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# **A Cognitive Analysis of the Relationships between Chinese EFL Writers' Strategy Use and Writing Achievement Performance**

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The purpose of this study was to explore writing strategy use in Chinese EFL student writers in relation to their achievement in L2 (English) writing. This research takes a cognitive approach to the process of writing in a second language as a skilled performance in production. A total of 40 Chinese EFL student writers in Taiwan partook in this study. The strategies used by high- and low- achievers in writing revealed through the concurrent think-aloud protocols and immediate retrospective interviews with the students were investigated, analyzed and compared. The results showed that in comparison with low achieving student writers, high achieving student writers focused more on clearly formulating their position statement in planning, generating texts, and revising and editing such as making meaning changes, and fixing grammatical and spelling errors during reviewing. The findings in the light of cognitive process-oriented writing strategy research and implications for L2 writing pedagogy are discussed.

## **1 INTRODUCTION**

In the past few decades, there was a significant breakthrough made in exploring the cognitive processing with respect to the first language (L1) writing model (for a recent comprehensive review, see Alamargot & Chanquoy 2001) and the comparison between skilled and unskilled writing for L1 learners (e.g., Eysenack & Keane 2005; Hayes & Flower 1986; Scarmadalia & Bereiter 1987). In spite of the great progress made on the cognitive model of how people write in the L1, little attention was paid to the second language (L2) writing model, particularly in understanding how L2 writers employ strategy use during writing in relation to their writing performance.

With the intention of contributing to the current state of knowledge in L2 writing, this study was prompted by (1) the belief that what takes place in the L2 writers' head when they are writing is in any case as important to the understanding of writing in L1 writers; and (2) the limitation of previous relevant studies documented in the L2 writing literature. The present study aims to fill out such a gap in L2 writing scholarship and is an endeavor to dig deeper into the writers' strategy use in their L2 writing process related to their writing performance. If we could link into a L2 student writer's strategy use during the writing process and uncover what it is that makes one student a great writer and another a poor one, we might be able to work out how to help writing of weaker students. Implicit in this study is the underlying assumption that students' strategy use in the writing process can potentially have an effect on L2 writing performance to take apart successful from less successful student writers. Implicit also is the conception that high and low achieving student writers write differently and that these differences may very well be related to distinctive writing achievement. Unveiling these student writers' tacit strategies is indispensable to make L2 writing teacher preparation more effective.

Within the framework of cognitive writing research, this paper first of all offers an existing scholarly literature review on (1) brief introduction of the inception of cognitive writing theory; (2) theoretical basis in cognitive writing research for the L2; and (3) more and less skilled L2 writers' strategy use, for the purpose of giving the reader a view of the attainments and limitations of this body of research. On account of such grounding, it then follows the research design of a study, which was intended to tackle some important issues in relation to the procedure in data collection and analysis via concurrent think-aloud writing and retrospective interviews with students. Finally, findings from the concurrent think-aloud

and retrospective interviews with student writers who took part in this study are reported. The present study is proposed to be a step further in setting up a more prudent research methodology than has hitherto been employed in L2 writing studies, and a contribution to the ongoing study on the nature of research into L2 writing strategy use related to the writing performance.

This study is useful and valuable because (1) it used the statistical analysis to measure whether high and low achieving groups were similar or different in writing strategy use throughout their whole writing processes, not just their partial writing processes; (2) it utilized both concurrent think-aloud protocols and student interviews to capture a more complete view in writing strategy use; (3) it recruited a relatively larger number of student writers compared with previous studies (e.g., Armengol-Castells 2001; Arndt 1987; Jones & Tetroe 1987; Kongpun 1992; Yahya 1994); and (4) it is situated particularly in the Chinese speaking area where there are a large number of students learning to write English and they are eager to improve their English writing and strategy use.

## **2 LITERATURE REVIEW**

### **2.1 Brief Introduction of the Inception of Cognitive Writing Theory**

Writing is an intricate cognitive activity necessitated by a number of processes and strategies<sup>33</sup>. The use of strategy is a purposeful cognitive action (Flavell, 1979). When drawn out for a conscious verbalization, it is of importance for what it discloses about the way writers process and generate texts. The set of writing processes underlying them were initiated by the pioneering work of Emig (1971), who carried out the first study by observing school children as they wrote. These insights were then formalized by Hayes and Flower (1980) in an “explicit” model of the constituents of the writing process and were followed by Bereiter and Scarmadalia (1987), Hayes (1996), Kellogg (1996), Field (2004) and Eysenack and Keane (2005). It should be acknowledged that the various models after the Hayes and Flower’s 1980 model were more or less similar and predominantly based upon the idea of their original 1980 model as it has been until now widely regarded as the most powerful in cognitive writing and supported by a number of studies (e.g., Alamargot & Chanquoy 2001; Braaksma *et.al.* 2004; Chanquoy & Alamargot, 2002; Graham and Harris 2000). It should also be noted that the Hayes and Flower’s model is often used as a criterion in exploring L2 writing. The literature in L2 cognitive writing theory until now is at any rate extremely scarce (Shaw & Weir 2007). Therefore, in the following below I shall give a review how the Hayes and Flowers model works in the cognitive writing process.

### **2.2 Cognitive Theory of the Writing Processes/Strategies for the L2**

In accordance with Flower and Hayes (1981), Hayes (1996) and Hayes and Flower (1980), planning, composing, and reviewing are the three major processes that a writer may undergo in the course of writing. They are explained as follows.

