned, a pseudonym will be used. You will not be identified personally.

Contact Details and Approval Wording

If you would like further information about this project, please feel free to contact me or my supervisors through our contact details below.

<table>
<thead>
<tr>
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<td>Ph: (0064) (9) 923 5619 (New Zealand) Email: <a href="mailto:rj.hamilton@auckland.ac.nz">rj.hamilton@auckland.ac.nz</a></td>
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Appendix D  The Consent Form  
(For Students in Phase 2)

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project title: Metacognitive Perspectives on Learning to Writing in English as a Foreign Language (EFL) in Multimedia Environments at Tertiary Level in China

Name(s) of Researcher(s): Limin Qin

The following activities are provided for you to choose. If you agree, please tick (√) in the □.

□ I agree to participate in the teaching instruction (16 sessions, each session lasts 50 minutes).

□ I agree to participant in the following writing tests: (30 minutes each)

  □ Pre-test  □ Post-test  □ Maintenance test

□ I agree to participant in the interviews: (10 minutes each)

  □ Before-the-course interview

  □ In-the-middle-semester interview

  □ After-the-course interview

□ I agree to write a diary once a week (15 minutes each)

□ I understand that I am free to withdraw participation at any time during the study.

□ I understand that I can withdraw my data up to 2 weeks after the maintenance test.

□ I agree to be audiotaped during the interview.
☐ I wish to receive the summary of findings. My email address is ______________.

☐ I agree to not disclose anything discussed in the interviews.

☐ I understand that a third party who has signed a confidentiality agreement will transcribe the tapes.

☐ I understand that data will be kept for 6 years, after which they will be destroyed by the researcher with the permission of the dean.

I have read the Participant Information Sheet (For students in Phase 2). I have understood the nature of the research. I have been told that you have got the assurance from my dean that my participation or non-participation will never affect my relationship with the school or my academic performance in the university. I have had the opportunity to ask questions and have them answered to my satisfaction.

Name: ______________________

Signature: ___________________

Date: ______________________

Chair contact details:  — For any queries regarding ethical concerns you may contact the Chair, The University of Auckland Human Participants Ethics Committee, The University of Auckland, Research Office, Private Bag 92019, Auckland 1142. Telephone 09 373-7599 ext. 83711. Email: ro-ethics@auckland.ac.nz.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 4 May 2015 for (3) years, Reference Number 013976.
Appendix E

The Metacognitive Awareness Inventory of Chinese University EFL Writers in Multimedia Environments
(MAIME, Phase 1)

Dear student,

In order to find out the problems we have in our teaching of writing in English, we would like to ask you to help us by participating in a survey to better understand what you do as a language learner when you use computers for writing in English. The questionnaire is divided into two parts. Part I is intended to know some information related to your background and beliefs about writing. Your personal bio-data and beliefs about writing in English will provide us with many insights into your writing processes. Part II is a survey of metacognitive awareness about EFL writing in multimedia environments. It is not a test so there is no “right” or “wrong” answers. Please think about your own situation in English writing, and tick the number that is most appropriate for your situation for each statement according to your own writing experience and beliefs. We would therefore be grateful if you would complete the following items. The results of the study will be used only for research purpose. You are not required to write down your name on the questionnaire. The information you provide will be kept exclusively confidential. So please give your answers sincerely.

Thank you very much for your cooperation and help!

Part I  Writer Background and Beliefs about Writing in English

Major: ________________
Student ID: ________________
Age: ________________
Gender: □Male  □Female

1. How many years have you been studying English?

   I have been studying English for ______ years.

2. When did you begin to learn English (Please tick one of the following) ?

   □Before kindergarten     □Kindergarten     □Primary School
   □Junior Middle School   □Senior Middle School   □Other
3. Would you please tell me your scores of the following examinations?

1) National University Matriculation English Examination  Score:________.
2) Last Semester’s Final English Examination  Score:________.
3) College English Test (CET) Band IV  CET-4 score: ________.

4. As for your writing ability in English, how would you evaluate it in general (Please tick one of the following)?

□ Excellent  □ Very good  □ Good
□ Fair  □ Relatively poor  □ Poor

5. How often does your English teacher assign an English composition for you to practise (Please tick one of the following)?

□ Weekly  □ Once a fortnight  □ Once a month
□ Once a semester  □ Never

6. How often do you use the modern advanced technology (e.g. using the word processor on computers, using the Internet to send emails, or using the mobile phone to send text messages) for practising your English writing (Please tick one of the following)?

□ Daily  □ Weekly  □ Monthly  □ Never

7. What do you think is the most important aspect in English writing for you (Please tick one of the following)?

□ Accuracy in use of the vocabulary and grammar
□ Complexity in use of words and sentence structures
□ Fluency in expressing your own ideas
□ Cohenrency in discourse presentation
□ Profound insights into the writing topics

8*. What do you think are your own problems in English writing? (Please tick off (√) the choices that apply)
1) Lack of a large enough vocabulary
2) Lack of an adequate variety of sentence patterns
3) Lack of grammatical correctness
4) Have difficulty in organizing a coherent composition
5) Have difficulty in expressing my true feelings
6) Have difficulty in finding appropriate arguments to support my ideas
7) Have difficulty in concentrating on writing in multimedia environments
8) Strongly affected by Chinese thinking when writing in English
9) Others (please specify) ___________

Could you please tell me how difficult you would evaluate your English writing compared to other English language skills such as listening, reading and speaking if the total score is 10 (Please tick one of the following)?

□ Very difficult (8-10)  □ A little difficult (5-7)  □ Easy (1-4)  □ Very easy (0)

9*. What type(s) of teaching methods you have experienced during your educational experience? (Please tick off (√) the choices that apply)

1) The teacher assigned writing topics and asked us to write without instruction.
2) The teacher explained writing strategies in class and then asked us to practise the strategies by doing writing assignments.
3) The teacher didn’t explain writing strategies in class but emphasized the writing features in class, such as the spelling of the vocabulary, the correctness of grammar, and the beautiful handwriting, etc.
4) The teacher corrected my errors on my essays.
5) The teacher asked us to revise the essays by ourselves.
6) The teacher organized student groups in class to edit each other’s essays.
7) Others (please specify) ___________
Could you please tell me how you would evaluate your writing teacher’s classroom instructional focus in general (Please tick one of the following)?

