Language Learners' Use of Metacognitive Strategies in Face-to-Face and Computer-Mediated Discussions

Ming Yee Carissa Young, PhD

A dissertation submitted in partial fulfilment of

the requirements for the degree of

Master of Arts in Information and Communications Technology in Education

University of London, Institute of Education

12 September 2002

Abstract

While language learners' behaviours in face-to-face and computer-mediated discussions have been studied, their use of metacognitive strategies -- actions taken to plan for learning, monitor discussion and evaluate task performance -- has not been explored. Therefore, this study examined the metacognitive strategies used by language learners in the two discussion modes.

Eight Chinese postgraduates studying in Singapore were allocated to two groups. One group completed a discussion task in the face-to-face mode while the other completed the same task in the text-based computer-mediated communication mode. Immediately after task, the students gave individual retrospective verbal reports on their thought processes. The reports were transcribed and analysed for identification of metacognitive strategies using a strategy inventory proposed in previous empirical studies.

Quantitative analysis of the verbal reports and student worksheets indicated that both groups used similar number of metacognitive strategies to complete the discussion task, although those students who had a discussion in the computer-mediated communication mode could develop ideas more logically. Qualitative analysis revealed students' clustered use of some metacognitive strategies such as Planning and Evaluating, which has not been mentioned in the literature and therefore deserves more research attention. Based on the finding that some students in this study did not use metacognitive strategies effectively, tutors may like to increase their students' awareness of effective metacognitive strategy use in face-to-face and computer-mediated discussions.

Acknowledgements

I would like to thank my supervisor and mentor Dr Paul Dowling for his valuable feedback on the earlier drafts of this work. Without his guidance and support, this dissertation would not have been the same.

I am especially grateful to the anonymous participants for giving me information about face-to-face and computer-mediated discussions.

I wish to express my gratitude to the anonymous expert marker for marking the student worksheets and for commenting on the earlier draft of the marking scheme.

I am grateful to the Centre for English Language Communication at the National University of Singapore for giving me permission to use the recording equipment and computer facilities.

Most of all, I thank my family members: my father Kwok Chu, mother Wai Ling, sister Julia, and brother Karl, whose love and encouragement make all my work possible and worthwhile.

Contents

Tables and Figures

1 Introduction

This chapter describes the background and purposes of the present study. It provides a definition of key terms and briefly describes the organisation of the dissertation.

1.1 Background

At the beginning of the new millennium, we are witnessing a surge of information and communications technologies (ICTs) into the academic world. The application of ICTs to education ranges from the use of the Local Area Networks for teaching and research, to the use of the Internet for communication and collaboration within and among academic institutes.

Within the language learning community, the ICT which has been frequently applied to language teaching and learning is the Internet. This is because so long as users have access to the networked computers, they could teach or learn as well as share information about language teaching or learning without being bound by time and space (Warschauer, Shetzer, & Meloni, 2000).

One of the most common ways of using the Internet for language teaching/learning is computer-mediated communication (CMC). In CMC activities, teachers and students communicate in real time via online chat rooms, instant messaging, or videoconferencing in virtual learning environments (Dabbagh, 2002). The advantages of CMC are that students could express their opinions at the same time without interruption and that students have more time to read their peers' or teacher's comments at their own pace (Kelm, 1992).

Previous studies on CMC programmes have shown that students have positive attitudes towards this mode of communication (Sullivan & Pratt, 1996). Also, some studies conclude that there appear to be more student-student interactions in computer-mediated discussions than in face-to-face discussions (Kelm, 1992; Sullivan & Pratt, 1996; Warschauer, 1996). Furthermore, results of previous studies suggest that the use of language in face-to-face discussions differs from that in computer-mediated discussions (Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996; Sengupta, 2001).

Whereas learners' social interaction and language use in the two communication modes have been studied, individual differences such as learners' strategies use in language discussion tasks in the face-to-face and CMC modes have not been explored (Chapelle, 1997; Ortega, 1997; Salaberry, 1999; Liou, 2000).

The use of learner strategies, especially metacognitive strategies, that is, actions for "planning for learning, monitoring one's own comprehension and production, and evaluating how well one has achieved a learning objective" (Chamot & O'Malley, 1994:60) would be of great importance for language learning in the electronic mode (Jamieson & Chapelle, 1987; Chapelle & Mizuno, 1989; Bull, 1997; Liou, 1997). A better understanding of learners' planning, monitoring and evaluating of learning would help teachers and researchers develop online learning activities which are more suitable for the learners.

In the learner strategy literature, a few previous studies have argued that students having discussions in the CMC mode would have more time to plan for learning before typing their messages (Kelm, 1992; Bull, 1997; Ortega, 1997). Also, students could monitor and evaluate their learning with the assistance of computer tracking (Liou, 2000). However, since the above opinions are speculative, it would appear that empirical comparative studies of face-to-face discussions and computer-mediated discussions in terms of learners' metacognitive strategy use are needed.

1.2 The Purposes of this Study

The primary aim of this study was to compare and contrast English-as-a-Foreign Language (EFL) learners' metacognitive strategy use in small group discussions in the face-to-face and CMC modes. Also, it aimed to determine whether or not the two modes of discussion would affect students' accomplishment of language tasks. This study addressed the following research questions:

1. What metacognitive strategies do the students use in face-to-face discussions and computer-mediated discussions?
2. Are there any similarities and differences in the students' metacognitive strategy use in face-to-face discussions and computer-mediated discussions?
3. Are there any similarities and differences in the students' participation in face-to-face discussions and computer-mediated discussions?

4. Are there any similarities and differences in the students' completion of language tasks in face-to-face discussions and computer-mediated discussions?

This study may reveal EFL learners' metacognitive strategy use in face-to-face discussions and computer-mediated discussions. Besides, the results of this study may determine whether or not learners' performances differ in the two learning environments, which could be useful to researchers as well as educators responsible for designing discussion tasks for EFL courses.

1.3 Definition of Terms

The key terms used in this dissertation are defined below.

Learner strategies are actions one takes to help one enhance learning results (Chamot & O'Malley, 1994). The learner strategies discussed in this dissertation are *metacognitive strategies*.

Metacognitive strategies are actions one takes to plan for learning, to monitor one's own comprehension/production, or to evaluate the extent to which a learning goal has been reached (O'Malley & Chamot, 1990; Chamot & O'Malley, 1994).

Computer-mediated communication (CMC) is one-to-one or many-to-many online communications via networked computers (Warschauer et al., 2000).

Integrated Virtual Learning Environment (IVLE) is a web-based courseware management system designed and developed by the National University of Singapore, Republic of Singapore. IVLE offers a wide variety of web-based tools such as chat room, discussion forum, and auto-marked quizzes to enrich those course websites developed in this virtual learning environment (National University of Singapore, n.d.-a).

IVLE Chat Room is the CMC tool used in this study. IVLE Chat Room is a web-based tool which supports real time text-based communication among staff and students at the National University of Singapore (National University of Singapore, n.d.-b).

1.4 Organisation of this Dissertation

The rest of this dissertation is organised as follows. Chapter 2 includes a description of metacognitive strategy theories, a review of related studies on learner strategy use in face-to-face and computer-mediated language activities, and a discussion of methodological issues in collecting strategy data in face-to-face and computer-mediated discussions. Chapter 3 describes the methods used in the present study. Chapter 4 reports on the results of quantitative analysis of the participants' metacognitive strategy use and task performance in the two communication modes. Chapter 5 discusses the results of qualitative analysis of the students' verbal reports and interviews. Finally Chapter 6 concludes this study on the basis of the quantitative and qualitative analyses, and provides possible directions for teaching and research.

2 Literature Review

This chapter introduces some basic concepts of metacognitive strategy and reviews previous studies on learner strategy use in face-to-face and computer-mediated language learning activities. Also this chapter addresses the methodological issues regarding strategy data collection and describes the present approach in gathering strategy data in face-to-face and online discussions.

2.1 Language Learning from an Information Processing Perspective

In the computer-assisted language learning literature, there are currently three possible approaches to the study of computer-mediated language learning: structural, socio-cognitive and cognitive (Kern & Warschauer, 2000). In this dissertation, I will take the cognitive approach and view humans as active processors of information. In this theory, a cognitive process is "a sequence of internal states successively transformed by a series of information processes" (Ericsson & Simon, 1993:11). Information is stored in various memories with different capacities and accessing time: sensory stores have the shortest duration; short-term memory has relatively longer duration and limited capacity while long-term memory has the largest capacity and longest storage duration.

Information processing begins when information is through the sensory organs. Such information is further processed through recognition process and/or association process. In the recognition process, sensory information is directly

recognised and encoded if a familiar pattern exists in long-term memory. In the association process, sensory information is associated with the existing patterns in long-term memory, which are then retrieved from long-term memory and stored in short-term memory for further processing (Ericsson & Simon, 1993). Information resides in short-term memory only when the central processor is attending to it; unattended information will be lost permanently (Atkinson & Shiffrin, 1971). Since short-term memory has limited capacity, it can only process a small amount of familiar patterns at one time. When new information is processed, the previous information may be lost. In order for the attended information to be recalled later, information stored in short-term memory must be transferred to long-term memory.

When processing language information, learners actively choose the type and amount of language information for further processing. They organise the information and associate it with what they already know. They also replace old information with new information and reflect upon the success of their language learning from time to time. Language learning is regarded as successful if learners can use the language information in suitable contexts (Chamot & O'Malley, 1994).

2.2 The Role of Strategies in Second/Foreign Language Information Processing

In theory, learners find it more difficult to process second/foreign language information because the memory span for second/foreign language input is

shorter than that for first language input (McLaughlin, Rossman, & McLeod, 1983). Therefore, the amount of attention paid and the quality of information processing are essential for successful second/foreign language learning.

Successful language learners use strategies to help them process language information (Bialystok, 1978). Learning strategies, or the “optional methods for exploiting available information to increase the proficiency of second language learning” (Bialystok, 1978:76), are used to enhance information processing when there is a gap between the new information and the learners’ existing knowledge. These strategies include “formal practicing”, which increases the explicit knowledge of the code to master the rule system of the new language; “function practicing”, which increases the learners’ opportunity to communicate in the second/foreign language; “inferencing”, which helps learners construct meaning from the unknown linguistic input; and “monitoring”, which brings information from the explicit linguistic knowledge to control the processing. The last category of strategy is referred to as a metacognitive strategy in this study.