#### **Planning**

Planning encompasses three strategies, including generating ideas, organizing, and goal-setting. According to the Hayes and Flower model, generating ideas consist of retrieving relevant information from the task environment and long-term memory, which is a storehouse of knowledge about discourse and topic. The memory is probed with information about the

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<sup>33</sup> The terms, writing “processes” and “strategies” are often used interchangeably to indicate the mental processes that writers go through while engaged writing (e.g., Armengol-Castells, 2001; Arndt, 1987; Jones and Tetroe, 1987; Kongpun, 1992; Martin-Betancourt, 1986; Yahya, 1994).

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writing. Each retrieved item turns out to be a new memory probe. Related items are retrieved from memory simultaneously. This process is broken when a non-pertinent item is retrieved. This break in the process entails the writer to begin the search again with a new memory probe. Once an item is retrieved the writer may decide to jot down words or sentences about the particular item.

The other phases of the planning stage of the Hayes and Flower writing model include organizing and goal setting. Organizing involves choosing the subject matter retrieved by the generating process and structuring it into writing. It includes structuring information in a cohesive and coherent manner, through knowledge of the long-term memory and task environment for the documentation. While organizing, writers structure their thoughts. The other strategy of planning is goal setting. In this strategy, some ideas from the generating process are used to assess the text with regard to meeting the goal specified. Goal setting entails conveying ideas and information, again, through the information gained through knowledge of long-term memory and task environment for the documentation. Setting goals will make people develop plans, in other words, to think about the method or means by which they will reach their goal. As their goal base alters, they will re-organize and adjust plans to fit their deepening understanding of the task at hand.

### **Composing (Translating)**

In the Hayes and Flower writing model, the second part of the writing process, the act of composing referred to as “translating,” is when writers actually put their ideas into visible language, an activity through which the writer transforms the ideas from a linear or hierarchic plan into sentences (Flower & Hayes 1981). It involves putting ideas into language (text generation) and then into written words (transcription) to build cohesive and coherent text. Hayes and Flower stated that one can make a distinction when writers move from planning to translating. It does not represent that writers can have a wholly shaped meaning that they merely articulate in words. Hayes and Flower (1983: 209) explained as follows.

Writers have some more or less developed representation encoded in one form. The act of translating this encoded representation to another form (i.e., written English) can add enormous new constraints and often force the writer to develop, clarify, and often revise that meaning. For that reason, translating often sends writers back to planning. Often these processes alternate with each other from one minute to the next.

### **Reviewing**

Reviewing is the act of evaluating either what has been planned or written. Reading and editing are strategies during reviewing. In these strategies, the writer checks any content written with the aim of correcting anything that would prohibit the text from meeting the objectives. This comprises correcting grammatical errors and changing the contents of the writing. Hayes and Flower (1980) postulated that when the evaluation of a plan or a text is not satisfying, reviewing generally brings about revision. Reviewing arises self-consciously while the writer is set to evaluate the written text. It also takes place when the writer senses the error or illogical aspects during the act of translating. It is not an impulsive activity but rather one in which the writer makes up mind to devote time to systematic verification of the text (Flower & Hayes 1981; Hayes 1996).

### **Monitoring**

According to Flower and Hayes (1981), Hayes (1996) and Hayes and Flower (1980), monitoring the writing process well is the ability to think about thinking and to continuously coordinate and examine the mental manipulation in sustaining and shifting the focus of attention among different strategies in order to ensure the writing progress and quality. To

progress as writers, people must actively set, and then regulate and monitor their own progress towards those cognitive goals associated with writing; this process is referred to as executive control (Hayes, 1996).

### Summary

The Hayes and Flower writing process model, as stated by Scarmadalia and Bereiter (1986:122), “appears to do what it is supposed to do, which is to serve as a frame for working out more detailed and possibly more controversial accounts of how the mind copes with writing tasks.” This model is significant in several ways. First, it helped set up a theoretical model that sparked widespread discussion by supporters of empirical L1 and L2 writing process research (e.g., Armengol-Castells 2001; Arndt 1987; Jones & Tetroe 1987; Kongpun 1992; Martin-Betancourt 1986; Yahya 1994). Hayes and Flower helped us throw light on different sub-skills of the actual strategies that writers might have to put them into practice collectively. Second, it established interdisciplinary links among composition studies, cognitive science and psychology. Finally, it held out the prospect of writing process research that might make improvement in composition instruction. It helped change views about the teaching of composition. Writing is tough work, and to do it well, a writer must self-regulate and monitor the intricate cognitive processes. Writers who are conscious of the strategies they use can differentiate between strategies that are proper or not for particular writing situations, and are thus capable of monitoring their writing. This understanding and control of cognitive processes forms the writer’s metacognition (Hayes 1996).

### 2.3 More and less skilled L2 Writers’ Strategy Use

L2 writers’ strategy use, particularly the differences between those of more and less skilled writers, has been studied in the past few decades mainly on the basis of think-aloud protocols. However, so far research into the more and less skilled writers’ strategy use in the L2 studies is limited and of very restricted generalizability. Indeed there are difficulties in conducting the think-aloud writing study. Since the task is very time consuming, it often takes the researcher a large amount of hours transcribing a recorded protocol, and another several hours analyzing and comparing the transcription. This denotes that it is impossible to have a large number of participants involved in this kind of study. Given the large quantity of data obtained from each individual, think aloud is normally conducted with small samples of between 5 and 20 participants (Liu, 1999). As a result, it is not yet possible to talk about writing profiles for skilled and unskilled L2 writers. It is a gap in the research which needs to be filled and documented.