- Teacher-centered
- Teacher-student Interactive
- Student-centered
- Sorry, I don’t know

10. How would you describe your strongest purpose to learn English in general?

- English is compulsory
- I like my English teacher
- I want to go abroad to study
- I like English very much
- I want to find a better job

Part II The Metacognitive Awareness Inventory of Chinese University EFL Writers in Multimedia Environments (MAIME)

Directions: Below is a list of beliefs that people have about English writing. Please show how much you agree or disagree with these statements according to your own writing experience and beliefs by ticking the number that matches your answer. Please do not leave out any statements.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Partly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<td>1</td>
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<td>4</td>
<td>5</td>
<td>6</td>
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No. | To what extent do you agree with the following statements? | Please tick (√)
---|------------------------------------------------------------|------------------
1  | I know about my strengths in multimedia-mediated writing in English well. | 1 2 3 4 5 6  
2  | I can adduce concrete evidence to explain my strengths in multimedia-mediated writing. | 1 2 3 4 5 6  
3  | I know about my weaknesses in multimedia-mediated writing in English well. | 1 2 3 4 5 6  
4  | I can identify concrete evidence to explain my weaknesses in multimedia-mediated writing. | 1 2 3 4 5 6  
5  | I am confident that I know the correct use of sentence structures (e.g. inverted sentence, emphatic sentence, elliptical sentence, etc.) in my writing. | 1 2 3 4 5 6  
6  | I am confident that I know the correct use of tenses (past, present, and future) and voices (active and passive) in my writing. | 1 2 3 4 5 6  
7  | I think the prerequisite of a good composition is that it should not have spelling and grammar mistakes in multimedia-mediated writing. | 1 2 3 4 5 6  
8  | I think the prerequisite of a good composition is that it should express clearly the writer’s ideas in multimedia-mediated writing. | 1 2 3 4 5 6  
9  | I think the prerequisite of a good composition is that it is easily comprehensible to the readers in multimedia-mediated writing. | 1 2 3 4 5 6  

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<th></th>
<th>Sometimes even if I cannot write out a good composition, I can still identify what kind of composition is a good composition.</th>
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<td></td>
<td>I translate key words and phrases by use of online dictionaries when I write if I do not know how to express by myself.</td>
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<td></td>
<td>I would like to think the whole sentence in advance how to express in Chinese, and then translate it into English with the help of online dictionaries when I write.</td>
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<td></td>
<td>I try to use <em>Google or Baidu</em> to find any online information relevant to help me organize a well-structured composition of my own when I write.</td>
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<td></td>
<td>I make sure I find out from multimedia support to stimulate my inspiration when I do not know how to do the writing task when I write (texts, pictures, audios, videos, online class, etc.).</td>
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<td></td>
<td>I usually surf the Internet for the information that are related to the writing topic if I know the topic in advance.</td>
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<td></td>
<td>I usually surf the Internet for the so-called English writing templates whether or not I know the writing topic.</td>
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<td>I feel a sense of achievement when I finish the writing task satisfactorily.</td>
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<td>I am aware that I feel happy when the teacher assigned us to write a composition with the computer.</td>
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<td></td>
<td>I am aware that I feel more confident about writing in English when I was praised by the teacher for my good writing.</td>
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<td>I tell myself I must try even harder to improve my writing ability when I find I have made some progress.</td>
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<td></td>
<td>I have a strong desire to make up for the failure when I find that I have failed to make improvement in writing in English.</td>
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<td>It will stimulate my determination for improving my English writing ability when I encounter difficulties.</td>
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<td>I feel frustrated when I did not finish my writing on a fixed time.</td>
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<td>I feel anxious when I find that I have not made progress in writing in English.</td>
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<td>27</td>
<td>I feel frustrated over the use of the new multimedia-mediated writing environment. I need to learn to use computers skillfully.</td>
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<td>28</td>
<td>Before I start to write, I make an outline to help structure the composition in a new word document.</td>
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<td>29</td>
<td>Before I start to write, I have a plan in my mind for what kind of sentence structures I will use in body paragraphs.</td>
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<td>30</td>
<td>Before I start to write, I make a list of the key points of views that I want to include in the composition in a new word document.</td>
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<td>31</td>
<td>Before I start to write, I think about the goal I want to achieve in the writing.</td>
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<td>32</td>
<td>As I write in a time-limited task, I pay attention to the rationality of the time use, adjusting my time arrangements to ensure completion of the writing task.</td>
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<td>33</td>
<td>As I write, I check my writing to make sure that the key points of views are consistent with the topic of the composition.</td>
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<td>34</td>
<td>As I write, I check if the paragraphs contain necessary and appropriate details.</td>
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<td>35</td>
<td>As I write, I mark the places in the composition with different colours on the computer screen that I think required revision to remind me of revising after I accomplished the writing task.</td>
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<td>36</td>
<td>As I write, I adjust my negative emotions (e.g. anxiety, nervousness, etc.) whenever it is necessary.</td>
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<tr>
<td>37</td>
<td>As I write, I encourage myself to use the information I accumulated to create the English writing as originally as possible.</td>
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<tr>
<td>38</td>
<td>As I write, I understand multimedia environments are quite helpful to my English writing success so I turn to orchestrate the complex writing environments to my advantage.</td>
</tr>
<tr>
<td>39</td>
<td>As I write, I remove distractions to keep attentive to the writing task, for example, cutting off the connection between the computer and the Internet.</td>
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<tr>
<td>40</td>
<td>As I write, I modify the errors, following the prompts on the computer screen.</td>
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<td>42</td>
<td>As I write, I will not modify the mistakes until I finished my writing task in case the revision interrupted my train of thought.</td>
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<tr>
<td>43</td>
<td>After I have completed my writing, I will change the sentences or expressions that I think are not accurate even if there seems to be no errors in the word document.</td>
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<td>44</td>
<td>After I have completed my writing, I reread my work to check if the key ideas are clearly stated with appropriate modifications.</td>
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<tr>
<td>45</td>
<td>After I have completed my writing, I think back to how I write, and about what I might do differently to improve my writing in English next time.</td>
</tr>
<tr>
<td>46</td>
<td>After I have completed my writing, I make an evaluation by myself about the scores I could get after taking the writing test.</td>
</tr>
<tr>
<td>47</td>
<td>After I have completed my writing, I am thinking of my use of computers to write English compositions, which is what I like to do because in such a new environment, I feel less worried about my spelling and grammar errors.</td>
</tr>
<tr>
<td>48</td>
<td>After I checked the mistakes, I feel that there is no problem about my writing and tell myself that I can turn off the computer to relax and think no more about writing.</td>
</tr>
<tr>
<td>49</td>
<td>I will think about the importance of good English composition in passing CET-4 or CET-6.</td>
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<tr>
<td>50</td>
<td>I will think about the importance of good English writing for my future career.</td>
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Appendix F