2.3 Metacognitive Strategies and Language Learning

In this study, *metacognitive strategies* is defined as actions one takes to plan for learning, to monitor one’s own comprehension/production, or to evaluate the extent to which a learning goal has been reached (O'Malley & Chamot, 1990; Chamot & O'Malley, 1994). In the strategy literature, Chamot and O’Malley have conducted a series of empirical research based on information processing theories and proposed a comprehensive list of learner strategies. Since

categorisation of strategies is not the focus of this study, a metacognitive strategy scheme proposed by Chamot & O'Malley (1994) is used (Table 1.1).

Table 1.1 Metacognitive Strategy Scheme

Metacognitive Strategy	**Strategy Name**	**Strategy Description**	**Strategy Definition**
Planning	Advance Organisation	Preview Skim Gist	Previewing the main ideas and concepts of a text; identifying the organizing principle
	Organisational Planning	Plan what to do	Planning how to accomplish the learning task; planning the parts and sequence of ideas to express
	Selective Attention	Listen or read selectively Scan Find specific information	Attending to key words, phrases, ideas, linguistic markers, types of information
	Self-management	Plan when, where, and how to study	Seeking or arranging the conditions that help one learn
Monitoring	Monitoring Comprehension	Think while listening/reading	Checking one's comprehension during listening or reading
	Monitoring Production	Think while speaking/writing	Checking one's oral or written production while it is taking place
Evaluating	Self-assessment	Check back Keep a learning log Reflect on what you learned	Judging how well one has accomplished a learning task

(Source: Chamot & O'Malley, 1994:62)

As shown in Table 1.1, there are three categories of metacognitive strategies, namely, *Planning*, *Monitoring* and *Evaluating*. Under these categories, there are seven subcategories of metacognitive strategies. According to Chamot and O'Malley (1994), metacognitive strategies can be used by learners before, during and after a task. Learners use metacognitive strategies to plan for a task, to check how the plan is being carried out during task, and evaluate the learning outcomes after task.

Regarding the use of Planning, learners who take part in face-to-face discussions can use *Advance Organisation* to listen to others and plan for their responses before speaking. They could use *Selective Attention* to focus on some key terms of phrases of others. In online discussions, learners might use Advance Organisation to skim the messages and plan for their responses. They could also use Selective Attention to focus on certain key words, phrases, or other types of information. Since they have time to plan for their responses, they could use *Self-management* to plan when and how they would respond to others. In both face-to-face and online discussions, learners can use the metacognitive strategy *Organisational Planning* to create an outline or structure for the discussion.

As for the use of Monitoring, it appears that learners could use *Monitoring Comprehension* to check their listening comprehension of what others say and use *Monitoring Production* to check their own responses in face-to-face discussions. In theory, the above two strategies could also be used by learners to check their reading comprehension and writing in online discussion.

The use of Evaluating might be used when learners have finished their discussions on a certain topic. They could check how much they have learned after a task has been completed. It seems that the strategy *Self-assessment* could be use in both face-to-face and computer-mediated discussions.

Thirty years of language learning strategy research has provided empirical evidence that the use of metacognitive strategies is essential to the processing

of language information (O'Malley & Chamot, 1990; Chamot & O'Malley, 1994). However, certain issues remain controversial. For example, it has been argued that the successful completion of a language task depends on the how effectively rather than how many metacognitive strategies are used (Cohen, 1998). Also, it has been proposed that some learners use a cluster of strategies to help them accomplish language tasks (McDonough, 1996, 1999). Therefore, new studies are needed to describe how learners use these metacognitive strategies during face-to-face and computer-mediated discussions.

2.4 Previous Studies on Language Learners' Behaviours during Face-to-Face and Computer-Mediated Discussions

As mentioned in Chapter One, numerous studies have been conducted to compare face-to-face discussion with computer-mediated discussion; yet very few published papers have focused on the learners' metacognitive strategy use in these discussion modes. For this reason, the literature review is organised as follows. I would review the related comparative studies of face-to-face and computer-mediated discussions. Then I would critique the few strategy studies on computer-assisted language learning.

2.4.1 Comparative Studies on Face-to-Face and Computer-Mediated Discussions

Previous studies on language learners' participation in face-to-face and computer-mediated discussions have explored the turn-taking behaviours, online discourse and equality among students (Kern, 1995; Warschauer, 1996).

In a comparative study on students' participation and language use in face-to-face and computer-mediated discussions (Kern, 1995), French learners commented on a French article in face-to-face and computer-mediated discussion groups comprising 14 and 18 students respectively. Student participation was measured by frequency of turn-taking and number of T-units (independent clauses and accompanying modifiers). Kern found that the students took more turns in the computer-mediated discussion group (3 to 23 turns per student) than in the face-to-face oral discussion group (0 to 5.4 turns per student). The students also produced more T-units in the virtual environment than in the natural environment. Moreover, the student evaluation results indicated that over 90 percent of the students viewed that computer-mediated discussion was an appropriate supplementary language activity.

Whereas Kern's (1995) study showed greater and more equal student participation in computer-mediated discussion than in face-to-face discussion, the study seems to have a fundamental methodological problem: the two discussion sessions were managed very differently. According to the report, the tutor took over 80 turns in the face-to-face discussion but took 0 turn in the computer-mediated discussion. Such tutor interference appeared to have lowered the rate of student participation in the oral discussions. As such, Kern's conclusion that students participated more actively and equally in computer-mediated discussions than in face-to-face discussions was less justifiable.

A similar comparative study argued that students could participate more equally in computer-mediated discussion (Warschauer, 1996). In Warschauer's study, 16 international students learning English in an American community college were allocated to four small groups, each of which had a 15-minute discussion in the face-to-face mode and then in a text-based online discussion platform called Daedalus InterChange. The number of words used by individual students in each discussion session was tallied. The students were asked to comment on computer-mediated discussion. To analyse the data, the relationship between discussion mode and factors such as nationality, gender, student attitudes, and language complexity were statistically tested.

Three findings in Warschauer (1996) are of interest to the present study. The researcher used statistical results to show that students' participation increased when they had discussions in the online mode. Like Kern (1995), Warschauer (1996) argues that students had positive attitudes towards computer-mediated discussion. Finally, it claimed that students could construct more complicated sentences online. Based on these findings, the researcher concluded that computer-mediated discussion could enhance equal student participation and facilitate English learning.

While statistical data are used to justify the conclusions, there are several methodological weaknesses in Warschauer's (1996) work. First of all, it is less practical to perform any statistical tests since the sample size of his work was rather small. The results thus obtained could not possibly show the relationship between discussion mode and factors like nationality and student participation.

Also, the study was initially designed to determine whether males and females could participate more equally in computer-mediated discussions. However, the imbalanced male-female ratio (2:14) made it not possible for the researcher to address this question.

To avoid the shortcomings of the above mentioned comparative studies, the present study was exploratory and did not include any statistical tests. Also, the researcher-tutor did not participate in any of the discussion sessions to ensure that the discussions were equally managed. To answer the third research question about students' participation, the present study included qualitative analysis of students' retrospective reports and interview results to complement descriptive statistics.

2.4.2 Strategy Use in Computer-Assisted Language Learning Activities

There is very little research on the possible use of learner strategies in computer-assisted language learning (CALL) activities. In an earlier CALL study, Jamieson and Chapelle (1987) inferred from their computer tracking data and argued that three metacognitive strategies might be used when 33 international EFL students of an American university were engaged in audio dictation and spelling activities (Jamieson & Chapelle, 1987). When students finished listening to an audio input, they might use the metacognitive strategy "advanced preparation" (referred to as "Advance Organisation" in this study) before pressing the key to answer a question. Also, they might use the strategy "monitoring output" (known as "Monitoring Production" in this study) when the students edit the answers. When the students determined the number of times

they would like to listen to the audio input again, they might be using the strategy “monitoring input” (referred to as “Monitoring Comprehension” in this work).

While the results of the above study showed that several metacognitive strategies were used by the students, such results might be less reliable for two reasons. First, the strategies were coded by the researchers and the coding results were not counterchecked by other mechanisms such as inter-coder reliability check. Without follow-up analysis, the reliability of the researchers’ judgment might be questionable. Besides, the computer tracking method was not verified by any other data collection methods. As the researchers mentioned in their report, in order to accurately access students’ strategy use when performing computer-mediated tasks, data collection methods such as computer tracking should be triangulated with other methods such as questionnaires and verbal reporting (Jamieson & Chapelle, 1987).

Similar results were found in a study on computer-mediated grammar program (Chapelle & Mizuno, 1989). In this project, the strategy use of 13 international students studying English grammar in an American university was compared. The students were allocated to a high proficiency group and a low proficiency group based on their English placement test scores. The two groups were studied while the students were doing a CALL grammar task (English subject-verb agreement). Their interactions with the computers were recorded and the frequency of strategy use was tallied by computer tracking. The results of quantitative analyses did not show any significant differences between the high

and low proficiency groups in terms of the time students spent on the task and the sentences produced. Also, the two groups did not have any systematic differences in the use of strategies. While the researchers concluded that language proficiency level might not be a factor that affects students' strategy use in CALL activities, they noted that the cell size and sample size were small and therefore suggested that the results should be verified by other related empirical studies.

Chapelle and Mizuno (1989) also claimed that the students used those metacognitive strategies identified in the literature (Wenden & Rubin, 1987; O'Malley & Chamot, 1990), but these students did not always use the metacognitive strategies effectively when performing the CALL task. According to the researchers, the students used "self-monitoring" to check the linguistic output, "self-management" to understand and create conditions for learning, and "self-evaluation" to assess ones own learning and learning needs. While the researchers observed that some students did not appear to use strategies in an appropriate manner, the researchers could not provide any empirical evidence to prove their point. This is because Chapelle and Mizuno did not further analyse the students' behaviours qualitatively. Had the researchers used qualitative analysis methods to complement their quantitative ones, such inappropriate strategy use could have been identified and reported. In the present study, the two analysis techniques were triangulated in order to obtain a more holistic view of students' metacognitive strategy use.