In spite of this however, limited patterns are emerging. Studies are still ongoing to see how the findings match the pattern found below. Some researchers found that skilled writers were inclined to carry out more planning and revise more at the discourse level (Cumming 1989; Raimes 1987; Roca de Larios *et.al.* 2001; Roca de Larios *et.al.* 1999; Zamel 1983) while unskilled writers were likely to perform less planning and revise more at the word and phrase level (Roca de Larios *et.al.* 2001; Roca de Larios *et.al.* 1999; Zamel 1983). Expert writers were devoted more on planning, while novices tended to construct less global plans. Unskilled L2 writers, for example, showed little planning behavior; they reread small elements of their written texts both before and during the drafting of their essays; their first draft tended to be their final one, and it seemed they had a very narrow conception of what writing comprises (Raimes 1985; Zamel 1983). Nevertheless, as Raimes (1985: 249) noted, albeit some similarities in the behavior of her unskilled L2 writers, “no clear profile of the unskilled ESL writer emerged.” The extent to which any of these strategies is related to writing skill in the L2, has not yet been determined. L2 research to date is very scarce as to the relationship between writing strategy use and performance.

## 3 RESEARCH METHOD

### 3.1 Research Questions

1. From a cognitive process-oriented perspective, what strategies do students use in completing English writing?
2. How high- and low- achieving student writers can be differentiated in terms of writing strategies?

### 3.2 Data Collection Procedures

#### 3.2.1 Setting and Participants

A total of 40 participants were recruited. They participated in this study out of their willingness. They were all Chinese students taking the English composition classes lasting a whole academic year at a university located in the northern part of Taiwan. In terms of the course, it was a mandatory English composition course that is two parts, first and second semester, which was a total of 4 credits. The course's main goal was designed to help students develop and sharpen their writing skills necessary to become successful English learners. In order to achieve competence with the use of English and fluency with written English, they were guided step-by-step to improve their ways of thinking and writing clear and concise sentences and paragraphs into a unified, well-organized essay. In class, following the discussions of featured essays, the teacher helped them learn the writing skills of brainstorming, free writing, organizing ideas, drafting, revising and rewriting texts. Through teacher and peer feedback, and group discussion, it was hoped that the students could become effective writers. Before they entered the university, they had studied English as a compulsory subject in the elementary and secondary schools for at least 10 years. They started learning English from the third grade in the elementary school in the curriculum set by the Taiwan Ministry of Education (Taiwan Ministry of Education 2005).

In terms of sampling strategy in the present study, the selection of students with particular characteristics was given the fact that the teachers were often concerned with their students' achievement such as why some students could always achieve better or worse than the others. The study with such samples could be useful and valuable mainly for documenting that a particular characteristic or phenomenon took place within a given group for detecting relationships among different phenomena or, on the other hand, showing that not all members of that group demonstrated a particular trait. In order to select high and low achieving students, all of them at first were asked to write 5 different essay topics in different times without doing the think-aloud in 40 minutes as a part of their English composition classroom practice. In deciding on the type of writing task to use for this study, the following issues were considered: (1) A variety of topics were used for the purpose of minimizing topic effects. The topics were all from TOEFL writing guide (2005). This was deemed appropriate as the students usually practiced and wrote the kind of argumentative writing topics in the English composition course for academic purposes. In addition, writing 5 different essay topics rather than merely just once or twice was judged better in order to more precisely identify and distinguish high- and low- achievers in English writing. (2) For the comparable reason, it would be essential to set a time limit on the writing task, but with enough time allowance. A main postulation of the task was therefore that the students would, given a fixed time to finish the task, condense their writing process in that time rather than adopt an entirely different process. That is, their concerns when writing would be mirrored in this task as in others. (3) It had to be a task that was sensibly familiar to all the students in order that it could be said to reflect their writing processes in the daily life.

Each student's 5 essays were then holistically graded by two independent experienced EFL writing instructors. The grades given by the raters to each of the essays were collected and were the main performance indicators used to rank students within the group in order to select high- and low- achievers. The two raters scored the essays on the basis of the TOEFL

writing scoring guide (2005) on a 6-point scoring rubric. The major criteria set by the TOEFL writing scoring rubric was based on the capability to demonstrate competence in writing English. The inter-rater reliability was the scores calculated by using the Pearson bivariate correlation (2-tailed) coefficients. The correlation coefficients between rater 1 and rater 2 was .851\* which were statistically significant at .05 level ( $p < .05$ ). The researcher judged such a correlation was acceptable for the present study. Based on the score ranks of 5 essays, 5 students, Gina, Alice, Jane, Diana and Paul were assigned to the high achievers group while the other 5 students, Linda, James, Ben, Maria and Sue were assigned to the low achievers group.

As 5 high- and 5 low- achieving students were identified, in order to answer the research questions, I used a multiple case study to probe students' strategy use in the English writing process through the concurrent think-aloud protocol followed by immediate retrospective interviews with students to capture their perceptions in writing. On the basis of theoretical and practical significance, the concurrent protocol was decided and employed in the present study. The use of this method to investigate cognitive writing processes has been well established in the area of cognitive psychology (for overviews, see Ericsson 1998; Ericsson & Simon 1993; Smagorinsky 1994). The major reasons are that think-aloud protocol would plausibly offer a more correct view of the participants' synchronized processing, given that concurrent think-aloud protocols (1) present the direct link between a real-time thought and its verbalization, and (2) are more valid than any other kind of verbal reports in view of the lack of a time span between the occurrence of a thought and its representation (Ericsson 1998; Ericsson and Simon 1993). Smagorinsky (1989, 1991, 1994) upholds that a think-aloud protocol offers a distinctive glance into the information processing of the human mind and makes a considerable contribution to the understanding of writing processes. I was, nevertheless, well aware of the issues in opposition to the use of concurrent protocols<sup>34</sup>, mainly regarding the invalidity related to the method. Thereupon in the data collection procedures, I aimed to lessen such menace to validity<sup>35</sup>, inclusive of more careful design for both the practice and actual writing sessions. Procedures were strictly administered given the potential outcome of the instructions directed to the participants (Ericsson 1998; Ericsson & Simon, 1993; Jourdenais 2001).