中国大学生在多媒体环境下的英语写作元认知调查问卷

亲爱的同学：

为了帮助我们及时发现英语写作教学中存在的问题，我们诚挚地邀请您参与一项问卷调查，非常想了解您作为一个外语学习者对在现代多媒体环境下进行英语写作的体会和看法。该问卷分为两个部分。第一部分意在了解您的一些背景及您对写作的信念。您的个人信息及您对英语写作的看法将会帮助我们更加深入地理解您的写作过程。请按题目要求来回答每个问题。第二部分是问卷的调查部分。这不是一项测试，回答不存在对错之分，所以请同学们回想自己在英语写作中的实际情况，选择一个数字，并在这个数字上打勾（√），表示您赞同这种说法的程度。请根据您自身的经验和体会选择最适合您的回答，我们将不胜感激您的帮助。调查结果将仅用于研究目的，请不要把名字写在该调查问卷上，我们将对您提供的一切信息绝对保密。敬请您提供尽可能准确的回答。

非常感谢您的配合与帮助！

专业：_________
学号：_________
年龄：_________
性别：□男  □女

第一部分  写作者的背景及关于写作的信念

1. 您学习英语有多长时间了？我学习英语已经有______年了。

2. 您是在什么时候开始学习英语的？请选择一项打勾（√）。

   □幼儿园以前  □幼儿园  □小学

   □初中  □高中  □其他

3. 您能告诉我您参加的以下一些与英语有关的考试成绩吗？

   ●高考英语成绩：_________ ●上学期期末的英语考试成绩：_________ ●四级考试成绩：_________

4. 整体来说，您怎样评价您的英语写作能力？请选择一项打勾（√）。

   □极好  □很好  □好  □一般  □较差  □很差

5. 您的英语老师多久会布置一次英语作文让你们练习？请选择一项打勾（√）。

   □每周一次  □两周一次  □一月一次  □一学期一次  □从来不

6. 您会经常借助现代先进科技手段（比如，使用电脑上的 word 软件写作，利用因特网发送英语邮件，或者用手机发英语信息等）来练习英文写作吗？请选择一项打勾（√）。

   □每天都会  □每星期会  □每月会  □每学期偶尔会  □从来不

7. 您认为学习英语写作最重要的是哪个方面？请选择一项打勾（√）。

   □单词拼写准确，语法没有错误  □句式写得很复杂  □篇章的连贯性

   □能够流畅表达自己的观点  □对写作话题的深刻阐述

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8. 您认为您在英语写作中的困难有哪些？多选项，请在您认为适合您的方面打勾（√）。

____1) 缺乏足够的词汇量
____2) 缺乏英语句型的掌控
____3) 缺乏英语语法的正确性运用
____4) 很难组织一篇连贯的作文
____5) 很难准确表达自己的个人想法
____6) 很难找到合适的论点来支持我的观点
____7) 在多媒体环境下很难集中精力写作文
____8) 写英语作文时深受汉语思维的影响
____9) 其他（请注明）________________

► 相比起英语的其他技能（听力，阅读，口语），假设难度为 10 分的话，您觉得英语写作技能的难度有多大？请选择一项打勾（√）。

□ 非常难（8-10） □ 有点难（5-7） □ 相对容易些（1-4） □ 非常容易（0）

9. 以下哪些教学方式是您曾经在学校经历过的？多选项，请在您自从学习英语以来所经历过的选项前打勾（√）。

____1) 老师指定写作题目，不作任何指导，只让学生自己去写。
____2) 老师会在课上讲述写作策略，然后再布置作文来练习这些写作策略。
____3) 老师并不讲述写作策略，而只强调写作的一些注意事项，比如单词拼写的正确性，语法的准确性以及字迹的工整整齐等。
____4) 老师会改正我的作文中的错误。
____5) 老师让我们自己修改作文。
____6) 老师在课上组织学生小组讨论，互相修改作文。
____7) 其他（请注明）________________

► 从整体上来说，您怎样评价您英语老师的课堂教学？请选择一项打勾（√）。

□ 以老师为中心型
□ 以学生为中心型
□ 师生互动型
□ 对不起，我不知道

10. 您认为您学习英语最重要的动机是什么？请选择一项打勾（√）。

□ 英语是必修课，为完成学业。
□ 我本人非常喜欢英语，学习英语是我的个人兴趣。
□ 我喜欢我的英语老师。
□ 我想找一份好工作。
□ 我想去国外继续深造。
第二部分 中国大学生在多媒体环境下的英语写作元认知调查问卷

在下面1-50项选项题中，列出了一系列人们对英语写作的想法和做法。请同学们回想自己无论是在考试环境下，还是自己练笔时的实际英语写作情况，在相对应的数字上面打勾(√)。请不要遗漏题目。

<table>
<thead>
<tr>
<th>序号</th>
<th>请选择一项打勾(√)</th>
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<tbody>
<tr>
<td>1</td>
<td>完全不赞同1</td>
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<td>不赞同2</td>
<td>31</td>
<td>不赞同2</td>
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<tr>
<td>31</td>
<td>不赞同2</td>
<td>32</td>
<td>不赞同2</td>
</tr>
</tbody>
</table>

序号
1. 我非常了解自己在多媒体写作环境下英语写作方面的长处。
2. 我能够举出实例来说明自己在英语写作方面有哪些长处。
3. 我非常了解自己在多媒体写作环境下英语写作方面的不足之处。
4. 我能够举出实例来说明自己在英语写作方面有哪些不足之处。
5. 我能够正确使用各种英语句式结构（比如，倒装句，强调句，省略句等）。
6. 我能够正确使用英语的时态（过去式，现在式和将来式）和语态（被动语态和主动语态）。
7. 我认为没有拼写错误和语法错误是一篇好作文的先决条件。
8. 我认为能够写出合适的论据来支撑论点的作文是一篇好作文的先决条件。
9. 我认为能够让读者很容易理解是一篇好作文的先决条件。
10. 即使我自己写不出来好文章，我也知道什么样的作文是好的作文。
11. 如果我不知道怎么表达，我会借助于在线词典把关键词和短语翻译成英语。
12. 我会事先想好整个句子用汉语怎么表达，然后一点点翻译成英语来完成作文。
13. 我会使用搜索引擎（谷歌或百度等）去寻求帮助，查找相关网络资源来帮我组织一篇自己的结构良好的作文。
14. 当我感到对写作任务无从下手时，我就会寻求多媒体网络的支持（文字，图像，音频，视频，在线网络课堂等），来激发我的灵感。
15. 如果我知道写作话题的话，我会事先上网查找与本次写作话题相关的一些资料。
16. 不管我是否知道写作话题，我都会上网事先查找一些英语写作的模板。
17. 当顺利完成写作任务时，我会有种成就感。
18. 当老师布置给我们用电脑写英语作文时，我会很高兴地接受写作任务。
19. 当被老师表扬时，我会对英语写作水平的提高更加有信心。
20. 成功写好一篇作文后，高兴之余我会告诉自己仍需努力。
21. 当我写作失败后，我会产生弥补自己不足的强烈愿望。
22. 当我在规定时间未能写完一篇作文时，我会有很挫败感。
23. 当我发现我的作文水平没有提高时，我会产生急于提高写作水平的焦急情绪。
24. 当我使用多媒体进行英语写作有挫败感时，我需要提高我的电脑技能。
25. 在写作之前，我会在一个新的word文档中列个提纲来组织我的作文框架。
26. 在写作之前，我会在新文档中把作文中要阐述的主要观点都一一列出来。
27. 在写作之前，我会想到这次写作所要达成的目标是什么。
28. 在写作之前，我会在脑海中计划好我在写作中将会用到哪些句式结构。
29. 当被老师表扬时，我会对英语写作水平的提高更加有信心。
30. 当我发现我的作文水平没有提高时，我会产生急于提高写作水平的焦急情绪。
31. 当我使用多媒体进行英语写作有挫败感时，我需要提高我的电脑技能。
32. 在写作之前，我会想到这次写作所要达成的目标是什么。
在写作时，我非常关注时间利用的合理性，及时调整时间以保证写作任务的完成。