Another related study suggests that students might use various metacognitive strategies to facilitate computer-user interaction in a CALL grammar lesson (Bull, Pain, & Brna, 1993; Bull, 1997). Using the network of metacognitive strategies proposed by O'Malley and Chamot (1990), Bull speculated that adult learners might use metacognitive strategies such as "advance organisation", "advance preparation", "organisational planning", "selective attention" and "self-management when learning Portuguese pronouns on the computer. However, the reports did not state clearly what methods were used to collect the strategy data, nor did they provide any examples to support the researchers' claims. Hence the results of these studies could not possibly be compared with those of other studies. To solve this problem, the qualitative results reported in this study were supported by ample examples taken from the students' verbal reports. This approach could help other researchers to see what metacognitive strategies are actually used and how learners use these strategies.

A study using verbal reporting and computer tracking as data collection methods suggests that students use online help as a strategy in interactive computer assisted listening comprehension activities (Liou, 1997). The participants of Liou's study were 20 university level Chinese EFL students from Taiwan. These students were allocated to an "ineffective" group and an "effective" group based on students' *TOEFL* scores, researcher's observation and tutors' feedback. The students watched an unspecified self-paced interactive videodisc programme during the data collection session. They were interrupted at certain intervals and prompted to answer 54 comprehension questions. During this time, they were also prompted by the researcher to give

verbal reports on what they were thinking. An instance of strategy use was defined as each time a student made an online help request such as pause or replay of the video material, repetition of the sentences, or word search. The frequency of strategy use was recorded by computer tracking. Liou did not report any systematic differences between the “ineffective” and “effective” groups.

The justifiability of Liou’s (1997) study appears to be questionable since the study compared the performance of first year and second year students, who might have different abilities. However, Liou’s paper is of interest to the present study in that it reports that some students used organisational devices to focus on information, which is similar to the metacognitive strategy Planning examined in this study. Nevertheless, Liou’s paper does not include any detailed discussion on the qualitative analysis of the verbal reports. Neither does it include any excerpts of the students’ protocols to justify Liou’s claim. As such, this dissertation discusses the qualitative results in detail and provides evidence to support the arguments.

Based on the above literature review, it would appear that there is inadequate research on learners’ metacognitive strategy use in computer mediated language learning activities, as argued by other CALL professionals (Chapelle, 1997; Ortega, 1997; Salaberry, 1999; Liou, 2000). Since there is no published work on the comparison of students’ metacognitive strategy use in face-to-face discussions and online discussions, this study aimed to explore this neglected area.

2.5 Approaches to Collecting Strategy Data in Face-to-Face and Computer-Mediated Discussions

A possible reason for the lack of published works on strategy research in online discussion is that it is difficult to collect strategy data. Since the use of strategies by students cannot possibly be observed, there are limited data collection methods which could be used to assess strategy use. In the language learning strategy field, researchers have extensive discussions about the use of different data collection procedures for assessing strategy use (O'Malley & Chamot, 1990; McDonough, 1995; Anderson & Vandergrift, 1996; Cohen & Scott, 1996; Liou, 2000).

There are five possible approaches which are suitable for the present study: interviews and strategy questionnaires, observation, learner diaries, computer tracking and verbal reporting. However, each of these approaches has its advantages and disadvantages (Cohen, 1998).

Interviews and strategy questionnaires have been used to collect data from a large group of learners. Using statistical tests such as factor analyses, researchers could examine the association of learner strategy use with factors such as gender, learning style, and language proficiency. The most popular example of strategy questionnaire is the *Strategy Inventory for Language Learning* (Oxford, 1990), which has been administered to thousands of language learners worldwide since the 1980s (Oxford, 1996; Cohen, 1998). This method, however, does not provide researchers with data on "how"

learners use strategies during task. It only reveals the possible strategies that the learners think they would use when learning a language.

Classroom observation is one of the methods used in earlier strategy studies. This method allows the researchers to gather strategy data in classroom settings. It also enables researchers to understand strategy use in student-student and student-teacher interactions (Hosenfeld, 1976). However, given the intrinsic nature of strategy use, observation might be more useful in collecting strategy data during face-to-face discussions than in obtaining strategy data during computer-mediated discussions. Besides, the presence of a researcher in a classroom might affect the behaviours of the students (McDonough, 1995).

Learner diaries could be used to record learners' self-observation of strategy use. This method could provide researchers with rich data on how learners use strategies to solve language learning problems. Also it could allow researchers to understand learners' improvement in their strategy use over time (Nunan, 1996; Young, 2001). For a cross-sectional study such as the present one, however learner diaries may only reveal the students' reflection on their strategy use in one discussion session.

Computer tracking refers to the use of computer logs to keep a record of learners' use of strategies like the use of online help functions (Liou, 1997). The advantages of computer tracking are that it could minimise the interference of the researchers and that it could gather data automatically. Like questionnaire, however, computer tracking cannot provide researchers with information about

how learners use strategies to complete a language task. Also, this new method can only collect data on limited types of strategies (Cohen & Scott, 1996).

Verbal reporting is a commonly used method in cognitive psychological research. Based on the data collection timing, there are two types of verbal reporting: introspection/think-aloud and immediate recall/retrospection verbal reporting. In an introspection/think-aloud verbal reporting session, learners report on what they are thinking while performing a task. The advantage of this method is that learners report on their thought processes while the information is being attended to. However, such method might not be suitable for this study because learners cannot think aloud while having face-to-face discussions.

In an immediate recall/retrospective reporting session, learners report on what they have been thinking after they have finished a task. This method appears to be less “obtrusive” than introspection/think-aloud since learners could concentrate on a task and report on their thought processes later. More importantly, verbal reporting has no conflict with the information processing theory described in sections 2.1 and 2.2: participants can report their thoughts provided that the information is being heeded.

However, there are two possible disadvantage of this verbal reporting technique. One disadvantage is that some people may not been able to give full reports due to the limited memory span (Ericsson & Simon, 1993). To solve this problem, researcher should audiotape or videotape the whole process during task and then play back the tape in order to help the learner refresh his/her

memory. The other disadvantage is that the strategies coded by the researchers might not be the strategies used by the learners (McDonough, 1995). To tackle this problem, researchers should check the coding reliability and verify the results with the learners (Cohen & Scott, 1996; McDonough, 1995).

Despite its limitations, verbal reporting is the preferred technique in collecting strategy data (Cohen & Scott, 1996; McDonough, 1995). It allows researchers to access learners' strategy use before, during and after a language task. Also, it enables researchers to understand how the learners use strategies to accomplish a task. To use verbal report as data, Cohen (1998) argues that researchers should provide a clear description of the participants' characteristics, illustrate the instruments in detail, give participants clear guidance in verbal reporting, report intercoder reliability checks, and include representative verbal report excerpts.

Since each data collection method mentioned above has its strengths and weaknesses, a triangulation of retrospective verbal reporting, computer tracking and interviews was used to collect strategy data in face-to-face and computer-mediated discussions. In brief, the participants gave retrospective reports immediately after task. A record of the computer-mediated discussion session was kept by computer tracking. To help participants report their thoughts, both face-to-face and computer-mediated discussion sessions were video-taped and audio-taped. To verify the strategies identified, I interviewed the students at the end of each session. Moreover, the data collection and data analysis

procedures were clearly described following Cohen's (1998) suggestions. I hope that this approach would produce some reliable data for the present study.

2.6 Chapter Summary

The theoretical framework in which the present study was conducted has been described in this chapter. A review of the literature indicates that some studies have compared language learners' behaviours in face-to-face and computer-mediated discussions. A few CALL projects have also examined the metacognitive strategies used by language learners. However, no published work has contrasted EFL learners' metacognitive strategy use in face-to-face and computer-mediated small group discussions. Following other researchers' recommendation on strategy data collection, the present study triangulated retrospective verbal reporting, computer tracking as well as interviews to obtain metacognitive strategy data from EFL learners.

3 Method

Some issues regarding the use of verbal reporting in collecting strategy data have been described in Chapter 2. This chapter describes the details of the participants, instruments used in the study, data collection procedures. A data analysis plan is presented at the end of the chapter.

3.1 Participants

3.1.1 Characteristics of the Participants

The participants of this experiment were 8 postgraduate students from the People's Republic of China. These volunteers, 4 males and 4 females, were 26 years old on average. They were research students at the Engineering faculty of the National University of Singapore in the 2000-2001 academic year. These students were enrolled in a postgraduate English course designed for upper-intermediate EFL learners between January and April 2001. They had similar language performance in class and could express themselves well in English.

These students were selected for this study for three reasons: (1) they volunteered to take part in this research project; (2) they were my own students; and (3) they had similar language and cultural backgrounds.

3.1.2 Grouping of the Participants

The 8 participants were allocated to two small groups, each of which comprised two male and two female students. One group (FTF Group) completed a language task (see section 3.2) in the face-to-face mode whereas the other

group (CMC Group) did the same task via online discussion in a virtual learning environment. Table 3.1 shows the grouping details. The names of the participants are replaced with pseudonyms.

Table 3.1 Profile of the Participants

Group / Gender	CMC	FTF
Male	**Frank Zhang**	**Lee Southeagle**
Female	**Chen Rebecca**	**Alice Wang**

3.2 Instruments

3.2.1 The Language Task

The language task used in this study was typical of the English course the participants had just completed: students were asked to read and respond to an authentic article taken from the Forum section of a local English newspaper. Students were instructed to work individually and read the article in order to identify the thesis and main arguments of the article. After that, they decided the extent to which they agreed with the author of the article. They were also required to develop ideas which supported their own arguments. They wrote down their ideas on a worksheet provided by the tutor. An example of the article with instructions is shown in Appendix 1.

To check the extent to which the students could complete the task successfully in the two modes, a lecturer who was also teaching on the above mentioned English course marked the student worksheets based on the students' main

ideas, logic, and grammar using a marking scheme (Appendix 2). To facilitate blind reviewing, the students' names and the grouping details were not disclosed to the marker.

3.2.2 IVLE Chat Room

The online discussion took place in IVLE Chat Room, which allowed students to share ideas by typing messages back and forth in 'real-time'. IVLE Chat Room is one of the web-based tools in the Integrated Virtual Learning Environment -- a courseware management system created and maintained by the Centre for Instructional Technology of the National University of Singapore. The students in the chat room will see their own messages and get response almost immediately.

In this experiment, the four students in the CMC group had an online chat session during a pre-arranged time slot. The students' messages were automatically recorded on the server, which enabled the students and I to keep track of the online discussion. Appendix 3 shows a screenshot of the IVLE Chat Room.