### 3.2.2 The Practice Think-aloud Writing Session

A small room was chosen for the purpose of comfort and quietness. A practice session was designed to familiarize students with the think-aloud procedure. I did not pre-set what they might do and also did not demonstrate to the students since I did not want to influence their thought processes in any aspect (Smagorinsky 2001; Smith 1994). As for the researcher, my role was that I kept the distance from them and served only as a neutral prompter ("keep talking") who hinted the students to say aloud what they thought only if they were silent. The ideal condition was that the researcher had to abstain from any involvement so as not to disrupt the students' flow of thoughts. Prior to the practice session, they were given the following guideline by Hayes and Flower (1983) and Manchon *et.al.* (2005):

You will have forty minutes to write an English composition on a given topic on the computer in the actual writing session. You just write anything you want. You should talk aloud everything you think and everything that occurs in your mind while performing writing, regardless of what it may be. You can use whatever language you want: English or Chinese or a mixture of English and Chinese. You should not converse with me. If you are silent, I will remind you to talk aloud what you are thinking. If you

<sup>34</sup> For a review of controversy, see Ericsson and Simon (1993), Janssen *et.al.* (1996), Jourdenais (2001), Smagorinsky (1994) and Stratman and Hamp-Lyons (1996).

<sup>35</sup> For a full discussion of these and other methodological issues in the use of concurrent protocols, see Manchon *et.al.* (2005).

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find you cannot write naturally, let me know straight away. If not, keep writing until I inform you the time to stop. (originally in Chinese)

After this explanation to the students, they were invited to raise concerns and questions about the procedure. Then they had around one hour to practice think-aloud on a mock topic on the computer. In the practice writing session, I was able to examine afterwards whether they conformed to the guideline as stated above and if necessary gave them further practice before the actual writing session. In fact, all of them seemed to adjust themselves to the think-aloud very quickly. None of them thought they needed to practice more before the actual writing session. Also having watched the practice sessions, I was quite satisfied with what they did.

### **3.2.3 The actual think-aloud writing session**

In the actual writing session, for the purpose of comparability of data, it was decided to set a common topic in writing for 40 minutes<sup>36</sup>. The criteria for selecting the topic were: (1) It should be something that the students were all sensibly familiar; and (2) It should be a topic that the students would feel some association with in view of the fact that they were being asked to their viewpoints on it. The topic chosen was “Do you agree or disagree with the following statement? With the help of technology, people nowadays can gain more information and learn it more quickly. Use specific reasons and details to support your argument.” As technology currently has a great impact in Taiwan, a reasonable level of participation in the task could be expected. The topic was given right after the writing task began. When the students composed aloud, there was no interruption. Only if the students forgot and fell silent, they were reminded by the researcher with verbal signals (“keep talking”) to prompt them to say aloud their mental processes. The whole writing processes were videotaped, with the camera focused specifically on the screen and the equipment was made as unthreatening and unobtrusive as possible. In this study video was used as it was judged that the visual images could offer useful information in the writing process.

After the students had finished their writing, interviews were immediately conducted individually in Chinese language for about 30 minutes each to capture their thoughts about their writing strategy use. The data collected by interviews were compared with and compensated for the think-aloud protocols. In addition, their finished think-aloud writing pieces were gathered and graded again by two experienced EFL writing instructors previously. This action was decided to further ensure that high achieving students’ think-aloud writing still remained higher than those who were categorized as low achieving students in the past. The grades given by the raters to each of the essays again consistently showed that all the high achieving students scored higher than all the low achieving students in the think-aloud writing.

### **3.3 Data Analysis Procedures**

There were two main sets of data for the analysis, videotaped think-aloud protocols and student interviews. As for the think-aloud analysis, the videotapes were coded using a “modified version” of Hayes and Flower coding scheme. Although the Hayes-Flower model (Flower & Hayes 1981; Hayes 1996; Hayes & Flower 1980) seeks to explain what strategies people may use during writing, nevertheless this model is weak in some aspects because it does not provide a “detailed” picture in the cognitive writing process. In other words, Hayes and Flower did not offer complete strategies in the cognitive writing processes. They seemed to oversimplify the complexity of cognitive writing processes. When I adopted the Hayes-Flower coding system for the analysis of the think-aloud data produced by students in my

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<sup>36</sup> Limiting time to 40 minutes was due to the consideration of both practicality and feasibility. The think-aloud could not be sustained for a very long time. In the think-aloud writing, keep talking for a very long period would make people feel extremely tired.

study, I found the categories could not accommodate all the strategies in cognitive writing processes. It thus became very difficult for me to replicate Hayes-Flower studies. In order to solve this problem and to code the think-aloud data systematically, one major issue in analyzing how the students use their strategies was to develop a reliable and valid scheme able to label all the strategies observable in the writing process.