在写作时，我会仔细检查我的观点与写作话题的观点是否密切相关。

在写作时，我会在电脑屏幕上用不同颜色标记我想修改的地方，提醒我完成作文后要及时修改。

在写作时，我会检查我写的段落是否包含必要和恰当的细节。

在写作时，我会在电脑屏幕上用不同颜色标记我想修改的地方，提醒我完成作文后要及时修改。

在写作时，我会鼓励自己积极调动我积累的英语知识来使写作具有原创性。

在写作时，我意识到多媒体环境对我的英文写作的成功是很有帮助的，我努力利用好这种环境。

在写作时，我会集中注意力于我的写作任务，比如说，为了不分散注意力，我会切断电脑与因特网的连接。

在写作时，我会按照电脑屏幕上的提示边写边修改错误。

在写作时，为了避免修改打断我的思路，我会直到写完作文才去重新修改那些电脑屏幕上提示的错误。

写作完成后，我会去修改那些我认为不准确的句子或表达。

修改完成后，我会重新再检查一遍，看文章的主要观点是否被清晰地表达出来了。

写作完成后，我会去回想我是怎么写的，我会想下一次怎么做才能提高我的英文写作水平。

写作完成后，我会对我的作文作一个自我估分。

写作完成后，我会想我对使用电脑写作的感受，我还是喜欢用电脑写作的，因为我省了不少对单词拼写和语法错误的担心。

修改完成后，我告诉自己我可以关掉电脑放松一下，不用去想作文的事儿了。

我会想写好英语作文对通过四六级考试的重要性。

我会想写好英语作文对将来工作的重要性。

再次感谢您的参与！
Appendix G

Metacognitive Strategy Use in Multimedia Environments Questionnaire
(MSUQ-ME, Phase 2)

Student ID: ___________

Gender: □ Male □ Female

Age: ___________

Years of English learning: ___________

Directions:

For the following statements that people usually have in their writing situation, please show how much you agree or disagree with these statements in your own writing task you just had by ticking the number that matches your answer.

For the open survey part, please think carefully about your own process of essay writing in the test just now, and describe as detailed as possible your activities occurring in your own writing situation.

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Partly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Before I started writing,

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Please tick (√)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I had a plan in my mind for how I was going to structure each paragraph in my essay.</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>2</td>
<td>I made an outline, including a list of the key points of views that I want to include in my essay.</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>3</td>
<td>I read the topic carefully and arranged my writing around the topic.</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>4</td>
<td>I thought about the goal I wanted to achieve in my writing. (e.g. to use a new word or a new sentence structure I have learned, to avoid a mistake I had made before, or to get a high score, etc.)</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>5</td>
<td>I thought about how much time I should spend on each part of the essay.</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>
Think carefully: What else have you done? What else have you thought about? Did you come across problems or difficulties in preparing your writing? How did you deal with them?

____________________________________________________________________________

____________________________________________________________________________

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Partly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>To what extent do you agree with the following statements?</td>
<td>Please tick (✓)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>I tried to think about whether the arguments followed the instruction of the essay.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>I tried to think about how much time I had remaining, adjusting my time arrangements to ensure completion of the writing task.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>I tried to think about how to connect different parts of my essay (e.g. using transitional words).</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I tried to think about whether I was using the correct grammar (e.g. tenses, prepositions, etc.).</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I tried to think about whether I was using appropriate punctuation as well as the letter case.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>I tried to modify the spelling mistakes, following the prompts on the computer screen.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I tried to use what I have learned (e.g. the new words or sentence structures) in my own writing this time.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I tried to seek help from an online dictionary if I did not know how to express my own opinions.</td>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Think carefully: What else have you done? What else have you thought about? Did you come across problems or difficulties in the process of your writing? How did you deal with them?

____________________________________________________________________________

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<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Partly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
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<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

After I finished writing,

<table>
<thead>
<tr>
<th>No.</th>
<th>To what extent do you agree with the following statements?</th>
<th>Please tick (✓)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>I reread my essay and made sure that there were no mistakes of the language in word spelling and grammar correction before I submitted to my teacher.</td>
<td>1  2  3  4  5  6</td>
</tr>
<tr>
<td>15</td>
<td>I reread my essay and made sure I had covered the content fully before I submitted to my teacher.</td>
<td>1  2  3  4  5  6</td>
</tr>
<tr>
<td>16</td>
<td>I made an evaluation by myself about the essay, i.e., I asked myself how many scores I could get after taking the test.</td>
<td>1  2  3  4  5  6</td>
</tr>
<tr>
<td>17</td>
<td>I thought back to how I write, and about what I might do differently to improve my writing in English next time.</td>
<td>1  2  3  4  5  6</td>
</tr>
<tr>
<td>18</td>
<td>I did not do any rereading work but turned off the computer to relax and thought no more about writing.</td>
<td>1  2  3  4  5  6</td>
</tr>
</tbody>
</table>

Think carefully: What else have you done? What else have you thought about? Did you come across problems or difficulties in this stage in your writing? How did you deal with them?