3.2.3 Retrospective Verbal Reporting

Immediately after the discussions, the students met me individually to report on what they were thinking from the time they received the worksheet to the time they finished the discussion in either the face-to-face or the online environment. To help them recall what they had done, the students in the CMC group

watched the video clip featuring him/her during the online discussion and read the computer log which recorded their messages. The students in the FTF group watched the video recording of the discussion. The retrospective verbal reporting sessions were both audio- and video-taped.

3.2.4 Interviews

In order to understand how the students thought about having discussions in the two modes, the participants were interviewed by me at the end of each retrospective verbal reporting session. They answered some open-ended questions about their opinions on face-to-face and online discussions. Besides, they were asked about whether the verbal reporting exercises would have any effects on their thought processes.

3.3 Procedures

The CMC group and the FTF group met me on 9 and 11 June 2001 respectively. The venue of the meetings was a computer laboratory on campus. The settings for the two experiments were as follows: the students in the CMC group sat at the four corners of the room and could not see one another. The students in the FTF group sat around a desk placed in the centre of the room. Each data collection session comprised 6 phases, namely, (1) Briefing, (2) Preparation, (3) Discussion, (4) Worksheet-Answering, (5) Retrospection, and (6) Interview. All but the first phase were video- and audio-taped.

During the Briefing phase, I greeted the participants and described the procedures of the experiment. The students were ensured that the information they were going to give would be analysed anonymously for research purposes. All the students gave me permission to use their verbal and written data for research purposes. For the CMC groups, the students logged on to the network and were briefed on the IVLE Chat Room.

During the Preparation phase, each student was given a worksheet and stationery. They heard about the aims of the task and were asked to read the article individually. They were free to write their ideas on the worksheet. Besides, they could decide on how much time they needed to read the instructions and the articles before starting the discussion.

During the Discussion phase, the CMC group discussed about the article via the networked computers while the FTF group had their discussion verbally. The students in the two groups decided when they would like to end their discussions. I did not take part in the discussions but sat quietly in the room. For the CMC group, a computer log of the discussion was printed out immediately after discussion.

During the Worksheet-Answering phase, the students worked individually again to answer the three questions. When they had finished writing their answers, they made an appointment with me to retrospect on their thinking during task.

During the Retrospection phase, I met the students individually and gave each student this instruction: “Can you recall what you were thinking from the time you received the worksheet to the time the group finished the discussion?” To help them recall the discussion process, the students in the CMC group could choose to read the computer log and/or the video clip of the discussion. Those in the FTF group viewed the video clip of the discussion and reported on their thoughts processes. The students’ verbal reports were transcribed verbatim for analysis purposes.

During the Interview phase, I asked each student 3 questions about the experiment, namely, (1) “If you have a choice, would you like to have this type of language activity in a face-to-face or a computer-mediated environment?”; (2) “Why do you prefer such as environment?”; and (3) “Do you feel uncomfortable with the experimental setting?”. This part took around 10 minutes. All the interviews were transcribed verbatim for further analyses.

3.4 Data Analysis

3.4.1 The Coding and Scoring of the Protocols

The transcribed protocols of the students’ retrospective verbal reports were analysed for identification of Metacognitive strategies. The protocols were coded using a coding system derived from O’Malley and Chamot’s (1994) work, as shown in Table 1.1 and described in Chapter 2. Using Microsoft Word, I highlighted the sentence(s) which indicated the use of a certain metacognitive

strategy and then wrote down the name of the strategy and my comments as an endnote. An excerpt of a coded protocol is shown in Appendix 4.

3.4.2 Coding Reliability Check

In order to check the consistence of coding, I performed an intracoder reliability check by recoding all the protocols three weeks after the first coding. During the interval, I did not read any of the protocols so that a more reliable result could be obtained.

After coding the protocols for the second time, I compared the two sets of coded protocols and checked the matching rate. Following the literature (Scholfield, 1995), I tallied the total instances of strategies that were coded the same in the two coding sessions, and then divided the number by the instances of strategies coded by me in the first coding.

In the first coding, 76 instances of strategies were identified, of which 69 were coded the same in the first coding and second coding. Consequently, the intracoder reliability rate was shown to be 0.91. The protocols were examined again to correct the mismatched areas.

3.4.3 Analysis of the Student Interviews

The student interviews were transcribed verbatim and the results were compared. The next chapter shows how the students in the two groups thought about completing a language task online/face-to-face.

3.4.4 Analysis of the Student Worksheets

After the experiment, the author collected the completed student worksheets from the two groups. An expert marker who was also teaching on the English course commented on the worksheets for accuracy and depth of discussion. The comments were compared to determine whether there were any relationship between mode of discussion and students' performance.

3.5 Chapter Summary

The methods used in the present study have been described in this chapter. The CMC and FTF discussion sessions were recorded by computer tracking and audio-/videotaping respectively. The students' retrospective reports were transcribed and coded for the identification of metacognitive strategies based on categories constructed prior to the experiment. The students' worksheets were assessed by an expert marker following a blind marking procedure. The results of the quantitative and qualitative analyses of the above data are reported in Chapter 4 and Chapter 5 respectively.

4 Quantitative Analysis of Results

This chapter compares the FTF and CMC groups in terms of frequencies of metacognitive strategy use and student worksheet scores based on the data collected from the participants' discussion sessions and retrospective verbal reports. Besides, it reports the duration of discussion, turn-taking frequencies and number of sentences constructed by the two groups.

4.1 Students' Participation in the Two Discussion Modes

4.1.1 Duration of Discussions and Turn-taking Frequencies

The CMC and FTF discussions were timed and the number of turns and messages were tallied. As shown in Table 4.1, the computer-mediated discussion lasted 52 minutes whereas the face-to-face discussion was merely 33 minutes in duration.

Table 4.1 Duration and Turn-Taking Frequencies of the Two Discussions

	CMC (n = 4)	**FTF (n = 4)**
Duration	52 minutes	33 minutes
Total number of turns	136 turns	113 turns
Averaged number of turns per minute	2.6 turns/minute	3.4 turns/minute
Averaged number of turns per student	34.0 turns (range= 21 to 47 turns)	28.3 turns (range=18 to 43 turns)

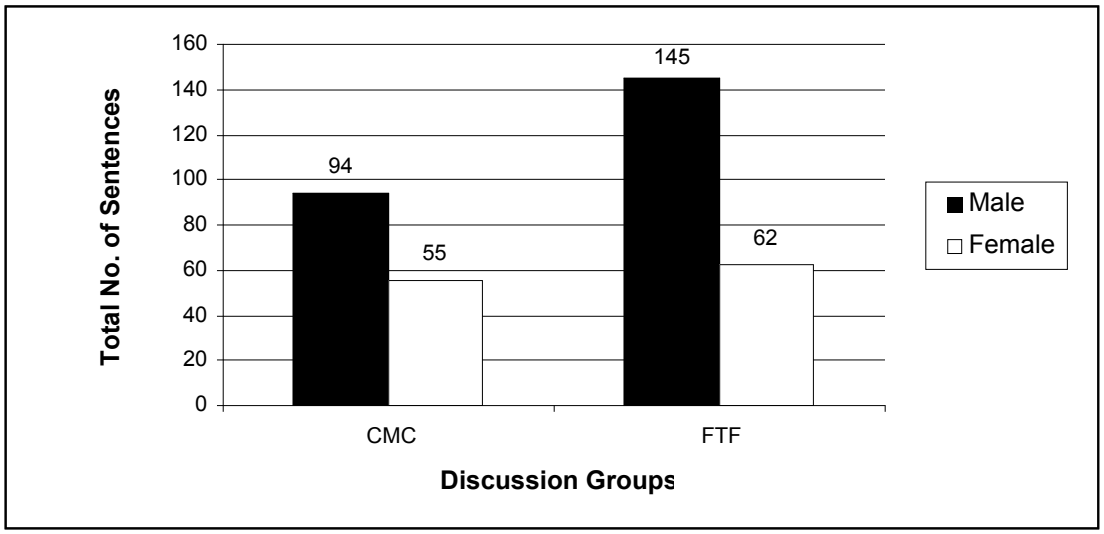
Although the CMC group spent more time to complete the discussion task than the FTF group, the former did not took strikingly more turns (136 turns) than the latter (113 turns). Consequently, the students in the CMC group took merely 2.6 turns per minute on average, while those in the FTF group took an averaged 3.4

turns per minute (Table 4.1). Turn-taking was less frequent in the virtual environment than in the face-to-face environment because the speed of typing was lower than that of speaking. However, none of the students remained silent during task, which indicated that the students in the two discussion modes had similar opportunities to contribute to the group.

4.1.2 Number of Sentences Constructed

A comparison of the number of sentences constructed by the students in the two discussion groups revealed that the CMC group constructed around 40 percent fewer sentences than the FTF group. The former produced a total of 149 sentences while the latter 207 sentences.

Figure 4.1 Number of Sentences Constructed by the Male and Female Students in the Two Discussion Groups



However, the two groups were similar in the sense that the male students produced more sentences than the female students did (Figure 4.1). The male

students in the CMC groups produced a total of 94 sentences, which was 1.7 times more than the 55 sentences typed by their female counterparts. In the FTF group, the males produced 2.3 times more sentences than the females. The former constructed 145 sentences while the latter 62 sentences.

The number of sentences used by individual students in the two groups, as illustrated in Table 4.2, suggested that the two males in the CMC group (Frank and Zhang) did take more turns and therefore typed more sentences than the two females (Chen and Rebecca).

Table 4.2 Number of Sentences Produced by the Students in the Discussion Sessions

	CMC*				**FTF****			
	F	**Z**	**C**	**R**	**S**	**L**	**A**	**W**
No. of turns	47.0	46.0	22.0	21.0	31.0	43.0	21.0	18.0
No. of sentences	47.0	47.0	28.0	27.0	51.0	94.0	32.0	30.0

* CMC Group: F = Frank, Z = Zhang, C = Chen, R = Rebecca
**FTF Group: L = Lee, S = South Eagle, A = Alice, W = Wang

As for the FTF group, the two males appeared to be more talkative than the two females. South Eagle and Lee produced 51 and 94 sentences respectively. In contrast, Alice and Wang, the two females in the group, produced only 32 and 30 sentences respectively. This result suggested that the males appeared to dominate the face-to-face discussion: the males spoke more often than the females.