First of all, the major procedures for analyzing the think-aloud protocol data include transcribing all the soundtracks of protocol data documented in the videotapes, segmenting and coding the strategy<sup>37</sup>, counting the number for each strategy, and comparing the intensity of attention in different mental activities across high and low achievers. The videos, as expected, produced useful information in the protocols and increased the precision. For instance, what the students did think-aloud could be heard on the audios but sometimes there was no idea as to what aspect of the text was being done. Whether the students were actually at the particular moment of (1) generating ideas; (2) generating pretext; (3) generating text; or (4) rereading the sentences that they had written before made no difference when the voices/sounds were just listened to the audios and/or when the transcripts were just read and examined. The images on the videos could help trace these areas. For example, an excerpt reads “the technology can provide” (Jane). When we read these words, readers may have no idea what the writer actually did. Even when we listen to the audio, still we do not know what happened at that time. However, when the image in the video is checked, it clearly shows that the writer was at the moment of jotting down the words “the technology can provide.” Thus, by watching the videos and simultaneously following the texts created by the students, it was possible for me to explore the particular functions of the different writing strategies. This enabled me to segment the words (i.e. utterances of strategies) precisely on the paper. The segmenting criterion was based on the points where the students switched from one strategy to another. For example, when a student switched from “reading the sentence part (RP)” to “generating the text (G),” the utterances were segmented into two units (strategies): “what you need is (RP) only to turn on your computer and get access to the internet. (G).” When the coding unit was found inadequate and unsatisfactory, it was modified by adding, deleting and combining/creating new strategies. Think-aloud protocols were coded for frequency of utterance of each strategy. The intensity of attention in different mental activities as measured by repeated use of particular strategies (i.e. utterances of strategies in each sub-process / utterances of strategies in the entire writing processes) was then compared and further statistically analyzed by paired group T-test, SPSS, version 15.0 (SPSS, Inc., 2007) between high and low achievers. The intensity of a particular strategy is very important in this study because it is related to conscious, purposeful use and attention. As indicated in the literature review section, a number of researchers (e.g., Flower and Hayes 1981; Hayes 1996; Scarmadalia & Bereiter 1986) state that writers who are aware of the strategies they use can make a distinction between strategies that are proper or improper for specific writing situations, and are thereupon able to monitor their cognitive processes. They would select, monitor and focus on which strategies or mental activities merit more attention than others and purposefully avoid using strategies which they regarded useless or harmful. This understanding comprises an awareness of the cognitive stores that support performance--the planning and monitoring that enable one to use suitable strategies, to regulate performance, and to measure outcomes.

The coding categories along with descriptions of each are in Appendix. Reliability of the coding of the think-aloud protocols was further ascertained with a second reader, an experienced Chinese EFL educator. The second reader coded approximately 20% of the think-aloud protocols. The inter-rater agreement between the researcher and the second reader was 96%.

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<sup>37</sup> In the past studies, researchers use the word “strategy” to represent people’s particular cognitive operations (e.g. Armengol-Castells 2001; Arndt 1987; Kongpun 1992; Yahya 1994). The utterance of a strategy means people verbalize a certain strategy that they use in the think-aloud.



With respect to the analysis of audio-taped student interviews, all the data were thematically analyzed based on planning, drafting and reviewing, and were translated into English by me.

## 4 RESULTS

### 4.1 Concurrent Think-aloud Protocol Data

The think-aloud protocol data uncovered how the students monitor and focus their attention of strategy in different areas during their writing processes. The strategies employed by the students from starting to read the writing prompt until completing their writings were counted. The 16 different sub-strategies that came out in the data (see Appendix) were clustered into six groups: the reading process, planning process, composing process, reviewing process, miscellaneous process which is less directly related to the writing, and contextual influence (see Table 1). In the following part I will, first of all, discuss strategy found in each major process and compare the intensity of attention (the percentages of utterances of these strategies dominant in utterances of strategies in the entire writing processes) across the groups of high and low achieving students and then the strategies used by these two groups as measured by paired group T-test.

Table 1  
Intensity of Attention: The Breakdown of Strategy Use in Six Major Processes

Processes and Factors	High Achievers		Low Achievers	
	Utterances of Strategies (Number)	Intensity of Attention: (%)	Utterances of Strategies (Number)	Intensity of Attention: (%)
Reading	14	0.7% (-)	26	2.0% (+)
Planning	90	4.4% (-)	143	10.9% (+)
Composing	797	38.7% (-)	510	38.8% (+)
Reviewing	1128	54.7% (+)	613	46.6% (-)
Miscellaneous	26	1.3% (-)	19	1.4% (+)
Contextual Influence	6	0.3% (-)	5	0.4% (+)
Total	2061	100.0%	1316	100.0%

As shown in Table 1, there were two main differences found between the two groups. First, concerning the reading and planning processes, the percentages in low achievers were more than twice the percentages in high achievers. That is to say, low achievers were more involved in reading the prompt and planning than high achievers. This pattern entails that high achievers did not need to do these and could progress towards the other strategies, while low achievers had to go back to reread the writing prompt and to do the planning. Second, regarding the reviewing process, the percentages in high achievers were higher than low achievers. This indicates that high achievers spared more effort to review the texts they had written and reviewing was more important for the high achievers group than for the low achievers group. In other words, higher attention in the reviewing process was likely to be a key element in their writing. As stated by Flower and Hayes (1981) and Hayes (1996), going back to read what has been written is a conscious effort that writers make in order to make judgments of their own written texts.

Table 2  
Paired Group T-test: High- and Low- Achievers (H/L)

	Number: H/L	Mean: H/L	P- value (two-tailed)
<b>1. Reading Prompt</b>			
Reading the Prompt	5/5	2.8/5.2	0.266499
<b>2. Planning</b>			
Formulating the Position	5/5	1/0.2	0.01613*
Interpreting the Writing task	5/5	0.4/1.4	0.394348
Goal Setting	5/5	8.2/8.2	1
Memory Search for Ideas	5/5	2.2/4.4	0.295038
Memory Search for Languages	5/5	1.4/3.2	0.304559
Generating Ideas	5/5	4.8/11.2	0.370201
<b>3. Composing</b>			
Generating Pretext	5/5	25.8/22.4	0.724883
Generating texts	5/5	133.6/79.6	0.047309*
<b>4. Reviewing</b>			
Rereading/Repeating sentence Parts	5/5	104.4/67.8	0.115709
Reading sentence(s)	5/5	14.2/6.4	0.082383
Rereading sentence Parts+ sentence(s)	5/5	118.6/76.2	0.076882
Evaluating the written text	5/5	13.4/6	0.076931
Revising the written text	5/5	27.8/13	0.012093*
Editing the written text	5/5	65.8/29.4	0.044776*
Revising+ Editing the written text	5/5	93.6/42.4	0.020248*
<b>5. Miscellaneous</b>			
Giving general Comments	5/5	5.2/3.8	0.705169
<b>6. Contextual Influence</b>			
Researcher Intervention	5/5	1.2/1	0.871219

Note: \*An alpha level of .05 was chosen as the significance level.