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________
Appendix H

多媒体写作环境下元认知策略的使用调查问卷

学号:___________
性别: □ 男 □ 女
年龄:_________
英语学习年限:_________

对于以下诸项目中描述的写作行为，请结合您刚才在写作中的实际情况选择一个数字，在相应数字上打勾(√)，来代表您多大程度上采取了这样的做法。

对于开放式的问答部分，请仔细回想您刚才在考试中的写作过程，并尽可能详细地描述您当时自己的写作行为，请用中文回答。

►在我开始写作前，

<table>
<thead>
<tr>
<th>序号</th>
<th>请判断下列说法在多大程度上符合您的实际写作情况。</th>
<th>完全不同意</th>
<th>不同意</th>
<th>有些不同意</th>
<th>部分同意</th>
<th>同意</th>
<th>完全同意</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>我在脑海中做好计划，计划好怎样去安排每一段落的写作。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>我先列了一个提纲，提纲里列出了我想在写作中用到的主要观点有哪些。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>我仔细阅读了写作题目，按照题目的要求来安排我将要用怎样的语言结构。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>我想到了我这次写作要达成的目标有哪些。（比如，要用上刚学到的新单词或新的句式，要避免以前曾经犯过的一个错误，或者要得到一个高分评价，等等）</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>我规划好每段大约需要多长时间来完成。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

●请仔细回想:

您还做了些什么？想了些什么？您在准备写作时都遇到了哪些问题和困难？您是如何解决的？

____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________

►当我写作时，
<table>
<thead>
<tr>
<th>序号</th>
<th>请判断下列说法在多大程度上符合您的实际写作情况。</th>
<th>完全不同意</th>
<th>不同意</th>
<th>有些不同意</th>
<th>部分同意</th>
<th>同意</th>
<th>完全同意</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>我会检查思考我的写作内容，确保我论述的观点与写作话题保持一致。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>我会想还用多长时间结束作文，并及时调整时间安排以确保写作任务的完成。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>我会想怎样使得我的作文保持连贯（比如说，使用连接词、过渡词等）。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>我会想我是否使用了正确的语法结构（比如说，时态的使用，介词的使用等）。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>我会想我是否使用了正确的标点和大小写。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>11</td>
<td>我会按照电脑上的提示边写边修改单词拼写错误。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>我会在作文中用上我学到的单词或句式结构。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>13</td>
<td>我会停下来去查字典，如果我不知道怎么表达的话。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

请仔细回想：
您还做了些什么？想了些什么？您在进行写作时都遇到了哪些问题和困难？您是如何解决的？
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

当写作完成后，

<table>
<thead>
<tr>
<th>序号</th>
<th>请判断下列说法在多大程度上符合您的实际写作情况。</th>
<th>完全不同意</th>
<th>不同意</th>
<th>有些不同意</th>
<th>部分同意</th>
<th>同意</th>
<th>完全同意</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>我重新读一遍我的作文，确信没有单词和语法错误再上交给老师。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>15</td>
<td>我重新读一遍我的作文，确信我已经完整表达了要求写作的内容再上交给老师。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>16</td>
<td>我自己对作文做出大体的一个估分，会想自己这次作文能得多少分。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>17</td>
<td>我会回想自己是怎么写作的，下一次写作时怎么样才能更好地提高。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>我没有重读作文，而是直接关掉电脑，再也不想写作的事情了。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

请仔细回想：
您还做了些什么？想了些什么？您在写作完成后到提交给老师之前又遇到了哪些问题和困难？您是如何解决的？
____________________________________________________________________________________
____________________________________________________________________________________

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Appendix I  Writing Topics in Phase 2

Pre-test:
Directions: For this part, you are allowed 45 minutes to write a short essay entitled *My View on Computers and Phones*, following the outline given below. You should write at least 120 words but no more than 180 words.

1. Nowadays a large number of people become addicted to computers and phones.
2. Some people say that communication by using computers and phones will have negative effects on young people’s writing and reading skills.
3. Your opinion.

*My View on Computers and Phones*

Post-test:
Directions: For this part, you are allowed 45 minutes to write a short essay entitled *My View on Online Shopping*, following the outline given below. You should write at least 120 words but no more than 180 words.

1. Nowadays shopping on the Internet has been a fashion especially among the youngsters.
2. Some people have worried that the qualities of online products are hard to be guaranteed.
3. Your opinion.

*My Views on Online Shopping*

Delayed Post-test:
Directions: For this part, you are allowed 45 minutes to write a short essay to express your views on *Do Mobile Phones Distract Study*, following the outline given below. You should write at least 120 words but no more than 180 words.

1. Nowadays using mobile phones has become super popular among university students.
2. There is a major concern that overuse of mobile phones has a negative influence on students’ academic study.
3. Your opinion.

*Do Mobile Phones Distract Study*
# Appendix J  ESL Composition Profile

## ESL Composition Profile

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>CONTENT</th>
<th>DATE</th>
<th>TOPIC</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCORE</td>
<td>LEVEL</td>
<td>CRITERIA</td>
<td>COMMENT</td>
<td></td>
</tr>
<tr>
<td>30-27</td>
<td>EXCELLENT TO VERY GOOD — knowledgeable</td>
<td>• substantive • thorough development of thesis • relevant to assigned topic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-22</td>
<td>GOOD TO AVERAGE — some knowledge of subject</td>
<td>• adequate range • limited development of thesis • most relevant to topic, but lacks detail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-17</td>
<td>FAIR TO POOR — limited knowledge of subject</td>
<td>• little substance • inadequate development of topic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-13</td>
<td>VERY POOR — does not show knowledge of subject</td>
<td>• non-substantive • not pertinent • OR not enough to evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-18</td>
<td>EXCELLENT TO VERY GOOD — fluent expression</td>
<td>• ideas clearly stated/supported • succinct • well-organized</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-14</td>
<td>GOOD TO AVERAGE — somewhat choppy</td>
<td>• loosely organized but main ideas stand out • limited support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-10</td>
<td>FAIR TO POOR — non-fluent</td>
<td>• ideas confused or disconnected • lacks logical sequencing and development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-7</td>
<td>VERY POOR — does not communicate</td>
<td>• no organization • OR not enough to evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-18</td>
<td>EXCELLENT TO VERY GOOD — sophisticated range</td>
<td>• effective words/idioms choice and usage • word form mastery • appropriate register</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-14</td>
<td>GOOD TO AVERAGE — adequate range</td>
<td>• occasional errors of word/idiom form, choice, usage but meaning not obscured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-10</td>
<td>FAIR TO POOR — limited range</td>
<td>• frequent errors of word/idiom form, choice, usage • meaning confused or obscured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-7</td>
<td>VERY POOR — essentially translation</td>
<td>• limited knowledge of English vocabulary, idioms, word form • OR not enough to evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-22</td>
<td>EXCELLENT TO VERY GOOD — effective complex constructions</td>
<td>• few errors of agreement, tense, number, word order/function, articles, pronouns, prepositions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-18</td>
<td>GOOD TO AVERAGE — effective but simple constructions</td>
<td>• minor problems in complex constructions • several errors of agreement, tense, number, word order/function, articles, pronouns, prepositions meaning seldom obscured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-11</td>
<td>FAIR TO POOR — major problems in simple/complex constructions</td>
<td>• frequent errors of negation, agreement, tense, number, word order/ function, articles, pronouns, prepositions and/or fragments, run-ons, deletions • meaning confused or obscured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-5</td>
<td>VERY POOR — virtually no mastery of sentence construction rules</td>
<td>• dominated by errors • does not communicate • OR not enough to evaluate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>EXCELLENT TO VERY GOOD — demonstrates mastery of conventions</td>
<td>• few errors of spelling, punctuation, capitalization, paragraphing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GOOD TO AVERAGE — occasional errors of spelling, punctuation, capitalization, paragraphing but meaning not obscured</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>FAIR TO POOR — frequent errors of spelling, punctuation, capitalization, paragraphing</td>
<td>• poor handwriting • meaning confused or obscured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>VERY POOR — no mastery of conventions</td>
<td>• dominated by errors of spelling, punctuation, capitalization, paragraphing • handwriting illegible • OR not enough to evaluate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL SCORE** | **READER** | **COMMENTS**