It can be seen from the above results that while the males still dominated the two discussion sessions, the deviation appeared to be smaller in the CMC

mode than in the face-to-face mode. This is probably because during online discussion, the students were given equal opportunity to type and post messages. During face-to-face discussion, however, usually only one person could speak, which might lead to dominance.

A possible interpretation of the sex differences was that the females tended to think carefully before they send their messages during the online discussion. The reasons why the females could not dominate the discussions were revealed when the retrospective reports were qualitatively analysed and reported in the next chapter.

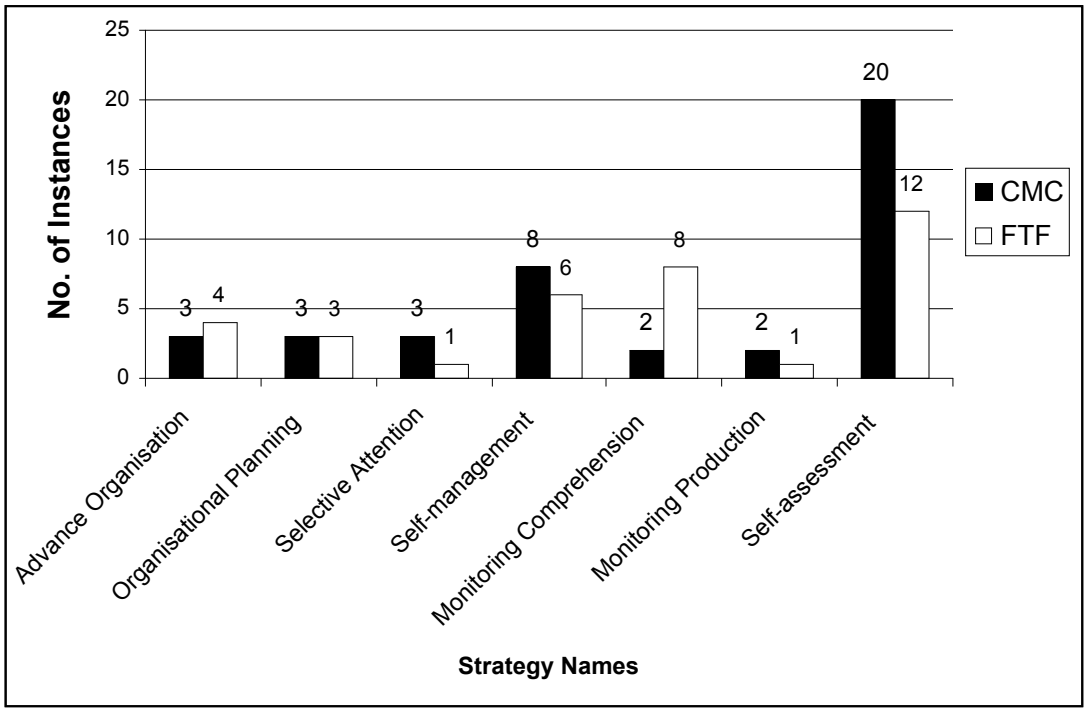
4.2 Frequency of Metacognitive Strategy Use

4.2.1 Group Differences in Frequency of Metacognitive Strategy Use

Analysis of the students' retrospective reports revealed that a total of 41 instances and 35 instances of metacognitive strategies were identified in the CMC group and FTF group respectively. Data on the identified instances of metacognitive strategies used by the two discussion groups are summarised in Figure 4.2.

Similar instances of Planning strategies were identified. A breakdown of the figures showed that the two groups used similar number of Advance Organisation, Organisational Planning and Selective Attention, ranging from 1 to 4 instances per group. However, Self-management was frequently used by the CMC group (8 instances) and FTF group (6 instances).

Figure 4.2 Frequency of Metacognitive Strategy Use by the CMC and FTF Discussion Groups



As for Monitoring strategies, the students in the CMC group used Monitoring Comprehension (2 instances) and Monitoring Production (2 instances) sparingly, but the students in the FTF group used the former much more frequently than the latter (8 instances versus 1 instance). As for Evaluating strategies, 20 instances of Self-assessment were identified in the CMC group while only 12 instances of this strategy were found in the FTF group.

4.2.2 Sex Differences in Frequency of Metacognitive Strategy Use

The frequencies of the Metacognitive strategies used by the male and female students were compared. As Table 4.3 shows, the differences between the sexes were minimal.

Table 4.3 Frequency of Metacognitive Strategy Use by the Males and Females in the Two Discussion Groups

Metacognitive Strategy	Strategy Name	Frequency of Strategy Use			
		CMC		FTF	
		Male	Female	Male	Female
Planning	Advance Organisation	2	1	2	2
	Organisational Planning	2	1	1	2
	Selective Attention	1	2	1	0
	Self-management	3	5	2	4
Monitoring	Monitoring Comprehension	1	1	4	4
	Monitoring Production	2	0	1	0
Evaluating	Self-assessment	4	16	7	5
	TOTAL	*15*	*26*	*18*	*17*

The males in the two groups seemed to use a similar number of Planning strategies as the females, except for Self-management, which was used less frequently by the males than by the females. The males in the CMC and FTF groups used 3 and 2 instances of this strategy while the females in the CMC and FTF groups used 5 and 4 instances of this strategy respectively. Regarding the use of Monitoring strategies, two males used Monitoring Production during task, but none of the females used this strategy. As for Evaluating strategies, the males in the two discussion groups used only 11 instances of Self-assessment while the females used this strategy twice more frequently (21 instances).

4.2.3 Individual Differences in Frequency of Metacognitive Strategy Use

A glance at the results showed that the students used Self-assessment differently. However, breakdown of the figures revealed that the difference

between groups was probably the result of extensive use of this evaluating strategy by one female student in the CMC group (Table 4.4).

Table 4.4 Frequency of Metacognitive Strategy Use by Individual Students in the Two Discussion Groups

Metacognitive Strategy	**Strategy Name**	**Frequency of Strategy Use by Student**							
		CMC*				**FTF****			
		F	**Z**	**C**	**R**	**L**	**S**	**A**	**W**
Planning	Advance Organisation	1	1	1	0	1	1	1	1
	Organisational Planning	1	1	1	0	1	0	1	1
	Selective Attention	0	1	1	1	1	0	0	0
	Self-management	0	3	2	3	0	2	3	1
Monitoring	Monitoring Comprehension	1	0	0	1	1	3	3	1
	Monitoring Production	2	0	0	0	1	0	0	0
Evaluating	Self-assessment	0	4	12	4	6	1	2	3
	TOTAL	*5*	*10*	*17*	*9*	*11*	*7*	*10*	*7*

* CMC Group: F = Frank, Z = Zhang, C = Chen, R = Rebecca
**FTF Group: L = Lee, S = South Eagle, A = Alice, W = Wang

As shown in Table 4.4, 12 instances of Self-assessment were identified in Chen's retrospective report while the other students in the CMC group used this strategy moderately. Therefore, the difference in the use of Self-assessment appeared to be an idiosyncratic one.

4.3 Students' Task Performance

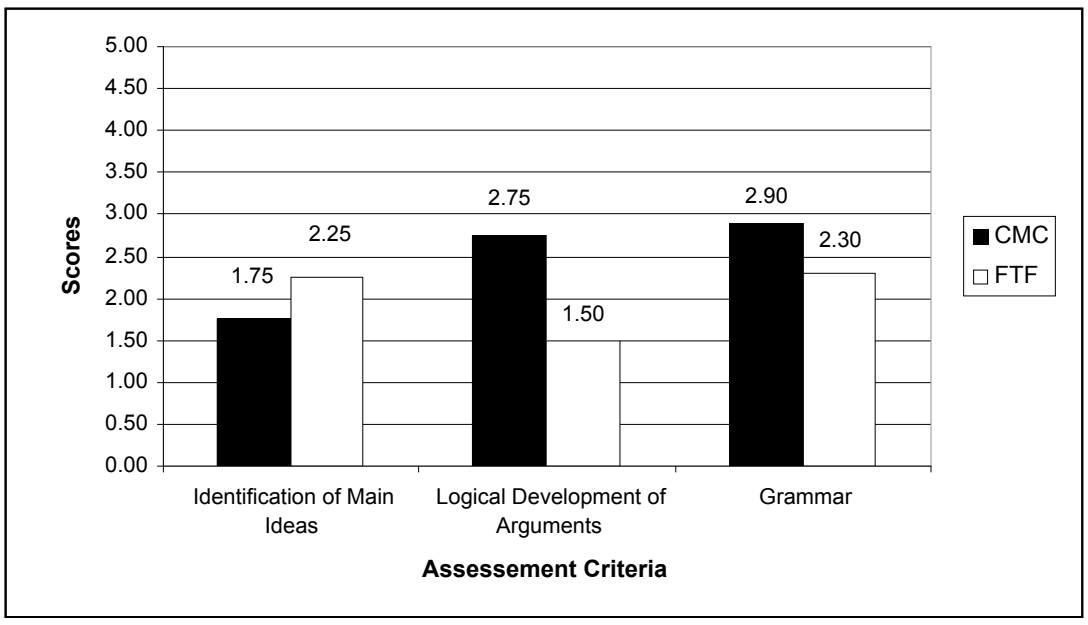
The expert marker of this study assessed the students' worksheets by blind-marking, and the criteria for evaluating the students' performance were whether the students could (1) identify the main ideas of the article, (2) show logical development of arguments, and (3) write grammatical sentences. The full score for each of the above categories was 5.0 marks; hence the full score for the task was 15.0 marks.

4.3.1 Group Differences in Worksheet Scores

Analysis of students' worksheets showed that the averaged score of the CMC group was 7.40 marks, which was 22% higher than that of the FTF group (6.05 marks). Figure 4.3 shows the breakdown of the scores, indicating that the CMC group outperformed the FTF group in two aspects. In terms of logical development of argument, the CMC group had an averaged score of 2.75 marks, which was 55% higher than the FTF group (1.50 marks).

Besides, according to the expert marker, the sentences written by the students in the CMC group were more grammatical than those in the FTF group. The averaged score of the former was 2.90 marks whereas the averaged score of the latter was 2.30 marks.