As Table 2 reveals, when the utterances of strategies in the high- and low- achievers groups are further measured by paired group T-test, the results show that they are statistically significantly different in (1) formulating the position ( $p < .05$ ) (2) generating texts ( $p < .05$ ) (3) revising ( $p < .05$ ) (4) editing ( $p < .05$ ) and (5) revising and editing ( $p < .05$ ). In two data sets, T-test can be used to establish whether the means are different, provided that the distributions are normal. Significance levels reveal how likely a result is because of chance. In this study, if T-test indicates that the two groups are statistically differently ( $p < .05$ ), it means that they use their strategies in a very different way and it is not by chance. They do it consciously and purposefully. Thus, in the present study, the pattern indicates that high achievers focused more on formulating the position, producing more texts, making amendments at both the discourse and word levels such as doing meaning changes, and fixing grammatical and spelling errors, while the low achievers group was less likely to do these. It is also noted that all the high achievers in this study formulated their position in whether to agree or disagree in writing the argumentative essays, while only one low achieving student formulated the position in writing the essay. The student writers who could be ranked in the better places seemed to hold a clear position and stood by it.

## 4.2 Video Observation and Interviews with Students

### 4.2.1 Reaction to the Writing Task and Representativeness of the Writing Behavior

In the present study, all the students reported that the essay they had written was as good as they could produce in timed conditions. They thought that forty minutes was enough to write an essay. They also found the topic fairly easy because it was something close to their daily life. However, in their perspectives, there were three major differences between their performance in this writing task and their approach to other conditions: (1) In the daily life, they have a longer time to think about the writing topic, gather ideas and formulate their own viewpoints before writing; (2) Once on completion of their first draft of their essays, usually they have time to leave it some time before coming back to review it and make changes; and (3) On doing the think-aloud writing task, they felt a bit tired because they had to keep speaking out their own thoughts. Aside from such differences, they thought that they approached this writing task in the similar way as they had done under other circumstances. The interpretations they gave with regard to what their normal writing processes were very close to their real behavior on this think-aloud writing task. It also seems that the students could condense their writing processes into the time on hand for this writing task rather than change their behaviors.

## 4.2.2 An Overview of the Students' L2 Writing Process

### 4.2.2.1 Planning

#### 1. High achieving students

##### A. Video observation

At this stage, they made responses, re-examined information and developed a global plan for their writings. There seemed to be four sub-stages.

(1) Preliminary reaction to the writing topic: After reading the writing topic they made the reaction it evoked in them. This reaction to the topic became the focal point of their writing and was later developed into the theme.

(2) Analysis of the writing topic: Having read the writing topic at the outset, they analyzed the demands of the writing topic. After identifying its problems, they tended immediately proceed to jot down the points for the categories identified.

(3) Re-examining the demands of the writing topic: After several minutes of brainstorming ideas on the topic, they returned to the writing topic to refocus on what it required and to review the ideas generated until now. They then further elaborated on their points and/or organization of ideas within the essay while simultaneously integrating and developing these ideas.

(4) Organizing the essay: They organized their essay, attending to both the structure and presentation of content. The act of organizing seemed in effect to be a practice to verify the proposed thinking, organization and content of their essay as well as the way that they would like to articulate their ideas more clearly.

##### B. Discussion.

They were all devoted time to planning the content and organization of their essays before drafting. However, they tended to spend little time planning prior to writing and quickly had a clear approach to make responses to the writing task and then formulate the position in their essays. Two possible explanations are as follows.

(1) The function that writing plays in the process. As Jane explained in her interview, writing was for her a means of discovering and clarifying what she wanted to say. "I would at first think what my opinion is. And then I need to clear up my mind and search for the thoughts. After that, I arrange the themes accordingly with an outline. Lastly, I follow the outline to write." In other words, she tried nut-shelled her whole idea, tried to diagram the major points, and did an outline to help her see a schematic representation of what she had. This may reflect that the student generated their ideas at first and then did the grouping according to the theme.

(2) The nature of the task. The time-constrained essay question may have discouraged an extremely complicated planning process, they have been very conscious of the time restriction and therefore did free writing and organizing at first and then hurried onto the drafting. For

example, Paul said it was somewhat regular for him to quickly keep going back over his ideas to make sure he organized well. "I would think about the outline. If the topic is what I can think immediately, I would write down the organization at first. That is, what I can write in the first paragraph and then the second paragraph etc. If the topic is what I cannot think straight away, I would write down all the things I can have and then cross out what I don't have so many ideas. And then I organize what I have in the remaining ideas." In this excerpt, when the student encountered the difficulties in idea generating, he would do free writing and then do the linking based on its relevancy and necessity.

## 2. Low achieving students

### A. Video observation

The planning stage could be divided into two sub-stages:

(1) Reaction to the writing topic: After reading the writing topic, they began to generate ideas, but did not seem to intend to make effort to organize or structure these ideas.