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Appendix K  Semi-structured Interviewing Protocol

I. Pre-Intervention Questions:

(In this interview, I would like to express my interest in your previous English writing experiences. Specifically, I am quite interested in your writing strategy use in writing, your views of the use of multimedia tools in your writing, and your opinions of the writing courses you had chosen to attend. To begin with, would you like to tell me something about yourself, like your name, age, interest of learning English, education, etc.?)

Questions about students’ metacognitive strategy use in writing in English:

1. Could you please tell me something about what you did before beginning to write English essays?
   a. Do you usually plan before writing?
      — If “yes”:
         What do you plan? (e.g. main ideas, number of paragraphs, time use, etc.)
         Why do you do these things?
      — If “no”:
         Can you tell me what you usually do?
   b. Do you usually make some preparations before writing? (e.g. setting up a goal, reciting a model essay, memorizing transitional words or sentence structures, going online to get some writing materials, etc.)

2. Could you please tell me something about what you did during writing English essays?
   a. When you write English essays, how do you think in your mind? Do you think about it in English or in Chinese? If in Chinese, at what level? Word-level, sentence-level, or discourse-level?
   b. What do you think are the difficulties in your writing?
   c. When you meet difficulties, what are the strategies you employ to deal with the difficulties in your writing?
   d. Do you think about the plans you made (if you made plans) while you are writing?
   e. Do you take your audience into consideration when you are writing English essays?
   f. What are the things that you paid the most attention to while you are writing?

3. Could you please tell me something about what you did as you were finishing up your writing?
   a. Do you re-read what you have already written? Why or why not?
   b. Do you revise your essays?
      — If “yes”:
What is your focus? (Language? Content? Or others?)

Why do you make such a revision?

— If “no”:

How do you feel about what you had written?

c. Do you judge how well you have written after completing your writing?

d. How do you decide when to stop writing and submit the finished product to your teacher?

— Adapted from Kim, 2013

Questions about students’ English writing in multimedia environments:

1. Could you please tell me something about your experiences about using modern technologies to learn English writing? (e.g. using the Microsoft Word to practise writing, using computers to write e-mails in English, or even using your cell phone to send English text messages)

2. Do you use online dictionaries to help your writing? If so, at what level? Word-level? Sentence-level? Or discourse-level?

3. Do you use the Internet to acquire information to facilitate your writing or English learning? What do you usually do with the Internet resources?

4. How do you feel about writing in English with computers? Do you like it? Or you don’t like it?

5. What do you think your strengths and weaknesses are when you write in English with computers? Can you give me some examples?

Questions about the regular writing course:

1. Could you please tell me something about your English teacher’s writing instructional approach?

2. How do you feel about your English teacher’s writing instruction? Do you like it? Or you don’t like it? Can you describe what you did in class?

3. Has your English teacher illustrated some modern technology elements into teaching writing? If so, what does your teacher usually do with the technology?

4. Do you have any suggestions for the teaching of English writing?
II. Post-Intervention Questions:

(In this interview, I am very interested in finding out about your English writing during this semester. So I will need to just talk about your own experience and talk about your writing learning process to have a better understanding how you help yourself to write in English in the multimedia environments. Maybe for a start, would you like to tell me...?)

Questions about students’ metacognitive awareness development in writing in English:

1. Would you like to tell me how you feel about writing in English now? Do you feel that your writing in English has changed in any way from the beginning to the end of this study?

2. What steps do you usually go through to complete a writing assignment now? (Do you plan? Do you revise? Do you make a judgment about how well you have written?)

3. What are the strategies you employ to deal with the difficulties (if you have) in completing a writing task?

4. Could you describe your purpose of learning English writing? What is your idea of a good English essay?

Questions about students’ English writing in multimedia environments:

1. Could you please talk about your experiences in writing English in multimedia environments in this semester? What aspects of activities do you think help you improve your English writing?

2. How do you feel about writing in English in multimedia environments now? Do you like it? Or you don’t like it?

3. Is there anything that you feel unhelpful towards your English writing in multimedia environments? According to your own experience, could you please give me some examples of the influence on your English writing? Please be as specific as you can.

4. Is there anything else you would like to tell me about your experience in writing English in multimedia environments?

Questions about the intervention writing course:

1. Would you like to tell me how you feel about your teacher’s teaching in this study? What do you like the most? What do you like the least?

2. Do you think what aspects of the instructor’s teaching you paid most attention to when you are learning writing in class?

3. What do you think about the strategies taught in the writing course?

4. Do you have any suggestions for the teaching of English writing in multimedia environments?
Appendix L  My Weekly Learning Journal

Name:                                                                                                               Time:

The purpose of this diary is for you to reflect on your writing program you are required to be enrolled in by the university. It will give you a chance to think about your own performance and your reactions about English writing and the positive steps that you have taken, which is beneficial for your gradual language learning success in the future. You are required to keep the diary on a weekly basis, normally after the writing program each week. There is no restriction on the language (Chinese or English) you choose to use in writing the diaries as long as you feel that the language can fully express your feelings and thoughts. However, the following focal points need to be answered in your diary:

1. What I learned this week (writing skills, English and Chinese discrepancies, writing genres, etc.)

2. The writing activities I did (paper writing, writing for speech competition, email to pen pal, English text message, assignment, etc.)