Figure 4.3 Group Scores Based on Expert Marker's Evaluation of the Students' Worksheets*



* The full score for each category was 5.00 marks

However, the CMC group scored slightly lower than the FTF group in their ability to identify the main ideas of the article, and the averaged scores of the two groups were 1.75 marks and 2.25 marks respectively.

4.3.2 Sex Differences in Worksheet Scores

The scores of the males and females in the two discussion groups were also contrasted, and the results suggested that the males in the CMC and FTF groups outperformed their female counterparts in terms of identification of main ideas (Table 4.5).

Table 4.5 Male and Females Students' Averaged Scores Based on Expert Marker's Evaluation of the Student Worksheet

Students / **Categories†**	**CMC**		**FTF**	
	Male	**Female**	**Male**	**Female**
Identification of Main Ideas	2.0	1.5	3.0	1.5
Logical Development of Arguments	2.0	3.5	2.0	1.0
Grammar	3.0	2.8	2.8	1.8
Total Score	*7.0*	*7.8*	*7.8*	*4.3*

† The full score for each category is 5.0 marks.

However, in the areas of logical development of arguments and grammar, both male and female students in the CMC group scored higher than those in the FTF group.

4.3.3 Individual Differences in Worksheet Scores

While a comparison of the group scores indicated that the CMC group had a much higher score than the FTF group, analysis of the students' scores suggested that the great difference was probably caused by the low scores of one student in the FTF group (Table 4.6).

Table 4.6 Students' Scores Based on Expert Marker's Evaluation of the Student Worksheet

Students / Categories†	CMC Group*				FTF Group**			
	F	**Z**	**C**	**R**	**L**	**S**	**A**	**W**
Identification of Main Ideas	1.0	3.0	2.0	1.0	3.0	3.0	1.0	2.0
Logical Development of Arguments	2.0	2.0	3.0	4.0	1.0	3.0	1.0	1.0
Grammar	3.0	3.0	2.0	3.5	2.0	3.5	1.0	2.5
Total Score	*6.0*	*8.0*	*7.0*	*8.5*	*6.0*	*9.5*	*3.0*	*5.5*

* CMC Group: F = Frank, Z = Zhang, C = Chen, R = Rebecca
**FTF Group: L = Lee, S = South Eagle, A = Alice, W = Wang
† The full score for each category is 5.0 marks.

As shown in Table 4.6, Alice's total score (3.0 marks) was much lower than her peers in the FTF group. This was because her answers were different from her group members'. In fact, as revealed by her retrospective report and interview, Alice did not agree with her group members during discussion. Therefore, if Alice's score were excluded, the difference between groups would be smaller.

Based on the results of the students' scores, it would appear that the CMC group was stronger than the FTF group in production: the group members could construct arguments more logically and present their ideas using grammatical sentences. By contrast, the FTF group seemed to excel in comprehension: the group members were able to find out the main ideas of an article more

accurately than the CMC group. The results of the qualitative analysis of the students' retrospective report will complement these findings.

4.4 Chapter Summary

The results of the quantitative analysis of the data are summarised in Table 4.7. Overall, the CMC group took longer to accomplish the discussion task than the FTF group. Since the students in the CMC group could spend more time in planning and typing their messages, they took fewer turns than those in the FTF group. It was noted that the males and females in the CMC group had comparatively equal opportunities to voice their opinions during discussion, while the males in the FTF group appeared to dominate the discussion.

Table 4.7 Summary of the Quantitative Results of the Present Study

Group / Areas of Comparison	CMC (n = 4)	FTF (n = 4)
Duration	Longer (52 mins)	Shorter (33 mins)
Turn-taking	Less frequent (2.6 turns/min)	More frequent (3.4 turns/min)
Range of Turns/Student	Similar (21-47 turns vs 18-43 turns)	
Sentences Constructed	Fewer (149 sentences)	More (207 sentences)
	Male dominance less serious	Male dominance more serious
Frequency of Metacognitive Strategy Use	Similar Planning Strategy Use (9 instances vs 8 instances)	
	Similar Monitoring Strategy Use (12 instances vs 15 instances)	
	More Frequent Use of Evaluating Strategy (20 instances)	Less Frequent Use of Evaluating Strategy (12 instances)
Student Worksheet Scores	Higher total score (7.40 marks)	Lower total score (6.05 marks)
	Scored higher in "logical development of arguments" and "grammar"	Scored higher in "identification of main ideas"

Regarding the frequency of Metacognitive strategy use, similar instances of Planning (Advance Organisation and Organisational Planning) and Monitoring (Monitoring Comprehension, and Monitoring Production) strategies were identified in the retrospective reports given by the two groups of students. The Evaluating strategy Self-assessment was used more frequently by the CMC group than the FTF group, but such difference was probably due to frequent use of this strategy by one member in the CMC group.

The quantitative analysis has revealed some similarities and differences between the two groups in terms of metacognitive strategy use. However, as mentioned in Chapter 3, since the individual and group differences were not controlled for, the experimental design tended to be undermined. As such, qualitative analysis of the students' retrospective reports appeared to be an important complement to the quantitative analysis. Reported in Chapter 5, the qualitative analysis of the students' retrospective reports revealed how the students used certain strategy.

5 Qualitative Analysis of Results

As a complement to the quantitative analysis, this chapter describes the students' use of Metacognitive strategies as identified in their retrospective reports. In addition, this chapter reports on the results of student interviews, which showed that most of the students would prefer to have discussions in the face-to-face mode, supplemented by discussions in the CMC mode. Finally, the students' performance in this task is reported.

5.1 Students' Use of Metacognitive Strategies

Analysis of the coded retrospective reports revealed that the students in the two discussion groups showed certain patterns of Metacognitive strategy use. However, individual differences in Metacognitive strategy use were also noted. In the following report, the examples of students' protocols are quoted in their original form, which may contain grammatical errors and hesitations. Besides, the students' names have been replaced by pseudonyms of their choice (see Table 3.1).

5.1.1 The Use of Planning Strategies

5.1.1.1 Advance Organisation

Qualitative analysis of the students' retrospective reports showed that the students in the two discussion modes used Planning strategies in a similar manner. Like the results reported in Subsection 4.3.1, group differences in the use of Planning strategies were minimal. In fact, almost all the students used the Planning strategy Advance Organisation at the outset of the experiment.

Regardless of the mode of discussion, the students used Advance Organisation to help them preview and skim the article for main ideas before having a discussion with their group members.

The Planning strategy Advance Organisation was identified in three retrospective reports from the CMC group. At the beginning of their reports, Frank, Zhang and Chen reported that they read the article before having a discussion online.

> I read the title for several times. (Frank)
>
> I read the text... (Zhang)
>
> I got the idea of the… the idea the author want to present. (Chen)

Rebecca was the only exception. She did not report on how she read the article. Instead, she was thinking how well she understood about the article, which was coded as an instance of Monitoring Comprehension.

Like their CMC counterparts, all members in the FTF group used Advance Organisation before discussion. For instance, Southeagle said he read the article at the beginning of the task. Similarly, Lee glanced through the article at the beginning while Alice and Wang reported that they read the article twice before discussing with their group members.

> Firstly I I read the three sentences the requirements of the worksheet and then I read three questions. And then I read and then I read the article I read very fast and then I read again, read again and get the idea. (Southeagle)
>
> Firstly I go through the whole page. (Lee)
>
> First I read I read the the article … I read read it… two times. (Alice)
>
> I read the article twice. Firstly generally and second more detail. Um… try to understand the aim of the author. (Wang)

The students' utilisation of a Planning strategy such as Advance Organisation before discussion was probably because reading the instructions and the article before doing any tasks could help them better understand the task.

5.1.1.2 Organisational Planning

It was noted that five out of the eight students used another Planning strategy Organisational Planning after they had used Advance Organisation. Again, the difference between CMC and FTF groups was not prominent. In the CMC group, Frank reported that he planned to have a discussion with his group members before answering the questions on the worksheet. Likewise, Chen's approach to the task was to express her opinions before completing the worksheet. In fact, Chen was the first member to post messages to the discussion forum.

> I communicate with my members group members and err we chat… by writing err by typing and we say our our err our opinions before I write down the answers. (Frank)
>
> I want to discuss with others to confirm my think is right. So I... present the arg- arguments of the author on the computer and wait for the replies. (Chen)

A combination of the two Planning strategies was utilised by some members in the FTF group. Wang used Organisational Planning after she used Advance Organisation. She described how she planned the parts and sequences of ideas which she would like to express. Later she reported that she answered two questions before discussion and responded to the last question after discussion. Similarly, Lee reported that he answered the first question before discussion and answered the rest afterwards.

> And then try to organise my own idea… my thought about this article and then fill the form. The first two I answered before the discussion. The last one I write the answer after the discussion. (Wang)

> I already have some ideas I think that's my opinion and I write I write down the first one the first one and then and the other two questions I finish after discuss discussion. (Lee)

A similar pattern was identified in Alice's report, which showed that she used the two Planning strategies at the beginning of the experiment.

The above analysis suggested that most of the students used Advance Organisation and Organisational Planning before having discussions in the CMC or FTF mode. Whereas there were individual differences in their approaches to the task, there were no obvious group differences in the students' use of these two strategies. It would appear that the use of these two Planning strategies before discussion helps students plan for the task.

5.1.1.3 Selective Attention

Group differences were found in terms of the students' use of Selective Attention. Unlike Advance Organisation and Organisational Planning, which were used at the beginning of task, Selective Attention was used by the students during discussion.

At the beginning of the online discussion, the students posted messages to the discussion forum, resulting in an influx of messages on the screen, which generated reading problems for the students. To solve this problem, three out of the four students in the CMC group used Selective Attention. As shown in the examples below, the students focused on various aspects. Chen decided to focus on certain type of information only, Rebecca chose to attend to the last

ten lines of messages, and Zhang selectively read the sentences which appeared on top of the screen.

> So I have to look through all these things on the screen and understand what they say. Sometimes you have to jump. (Chen)
>
> I looked back but not very much, just about ten lines. (Rebecca)
>
> Sometimes we just read the sentences on the screen… something on the on the top of the screen. (Zhang)

As for the FTF group, none of the students reported listening selectively during the face-to-face discussion. Nevertheless, Lee reflected that he scanned the article again because he would like to quote a sentence from the article.