(2) Brainstorming: They kept generating ideas on the topic they had initially identified. Their planning behavior did not appear to go beyond this. After each idea, they returned to the writing topic; however, this was only a strategy to generate more ideas and did not result in any re-examination or development of their writing. Unlike high achieving students, as the large amount of time spent at this stage, they made no obvious effort to plan the clear structure in the argument in their essays.

### B. Discussion.

There was no apparent organizing behavior recorded in the videotapes although their written texts reflected the basic organization of introduction, body and conclusion. They seemed to have made little attempt to organize ideas. For example, in the interview with Maria, she had some problems in organizing her thoughts. Almost all of Maria's planning decisions concerned content and what to write next. She reported "I kept having the problems in organizing my thoughts. I just wanted to write down what I could think about. I think I really need to improve my writing." Again, very little of Sue's planning decisions were captured in the videotape. Although, as they mentioned in their interviews, they both tried to achieve an overall plan of introduction, body and conclusion, there was a few record of their having made such a decision. They spent more time on struggling in planning and appeared to be concerned with what to write next immediately rather than overall global plans.

## 4.2.2.2 Drafting

### A. Video observation

#### 1. High achieving students

For high achieving students, drafting was a very recursive process; all the way through writing words or sentences they would stop to plan, reread, evaluate and revise their texts before going ahead. Their drafting behavior included the events when they recapped the content or structure of their existing texts. Probably this writing process reflected a well developed method in writing timed essays.

#### 2. Low achieving students

The drafting process of low achieving students seemed to be much less recursive than that of high achieving students. For example, in Maria's drafting stage, she did not move on writing a lot. It seemed to be a very difficult and frustrating experience.

### B. Discussion

The major difference was in the level of recursiveness of the writing process between high and low achieving students. For high achieving students, the purpose of drafting seemed to ascertain what they had written so far in terms of their overall plan for the essay, so as to either verify or adjust their plans for the additional development. For example, Paul said "I wanted to write more in detail and my points to be more obvious and stand-out. The strength of this essay was that at least there were three reasons with examples over there. I wrote an outline and told readers where my supporting details were." However, for low achieving

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students, there was much less back and forth movement in the texts. Their developing texts did not appear to create opportunities. They did not give sufficient examples to strengthen the argument in their essays. For example, Linda said “I thought each point could be elaborated in more depth and width. I did not clearly indicate some things. I felt I did not achieve such standard and the supporting details were quite general.”

#### 4.2.2.3 Reviewing

##### A. Video observation

###### 1. High achieving students

This was a time for reviewing the entire essay but in particular for examining matters of style such as vocabulary and sentence structure, and checking for errors. All the high achieving students reviewed their essays all the way through. For example, Gina, Alice, Jane and Diana made a number of changes when they read their essays until completion. They appeared to ensure that they had not omitted any information. Paul recapped the structure of his essay, read it through carefully and did a final edit.

###### B. Discussion

All the students said they normally re-read their whole essays at least once to check that they “think right.” As a matter of fact, in their interviews, they said that they normally, if at all possible, review their essays oftentimes, because this helps them identify the aspects that need revising. They ask questions, return to the question, go back to reread and so forth. They write and rewrite, continually revising, as they are drafting. For example, Gina said that she spent a lot of time reviewing her essay during writing. It was in the process of revising that she pushed her analysis further and further, expanded on significant points of the argument, and most importantly, made connections among all kinds of things. She would re-position herself to examine her essay through the revision.

When I finish writing a sentence, I would put myself as a reader to examine whether the sentence needs further explanation. If it is needed, I would do further illustration. Instead of directly skipping to the next sentence, I would position myself as a reader to check... Thereupon I would go back to read when I finish writing a part and see whether any revision needs to be made in order to make the meaning more clearly. I need to let the readers know what I intend to express and do not make mistake. This is very important.

In other words, when Gina read her written text through, she imagined as if she was reading an article, and tried to see if it was smooth and clear. When she revised, she reworked sentences, concepts and thoughts, and the links among them. That was how the revising process could give rise to synthesis: instead of merely producing a series of summaries, she developed a more complex argument that built on these summaries to construct something greater than the sum of the pieces.

###### 2. Low achieving students

##### A. Video observation

A typical instance at this stage for example, can be found in Linda. The first time when she completed her essay, she glanced through her written text very quickly and made very few changes. As reported in her interview, she put it, “I think this writing is enough for me. I just want to finish it as soon as possible.”

##### B. Discussion.

Unlike high achieving students, for low achieving students, completion of their essays did not signal a new stage for them, a stage that they reviewed what they had written. It may be because they were unaware of the possibilities for revision in their texts. As noted in the L2 literature (Zamel 1983), unskilled writers have a limited concept of what the writing task involves. They view writing assignments as perfunctory duties, things to be completed but not

lingered on or savored. Indeed, writers of eminent, high-quality pieces of work often need to revise and revise until the moment when they send their text off to do the work for which it was proposed. Revision is hard work; however it is perhaps one of the most valuable and essential work that the student can do to become a better writer and bring out the best in it.

## 5 OVERALL DISCUSSION AND CONCLUSION

With the aim of contributing to L2 writing, the current study's findings suggest that low achieving students did not state their position clearly, exerted less attempts in generate texts, and reviewed their work less. In contrast, high achieving students concentrated more on clearly stating their position in planning, generating more texts, and revising and editing more during reviewing.

First, in terms of planning, contrary to the previous L2 findings in the comparison between skilled and unskilled writers (see section 2.3), high achieving students in the present study, planned less, but they demonstrated a more concern for the aspects of global planning such as organization and style, and devised clear goal formation strategies to solve their problems, whereas low achieving students did not have this strategic knowledge for establishing clear writing plans and were unclear in their mind through writing. It may be that high achieving students already had a lot in place before the writing and were able to address the writing prompt appropriately. Low achieving students may not have had as much background knowledge or experience, which could account for their lack of clear position statement.