3. The feelings about what I did (any writing progress I made, any difficulties I encountered, etc.)

4. The methods for overcoming the difficulties

5. My views on this week’s writing class

6. What I plan to do next week
# Appendix M  Course Outline for the EFL Writing Class
(Used in the experimental group)

<table>
<thead>
<tr>
<th>W (week)</th>
<th>Course Contents &amp; Class Tasks</th>
<th>Process Goals</th>
<th>Stages</th>
<th>Assignments</th>
</tr>
</thead>
</table>
| 1        | • Introducing course objectives;  
          • Introducing multimedia components in scaffolding EFL writing, including principles for reducing extraneous processing in multimedia learning;  
          • Identifying personal goals for the course | Goal setting; Help-seeking; writers themselves | Plan | ● Making personal learning plans for the course;  
          ● Familiarizing the multimedia environments after class;  
          ● downloading and planning to use English learning apps on the cell phone |
| 2        | • Defining the writing goals to help students develop the motivation to learn writing in English | Goal setting | Selective attention: Knowledge on good writing standard | ● Giving a concrete answer to the question “For what purpose do I write the English essay?” |
| 3        | • Developing the knowledge of good writing;  
          • Instructing the functional components of a typical English argumentative essay under directions and requirements of the CET-4 examinational standard | Pre-writing plan | ● Searching online the criteria of a good writing and the relevant information on model argumentative essays |
| 4        | • Premise in an essay writing: Write an outline, manage time, memorize transitional words and sentence structures, Compare differences between Chinese and English | Generating ideas | ● Searching online the knowledge on language differences;  
          ● Drafting on the given topic to list an outline as the framework **Model essay**: Technology and Life: High-speed Rail in China |
| 5        | • Generating ideas by mind mapping and brainstorming;  
          • Instructing students to know how to apply TREE strategy by modelling to help sort out ideas relevant to argumentative essays | Mind-monitoring; Self-focusing | Revising drafts according to peer and teacher feedback  
          ● Learning more about the writing topic by gathering information from the Internet to generate at least three advantages and three disadvantages of the rapid development of the high-speed rail in China |
| 6        | • Learning to narrow the subject by clustering adequate supporting details  
          • Learning to use monitoring strategy | Self-focusing | Checking the relevance of the details by referring back to supporting reasons |
<p>| 7        | • Learning to how to write a topic sentence and develop an effective paragraph | | Developing paragraph structure by writing topic sentences in each paragraph |</p>
<table>
<thead>
<tr>
<th>8</th>
<th>• Learning to monitor the consistency of the topic and inclusion of a clear aspect to be developed in the supporting reason</th>
<th>Self-adjustment: Elaboration of supporting reasons</th>
<th>• Generating adequate and appropriate supporting details</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>• Learning to write a conclusion paragraph</td>
<td>Self-summarizing</td>
<td>• Finishing the first version of the essay</td>
</tr>
</tbody>
</table>
| 10 | **Mid-term review:**
- Reinforcing students’ self-awareness that apart from mechanics, such as spelling, grammar and punctuation, it involves dealing with the overall content and meaning of writing and adding, deleting, or reorganizing larger chunks of discourse does occur frequently in the process of writing
| | Self-reviewing: Self-correction | Monitor | • With the help of computers and the Internet, students were required to submit their written products to the writing platform related to adding, revising and deleting
• Rewriting the draft according to peer, teacher and the auto-rater’s feedback to generate the second version of the essay |
| 11 | • Identifying difficulties in writing for the model essay, whether they were from lack of language knowledge or from lack of psychological preparation
• Discussing the strategies used in dealing with difficulties during writing | Problem-solving | • Seeking help from partners or searching online to find solutions to the difficulties |
| 12 | **Vocabulary:**
- Revising the essay at lexical level in terms of appropriate word choices and correct verb forms | Self-assessment; Self-revising | • Evaluating the quality of the completed written products based on Jacob et al.’s (1981) marking rubrics.
• Submitting the essay to the Auto Writing Evaluation (AWE) platform ([www.pigai.org](http://www.pigai.org)) for revision according to their feedback as well as peer review, thinking of how we can do to make better next time. |
| 13 | **Language use:**
- Revising the essay at syntactic level in terms of syntactic complexity and variety | Self-assessment; Self-revising | Evaluate |
| 14 | **Content and Organization:**
- Revising the essay at discourse level in terms of topic progression and logic flow of ideas | | |
| 15 | **Mechanics:**
- Review the essay by counting the total numbers of words produced and monitoring the time allocation | Self-judgement | |
| 16 | Course review and summary | | |
### Appendix N  Descriptive Statistics of the MAIME (47 items)