> I'm trying to look for something [pointing to the worksheet] … I try to find out and I think I can… I err did not find out where is the sentence I want to I want to show my classmates. (Lee)

There were two possible reasons why group differences existed in the use of Selective Attention. First, the students in the CMC group encountered reading problems during discussion, and they used strategies to help them solve the problems. In contrast, the students in the FTF groups did not face similar problems. Second, students having an online discussion could read messages selectively without interfering others while those having a face-to-face discussion would be regarded as impolite if they listen only to certain group members.

5.1.1.4 Self-Management

While the students in both discussion groups used the Planning strategy Self-management to plan when, where, and how to study, they used this strategy in different ways.

For the CMC group, the students used Self-management to plan when and how they post messages and respond to others' messages. The two females, Chen and Rebecca, chose to communicate with one person at a time. Zhang decided to repeat his messages which were ignored by his group members.

> So we…err… when we ask some question we want to refer to the certain person so ask… him to reply. (Chen)
>
> I tried to focus on one person and react to react to what he said. First I think it should be Chen but… she didn't say something for a long time so I transfer to Frank… (Rebecca)
>
> Sometimes my message is ignored by others and there's no response… so I repeat it. (Zhang)

Like their counterparts in the CMC group, three students in the FTF group reported that they planned when and how to join the discussion. However, some gender differences were revealed when the students' protocols were analysed.

The students in the FTF group had some conflicts during discussion: the two females in the group disagreed with Lee, who was supported by his male classmate Southeagle. Instead of voicing different opinions, the two females chose to keep quiet and waited for an opportunity to start a new topic. By contrast, Southeagle tried to seek more chances to support Lee.

> I just keep quiet and wait the turn to me. (Alice)
>
> I listen to him about his opinions and find difference between us. (Wang)
>
> I try to find out another facts to support his opinion. (Southeagle)

It could be seen from the above analysis that while the six students mentioned above used Self-management to plan how and when to complete the discussion task, the female students in the CMC group tended to take a more active role during discussion than those in the FTF group. Further analysis of the retrospective data revealed that the two females kept quiet during the face-to-face discussion because they needed time to arrange their ideas.

> Err because I thought err before… I… talking my opinion I should arrange them clearly… but after discussion with them I still… need time to… think about these opinions… carefully. So I keep quiet and I think oh they approach the approach the answer. (Alice)

> I mean I don't know how to say err um… concretely and describe err my opinion. I think err if I say in Chinese I can say more clearly and make every one understood. (Wang)

5.1.2 The Use of Monitoring Strategies

5.1.2.1 Monitoring Comprehension

As mentioned in subsection 4.3.1, the students in the CMC group used fewer instances of Monitoring Comprehension than those in the FTF group. Qualitative analysis of their protocols revealed more group differences in their use of this Monitoring strategy: the students in the CMC group used Monitoring Comprehension to check their understanding of the article whereas the students in the FTF group used the same strategy to check their understanding of their group members' speech.

For the CMC group, both Frank and Rebecca used Monitoring Comprehension to check their understanding of the article before having an online discussion with their group members.

> I was not surprised with the topic because it's a common a common sense common issue and it happens every day and err the argument is err I I I agree with the argument… I agree with the author about this err argument… (Frank)

> I think the the art- article the conclusion of the article is correct but… here he gives us two examples but I don't agree with the examples. The author thinks the examples is too romantic… is not suitable to Singapore people. But I think it's very normal [laughs]. It can be carried out easily. (Rebecca)

On the contrary, 7 out of the 8 instances of Monitoring Comprehension coded in the FTF students' retrospective reports were about the students' comprehension of what their group members said. The students used this strategy to check (1) whether they and their group members had similar opinions, and (2) how well they understood what their group members said during the face-to-face discussion.

The students in the FTF group used Monitoring Comprehension at the beginning of the discussion to check whether there were any differences between their opinions and others' opinions. For example, both Southeagle and Alice reflected that their viewpoints were different from some group members'.

> At the beginning of the discussion because Wang's opinion is different from ours, so I think what's her opinion, what's her argument and then I think what's my opinion and then compare her opinion with my opinion. (Southeagle)

> It was Southeagle firstly… ask… he asked us to discuss the first question and he want wanted us err answer this questions one by one so the… it begin from Lee. Err I still remember what he said about the argument of the author. He said that… the author want to compare the western and Singaporean on their marriage. So… at that time I think his answer is… different from err from my answer. (Alice)

The students in the FTF group also used Monitoring Comprehension to check how well they understood other members' speech. For instance, according to the discussion log for the FTF group, Alice ended the discussion with the sentence "you can bear the marriage strongly". The word "bear" was heard by Lee as "beer". Since Lee did not understand what Alice meant, he used Monitoring Comprehension to check his understanding of Alice's speech.

> Um… At that moment my classmate talk talk about 'strong' something. At that moment she talk about 'beer' 'beer', I think ''beer'? What does she mean by 'beer'?'. Later I

> think maybe she's talk about they did not enjoy the life, just beer beer something that is not so comfortable. But because they have marriage and maybe so maybe maybe because of the responsibility and they have to… they have to maintain their… marriage so she use that word 'beer'. (Lee)

For the FTF group, the only instance of Monitoring Comprehension used to check one's comprehension of the article was identified in Wang's retrospective report. As mentioned in the previous subsection, Wang remained silent when she did not agree with Lee during discussion. Towards the end of the discussion, Wang reported that she checked her comprehension of the article.

> On the surface, this article seems to involve a phenomenon of Singapore and the action taken by the government. But what it's really about is Singapore is this Singapore's action how we should understand and so on. (Wang)

Unfortunately, Wang did not voice her opinions during discussion. Her ideas were known only when she was given an opportunity to describe her thought process during the retrospection session.

There were two possible reasons why the CMC group did not frequently use Monitoring Comprehension during discussion. One reason was that there were almost no conflicts among students during the online discussion. Analysis of the discussion log for the CMC group showed that the students seemed to reach a consensus. In contrast, the students in the FTF group had different opinions, which appeared to have stimulated the students to use strategies to monitor their comprehension of others' ideas. The other possible reason was, as supported by the student interview data (see section 5.2), that the online discussion involved reading rather than listening, which these EFL learners had more problems with. As a result, the students who had discussions in the face-

to-face mode had to use strategies to solve their problems with listening comprehension.

5.1.2.2 Monitoring Production

Only two students were found using Monitoring Production during task. Frank in the CMC group reported what he was thinking when he was typing his messages. Similarly, Lee in the FTF group described his thoughts while expressing his opinions about the article. Group differences in the use of Monitoring Production were minimal.

> I told my group members that I err almost fully agree with the author… and some of them agree with me. … And I told them it's different before and after marriage. It's err actually you know you you may arrange some surprise after marriage but it's err different. Because… after marriage you tend to you can only you tend to to arrange something but before marriage and err it's different. (Frank)

> So I just feel how government play… play role in the in this mar- mar- marriage in Singapore. ... But I do not think the government can can do can do something efficiently about the marriage about the problem- not a problem but marriage. I try to I try to express such kind of my point to the classmates. (Lee)

5.1.3 The Use of Evaluating Strategies

5.1.3.1 Self-Assessment

The students in both CMC and FTF groups judged how well they had accomplished the task during discussion. Besides, it seemed that group differences were not prominent as the students in the two groups used Self-assessment in a similar manner. As reported below, there were two patterns of this strategy use: Self-assessment was either used with a Planning strategy or used alone.

Self-assessment was used by three of the four students in the CMC group. For Chen and Rebecca, Self-assessment was followed by a Planning strategy Self-management. Chen evaluated her task performance and thought that there were some pauses during the online discussion. After evaluating her performance, she used a Planning strategy Self-management to improve her learning. She planned to ask one group member to answer the questions she posted to the discussion forum.

> Another time we also want to give a new idea… so so maybe we can see the discussion sometimes have some break or cannot continue. … (Chen)

Like Chen, Rebecca evaluated her task performance and then planned how she would approach the task. Rebecca reported that she could not remember what she had typed, which she thought had affected her accomplishment of the task. According to her retrospective report, she changed the colour of her messages – an instance of Self-management.

> It's difficult for me to [smile] communicate by computer with them … When you type you must try to find find some words find some expressions… up to that maybe you maybe I forget what I want to say. (Rebecca)

A combination of Evaluating and Planning strategies was also identified in the retrospective reports of the FTF group. Alice and Wang evaluated their task performance during discussion and reported that they thought the group was not addressing the topic. Later in their retrospective reports, Alice reflected that she attempted to redirect her group members while Wang chose to remain silent. Their follow-up actions were coded as instances of Self-management.

> I know we may err talking beyond the central point. (Alice)
>
> When Lee was speaking I think err the um, how to say, the core of the discussion is is little bit relevant to our task because our task. (Wang)

It was noted that the students who used a combination of Evaluating and Planning strategies were females, suggesting that gender differences might exist when Self-assessment was used. However, this fact was not conclusive because the female students, like their male counterparts, used Self-assessment alone also.

As mentioned before, Self-assessment was used alone by the students in the two groups. For the CMC group, Zhang reported that towards the end of the online discussion, some members were not addressing the topic. However, unlike his female group members, Zhang did not appear to use any Planning strategies to plan how to solve the problem.

> When we talked about the the movie, I think we have we are I think we are talking about another topic. It's not very related to the… topic. (Zhang)

As for the two males in the FTF group, Southeagle found that the group was not addressing the topic; however, he did not report any plans he used to improve task performance. Lee found that he might have some problems with his communication skills, which might have affected his performance. Like Southeagle, Lee did not think of any means to overcome this problem.

> At that at that time, err they… they're discussing how to maintain maintain the marriage. So I think… the article is discussing the way is real realistic or idealised. …I think it's unimportant to discuss this. (Southeagle)

> I think maybe somebody somebody cannot fully understand what I mention [laughs]. …Because when I want to express my feeling in my mind, I cannot find the suitable word… to to describe the things I'm thinking about… But I think my my classmates may be they can understand. (Lee)

The above analysis showed that regardless of the mode of discussion, some students, especially females, used Evaluating strategies to assess their

performance and then used Planning strategies to plan how to accomplish the task. Again, more empirical evidence is needed before any conclusions could be drawn.

5.2 Students' Opinions about Discussion Modes

After giving their retrospective reports, the students were told about the objectives of the experiment and were asked about their opinions on online discussion and face-to-face discussion. The two groups were asked similar questions. The students in the CMC group answered questions about two main areas: (1) what their comments on online discussion and face-to-face discussion were; and (2) whether they thought online discussion should be integrated into the English course. The students in the FTF group were asked similar questions; however, since they might not have experience in online discussion, their opinions are reported here for references only.