Second, in terms of text generating, in comparison with low achieving students, high achieving students exerted more efforts on texts generating. This behavior indicated that they were likely to be more motivated in order to be productive. In addition, their writing behavior was more recursive. This was possibly for them to make sure what they had written so far in relation to their overall plan for the essay, with the aim of reassuring their plans originally thought and also with a view to further development in their writing later.

Third, in terms of reviewing, although all the students participated in this study indicated they had sufficient time to write and finished their writing in time, L2 high achieving writers behaved somehow similar to those documented in L1 writing literature. They were engaged more in high level reflective activity in reviewing (Hayes & Flower 1986). However, in comparison with high achieving students, low achieving students did not have the awareness of constantly rethinking and reflecting the texts of what they had written and they tended to stop earlier than high achieving students when they thought they had finished their writing. This may also be the aspect low achieving students had to conquer. This result parallels Scardamalia and Bereiter's (1987) L1 writing research. That is, expert writers have effective knowledge-transforming processes that foster them to solve writing via reflection that brings about problem analysis. In contrast, novice writers attend more on accessing and generating ideas in planning as a strategy for making the writing controllable. The present study, however, is contrast to the previous L2 findings compared between skilled and unskilled writers (see section 2.3). In the present study, high achieving students were concerned more with not only the discourse level, but also the word level.

Finally, in terms of implications for teaching, teachers may need to think about the problems that low achieving students were encountered and then try to figure out a way to help them. The lack of clear global-level planning processing activities among these low achieving students denotes a call for instruction in which strategies to raise awareness in writing. The teachers may need to help students how to make their position statement clearly and organize their thoughts more coherently in the teaching writing activities. In addition, they may also need to think about how to encourage the students to be more productive and to rethink and revise their own texts regularly, which are perhaps also some of the important methods towards the development of metacognitive awareness.

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## APPENDIX

### The Think-aloud Protocol Coding Scheme

<p><b>Reading</b></p> <p><u>1. RP Reading the Prompt</u> Reading the prompt refers to the act of reading or rereading the writing prompt.</p>
<p><b>Planning</b></p> <p><u>2. FP Formulating the Position</u> Formulating the position refers to the mental activity of expressing the intention to take the position in whether to agree/disagree. Example: "I must agree that people nowadays can learn more information and learn it more quickly with the help of technology." (Jane)</p> <p><u>3. IW Interpreting the Writing Task</u> Interpreting the writing task refers to the process of responding to the prompt and defining the task. Example: "I think that's the topic of this essay." (Sue)</p> <p><u>4. GS Goal Setting</u> Goal setting refers to the process of making plans for what to do and/or what to write about. Example: "Make a conclusion I think. Go back. Have a look." (Alice)</p> <p><u>5. MS(I) Memory Search for Ideas</u> Memory search for ideas refers to the process in which a writer asks a question in order to generate sentences or ideas. Example: "□□ □□□□ (for example, what kind of example?)" (Maria).</p> <p><u>6. MS(L) Memory Search for Languages</u> Memory search for languages refers to the process in which a writer asks a question in order to find a word or expression to use. Example: "□□□□ (how to spell exaggerate)" (Maria).</p> <p><u>7. GI Generating Ideas</u> Generating ideas refers to the process of retrieving information from long-term memory. The process can be observed when a writer mentions his/her experiences that are related to the writing tasks. Example: "I should give some contrast to show how technology makes people learn quickly. Learn it more quickly." (Sue).</p>
<p><b>Composing</b></p> <p><u>8. GP Generating Pretext</u> Pretext refers to the words or expressions that are rehearsed in a writer's mind just shortly before they are actually written. When the utterance corresponds closely to the words that are usually immediately written after the rehearsing act, the act of producing the utterance will be categorized as "generating pretext" rather than "generating ideas." Example: "<u>the technology can provide (GP) the technology can provide (G)</u>" (Jane).</p> <p><u>9. G Generating text (Translating)</u> Generating text refers to the act of actually writing down the words and/or sentences.</p>
<p><b>Reviewing</b></p> <p><u>10. RP Reading/Repeating sentence Parts in the written text</u> Rereading/Repeating sentence parts in the written text refers the process of rereading or repeating the key words or sentence parts after they have written.</p> <p><u>11. R Reading sentence(s)</u> The process of reading a sentence or a group of sentences is an important part of the</p>

review process. Evaluative comments and revising behaviors usually follow the process of reading one's own text.

**12. EV Evaluating the written text**

Evaluating the written text refers to the act of making evaluative comments of the written text.

Example: "It's technology. *Not only* computer." (Jane).

**13. RV Revising the written text**

Revising the written text refers to the meaning changes are made usually after the writer rereads/evaluates his/her own text such as deleting a word(s)/sentence(s), changing major ideas, altering logic of argument or reorganizing ideas.

**14. E Editing the written text**

Editing the written text refers to making the changes that do not result in a meaning change such as fixing the grammatical or mechanical errors or such as correcting the spelling, punctuation, etc.

**Miscellaneous Process**

**15. GC Giving general Comments**

Giving general comments refers to the utterances that are less directly related to the process of writing, but are found in the think-aloud procedure.

Example: "I think the keyboard is a bit strange." (Sue).

**Contextual Influence**

**16. RI Researcher Intervention**

Researcher intervention refers the researcher's remarks indicating the need to remind the writers to verbalize their thoughts or raise their voice.

Example: "□□□□□ (Speak out)" (Alice).

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