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  I know about my strengths in multimedia-mediated writing in English well.</td>
<td>3.25</td>
<td>1.355</td>
<td>0.105</td>
<td>-0.687</td>
</tr>
<tr>
<td>2  I can adduce concrete evidence to explain my strengths in multimedia-mediated writing.</td>
<td>3.19</td>
<td>1.365</td>
<td>0.181</td>
<td>-0.776</td>
</tr>
<tr>
<td>3  I know about my weaknesses in multimedia-mediated writing in English well.</td>
<td>4.41</td>
<td>1.307</td>
<td>-0.692</td>
<td>-0.095</td>
</tr>
<tr>
<td>4  I can identify concrete evidence to explain my weaknesses in multimedia-mediated writing.</td>
<td>4.17</td>
<td>1.337</td>
<td>-0.522</td>
<td>-0.451</td>
</tr>
<tr>
<td>5  I am confident that I know the correct use of sentence structures (e.g. inverted sentence, emphatic sentence, elliptical sentence, etc.) in my writing.</td>
<td>3.65</td>
<td>1.280</td>
<td>0.162</td>
<td>-0.569</td>
</tr>
<tr>
<td>6  I am confident that I know the correct use of tenses (past, present, and future) and voices (active and passive) in my writing.</td>
<td>3.62</td>
<td>1.313</td>
<td>-0.143</td>
<td>-0.673</td>
</tr>
<tr>
<td>7  I think the prerequisite of a good composition is that it should not have spelling and grammar mistakes in multimedia-mediated writing.</td>
<td>4.46</td>
<td>1.444</td>
<td>-0.747</td>
<td>-0.414</td>
</tr>
<tr>
<td>8  I think the prerequisite of a good composition is that it should express clearly the writer’s ideas in multimedia-mediated writing.</td>
<td>4.31</td>
<td>1.237</td>
<td>-0.557</td>
<td>-0.126</td>
</tr>
<tr>
<td>9  I think the prerequisite of a good composition is that it is easily comprehensible to the readers in multimedia-mediated writing.</td>
<td>4.23</td>
<td>1.240</td>
<td>-0.425</td>
<td>-0.203</td>
</tr>
<tr>
<td>10 Sometimes even if I cannot write out a good composition, I can still identify what kind of composition is a good composition in multimedia-mediated writing.</td>
<td>4.37</td>
<td>1.335</td>
<td>-0.666</td>
<td>-0.253</td>
</tr>
<tr>
<td>11 I translate key words and phrases by use of online dictionaries if I do not know how to express by myself.</td>
<td>3.84</td>
<td>1.307</td>
<td>-0.997</td>
<td>0.357</td>
</tr>
<tr>
<td>12 I would like to think the whole sentence in advance how to express in Chinese, and then translate it into English with the help of online dictionaries when I write.</td>
<td>4.25</td>
<td>1.357</td>
<td>0.101</td>
<td>-0.615</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I try to use Google or Baidu to find any online information relevant to help me organize a well-structured composition of my own when I write.</td>
<td>3.15</td>
<td>1.390</td>
<td>-1.06</td>
</tr>
<tr>
<td>14</td>
<td>I make sure I find out from multimedia support to stimulate my inspiration when I do not know how to do the writing task when I write (texts, pictures, audios, videos, online class, etc.).</td>
<td>3.61</td>
<td>1.346</td>
<td>-1.057</td>
</tr>
<tr>
<td>15</td>
<td>I usually surf the Internet for the information that are related to the writing topic if I know the topic in advance.</td>
<td>3.77</td>
<td>1.309</td>
<td>-0.593</td>
</tr>
<tr>
<td>16</td>
<td>I usually surf the Internet for the so-called English writing templates whether or not I know the writing topic.</td>
<td>3.20</td>
<td>1.349</td>
<td>-0.541</td>
</tr>
<tr>
<td>17</td>
<td>I feel a sense of achievement when I finish the writing task satisfactorily.</td>
<td>4.65</td>
<td>1.296</td>
<td>-0.31</td>
</tr>
<tr>
<td>18</td>
<td>I am aware that I feel happy when the teacher assigns us to write a composition with the computer.</td>
<td>3.36</td>
<td>1.393</td>
<td>-0.289</td>
</tr>
<tr>
<td>19</td>
<td>I am aware that I feel more confident about writing in English when I was praised by the teacher for my good writing.</td>
<td>4.74</td>
<td>1.188</td>
<td>-0.323</td>
</tr>
<tr>
<td>20</td>
<td>I tell myself I must try even harder to improve my writing ability when I find I have made some progress.</td>
<td>4.65</td>
<td>1.160</td>
<td>-0.701</td>
</tr>
<tr>
<td>21</td>
<td>I have a strong desire to make up for the failure when I find that I have failed to make improvement in writing in English.</td>
<td>4.19</td>
<td>1.268</td>
<td>0.015</td>
</tr>
<tr>
<td>23</td>
<td>It will stimulate my determination for improving my English writing ability when I encounter difficulties.</td>
<td>3.91</td>
<td>1.336</td>
<td>-0.269</td>
</tr>
<tr>
<td>25</td>
<td>I feel frustrated when I did not finish my writing on a fixed time.</td>
<td>4.16</td>
<td>1.337</td>
<td>-0.184</td>
</tr>
<tr>
<td>26</td>
<td>I feel anxious when I find that I have not made progress in writing in English.</td>
<td>3.91</td>
<td>1.336</td>
<td>-0.207</td>
</tr>
<tr>
<td>27</td>
<td>I feel frustrated over the use of the new multimedia-mediated writing environment. I need to learn to use computers skilfully.</td>
<td>4.62</td>
<td>1.337</td>
<td>-0.363</td>
</tr>
<tr>
<td>28</td>
<td>Before I start to write, I make an outline to help structure the composition in a new word document.</td>
<td>3.76</td>
<td>1.328</td>
<td>-0.246</td>
</tr>
<tr>
<td></td>
<td>Before I start to write, I have a plan in my mind for what kind of sentence structures I will use in body paragraphs.</td>
<td>30</td>
<td>Before I start to write, I make a list of the key points of views that I want to include in the composition in a new word document.</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Score1</td>
<td>Score2</td>
<td>Score3</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>42</td>
<td>As I write, I will not modify the mistakes until I finish my writing task in case the revision interrupts my train of thought.</td>
<td>3.71</td>
<td>1.264</td>
<td>-0.589</td>
</tr>
<tr>
<td>43</td>
<td>After I have completed my writing, I will change the sentences or expressions that I think are not accurate even if there seems to be no errors in the word document.</td>
<td>4.17</td>
<td>1.256</td>
<td>-0.542</td>
</tr>
<tr>
<td>44</td>
<td>After I have completed my writing, I will change the sentences or expressions that I think are not accurate even if there seems to be no errors in the word document.</td>
<td>4.18</td>
<td>1.288</td>
<td>-0.445</td>
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<tr>
<td>45</td>
<td>After I have completed my writing, I reread my work to check if the key ideas are clearly stated with appropriate modifications.</td>
<td>3.69</td>
<td>1.289</td>
<td>-0.089</td>
</tr>
<tr>
<td>46</td>
<td>After I have completed my writing, I make an evaluation by myself about the scores I could get.</td>
<td>3.83</td>
<td>1.195</td>
<td>-0.155</td>
</tr>
<tr>
<td>47</td>
<td>After I have completed my writing, I think back to how I write, and about what I might do differently to improve my writing in English next time.</td>
<td>3.66</td>
<td>1.406</td>
<td>-0.753</td>
</tr>
<tr>
<td>48</td>
<td>After I have completed my writing, I am thinking of my use of computers to write English compositions, which is what I like to do because in such a new environment, I feel less worried about my spelling and grammar errors.</td>
<td>4.10</td>
<td>1.385</td>
<td>-0.41</td>
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<tr>
<td>49</td>
<td>After I have completed my writing, I am thinking of my use of computers to write English compositions, which is what I like to do because in such a new environment, I feel less worried about my spelling and grammar errors.</td>
<td>4.47</td>
<td>1.260</td>
<td>-0.184</td>
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<td>50</td>
<td>After I have completed my writing, I am thinking of my use of computers to write English compositions, which is what I like to do because in such a new environment, I feel less worried about my spelling and grammar errors.</td>
<td>4.29</td>
<td>1.345</td>
<td>-0.821</td>
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## Appendix O

### Independent Samples t-tests: The Perceived Use of Metacognitive Strategies before the Instruction Programme ($N_{exp} = 32$, $N_{con} = 32$)

<table>
<thead>
<tr>
<th>Metacognitive Strategies</th>
<th>Subcategories</th>
<th>Group</th>
<th>$M$</th>
<th>$SD$</th>
<th>$F$</th>
<th>$t$</th>
<th>$p$ (two-tailed)</th>
<th>95% CI</th>
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<tbody>
<tr>
<td></td>
<td>Planning</td>
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<td>Designing composition structures</td>
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<td></td>
<td></td>
<td>ConG</td>
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<td>ConG</td>
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<td>Setting up goals</td>
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<td>1.058</td>
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<td></td>
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<td>ConG</td>
<td>3.97</td>
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<td>ConG</td>
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<td>1.047</td>
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<td>Focusing on writing content</td>
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<td>Transferring prior-knowledge to writing</td>
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</table>

Note. CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit
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