5.2.1 Students' Comments on Online and Face-to-Face Discussions

The students in the CMC group had more positive comments than negative ones on online discussion. Frank and Zhang found it easier to express themselves in the online discussion forum.

> The difference is you feel … more… free… more easy… err easier yeah easier. (Frank)
>
> We can express much better than face by face. If I can express my opinion fully I feel good if because I think that I'll be understand by others. (Zhang)

Zhang further explained why he thought he could express his opinions better in the CMC mode than in the face-to-face mode. He thought that the former

allowed those English learners who did not have a good command of spoken English to express their opinions freely.

> If we talk face by face and our oral English is not very good. I spoke I speak out and they may not understand me. So I'll think I'd better keep silence. Iif we can talk online, I can give advice fully and faster. (Zhang)

Some students thought that they would be more likely to express their true feelings online than face-to-face. Rebecca and Frank believed that people would tell the truth when discussing online. Rebecca, in particular, thought that students were less embarrassed when they could not see others' faces.

> Because sometimes we spoke speak face to face maybe something that we won't we won't speak but by computer we try to express our true feeling sometimes. (Rebecca)

> If you talk personally I think you may hide something but if you face the computer you can tell the truth and what you really think. (Frank)

Following this line, Rebecca and Frank reflected that the online environment was a better platform if the discussion topic was a sensitive one or if the group members did not know one another well.

> If you like me ask me to discuss sex or some other topic maybe I won't discuss it face to face. (Rebecca)

> If you talk with unknown unknown strangers you know then you can you can talk with them on computer. … Sometimes it's better to chat with each other on computers than in class but sometimes for some topics maybe personal topics we type on the computer. (Frank)

Some students had contradictory opinions about the use of online discussion. While Chen thought that online discussion enabled several people to "talk" simultaneously, she argued that such feature has a potential weakness of distracting people.

> On the computer you can see several person talk at the same time so it's very fast to get information. But… sometimes you…you will feel interfere. (Chen)

The absence of facial expressions in online discussion seemed to be a double-sided sword to some students. While Zhang thought that it made him less embarrassed to repeat his ignored messages in the virtual environment, Frank and Rebecca thought that such feature was a disadvantage.

> If you talk personally you feel you know you can see from eye contact you feel something about the feeling of others and… if you talk … on the computer then you cannot get the feeling but can only read the words what your friend talk and [laughs] that's different. (Frank)
>
> I think I cannot see people's face. I don't know their expressions because you know sometimes voice can express your feelings. (Rebecca)

Finally, the students had different opinions about making errors during online discussion. Chen voiced her worries about having making mistakes during online discussion while Frank thought that errors which did not obscure meaning were acceptable.

> If we write online even if we write something wrong nobody can check. If in class we talk if we make some mistakes so the teacher can tell us and other students also can correct us. (Chen)
>
> I did have some typos. Err… if I know my my group members can understand can understand me. That's enough. (Frank)

The students in the FTF group tended to be less positive about having discussions online. Southeagle thought that in the face-to-face environment, students could use their native language and body language to compensate for their less proficient English.

> Sometimes when our especially when our English is not very good we can sometimes we can use Chinese and use *shoushi* [Researcher's translation: "gestures"]. (Southeagle)

Like Southeagle, Alice preferred face-to-face discussion to online discussion. She believed that the latter was suitable for active people who would like to

express their opinions while the former was suitable for people who preferred to listen to others.

> If you want to write down sentences or just the paragraphs I think it maybe for very activity [sic] person maybe he like err he or she like to use this method. But for normal person I think sit together will be… get more response from others and you can speak one sentence or you can keep quiet. (Alice)

Wang and Lee had contradictory opinions about online discussion. Lee thought he could have better communication with classmates than with strangers while Wang thought otherwise.

> I can if four of us we talk online, I think no problem. But the feeling is different err different from the face-to-face but I think I can we can discuss quite well, no problem. (Lee)

> And if I want to communicate with… acquaintance I can accept the way to talk face to face but to a stranger I prefer to use a computer to com- communicate. (Wang)

It was noted that the students in the CMC group, who had real experience in online discussion, had more positive comments on online discussion than those in the FTF group, who did not have such experience. It was possible that real life experience helped students to understand the nature of online discussion and eliminate their suspicions about it.

5.2.2 Students' Advice About Integrating Online Discussion Into the English Course

The students were asked about their opinions on whether or not online discussion should be integrated into the existing English syllabus, which was considered to have pedagogical importance to the present study. Interview results showed that while the four students in the CMC group were positive

about online discussion, none of them would like to have online discussion substituted for face-to-face ones.

Zhang, Frank and Chen supported the use of online discussion as a learning tool. However, Zhang thought that online discussion should not be the main means of discussion in the English course. Similarly, Frank preferred to have online discussions occasionally. Chen would like to practise her spoken English and preferred to have face-to-face discussions in addition to online ones.

> If it is not very convenient for all of the students to meet together, the chat room is useful. The chat room can be used can be used as a alternative to chatting face to face but it shouldn't be the main method. (Zhang)
>
> Yes but not every time. (Frank)
>
> English course… can be used. But one problem is discussion like this one overlooks the spoken English so in class if we discuss in public we can practice. (Chen)

Unlike her group members, Rebecca did not support the use of online discussion in the English course. She pointed out that the text-based online discussion forum could not meet her needs because she would like to polish her listening and speaking skills.

> No. No… In English course we we have to improve our listening and comprehension ability. It cannot be achieved on the Internet. (Rebecca)

Nevertheless, Rebecca believed that if students could adapt themselves to the online environment, they could probably improve their English. She took her friend's experience in chatting online with a native speaker as an example.

> But maybe… one of my girl friend… her English is very good and when I go to I went to English class in China, we chat by the Internet with an American- native American people by Yahoo. So… but Her English is better than me. It's a possibility: she's get to use this method but I'm not. (Rebecca)

Some constructive suggestions regarding the implementation of online discussion activities in the English were given. Chen believed that students could use this platform to exchange ideas. Zhang suggested that both online and face-to-face discussions should be included in the English course. Frank recommended students to discuss personal topics in the CMC mode.

> This one good for exchanging information. (Chen)
>
> We chat face to face three times one week, the online chat can be once a week. (Zhang)
>
> Sometimes for some topics maybe personal topics we type on the computer. (Frank)

Among those students in the FTF group, Wang strongly supported the integration of online discussion activities into the English course. She held the view that online discussion was suitable for students who did not like to speak in public, of whom she was one. Similarly, Lee believed that online discussion could be implemented if it was designed for students who knew one another.

> I don't like public public… how to say… speak in public I don't like to speak in public. If if I have to do so… I prefer to use a computer, let others know what I think. (Wang)
>
> If the purpose is, for example, if you organise online discussion for group for a group. If you organise such kind of discussion and all the people know each other and they discuss something online I think I can accept that kind of discussion. (Lee)

By contrast, Southeagle and Alice were more sceptical about having online discussion as a language activity. They both believed that discipline could be a problem.

> Yes, I think discussion maybe help maybe help… but I think it's difficult for us to chat or discuss at the same time. …If you ask us to discuss by computer maybe some of them may think, 'Oh, we have no time'. (Southeagle)
>
> But if you sit in front of the computer… the the discussion maybe not so activity [sic]. (Alice)

Again, their opinions indicated that the students in the FTF group, who did not have actual experience in online discussion, were less positive about integrating online discussion into the English course.

5.3 Students' Performance in Task

The task of the experiment, which contained an article entitled "Promote Marriage in a Realistic Way", required students to (1) identify the main arguments of the writer, (2) state the extent to which they agreed with the author, and (3) provide evidence to support their ideas. Below is the answer key provided by the expert marker, who was a tutor of the English course:

Writer's Main Arguments	• The government portrayed an idealised picture of marriage • The ideas suggested by the government were culturally inappropriate • The idealised image of marriage has led to problems
Writer's Recommendation	• To solve the above problems, the government should give ideas which were culturally-appropriate.

Based on the above answers, the expert marker assessed the students' task performance by blind-marking. As reported in the last chapter, the average scores of the students in the CMC group were higher than those in the FTF group. In particular, the former had higher averaged scores in the logical development of students' arguments and grammar but had slightly lower scores in the identification of the writer's main ideas.

Regarding the identification of the writer's main ideas, the students in the CMC group did not seem to fully understand the main arguments of the writer. They did not score high probably because they had mistaken the writer's recommendation as the main idea of the article. Below are some examples of students' answers:

> Marriage is realistic. Government's promotions are not appropriate. They are too romantic. We should promote marriage in a realistic way. (Zhang. Score*: 3 marks)
>
> We should have realistic expectations of marriage. Romantic cannot be achieved in most conditions in Singapore. If government wants to encourage or promote marriage, more realistic and appropriate methods should be applied. (Chen. Score: 2 marks)
>
> Singapore government's effort to promote marriage is unrealistic. Over-idealising to marriage is not suitable to Singapore culture. False expectation to marriage lead to increasing trend towards divorce. (Rebecca. Score: 1 mark)
>
> Marriage is realistic, but not idealised and desirable. To promote marriage, we have to do it in a realistic way. (Frank. Score: 1 mark)
>
> * Full score = 5 marks

The students in the FTF group had slightly higher scores in the identification of the writer's ideas, but the difference was minimal.

> The main arguments are that the author argue against promotion marriage in idealised way and encourage government to use a culturally-appropriate and realistic way. (Southeagle. Score: 3 marks)
>
> To enhance the marriage of couple, western practices may not be suitable in Singapore. (Lee. Score: 3 marks)
>
> Government's effort to promote marriage should be in a realistic way. (Wang. Score: 2 marks)
>
> He considers marriage should not descripted [sic] so beautiful to young couples. Many divorces are caused by disappointment rising between couples. So he asserts to tell young couples what marriage is being realisticly [sic]. (Alice. Score: 1 mark)

Regarding the logical development of students' argument, the CMC group scored higher than the FTF group. According to the expert marker, the ideas given by the students in the CMC group were more relevant to the topic.

> In Singapore, people are so busy in working, at the same time, they have to care for their children and do housework. There are no extra time and energy to persue [sic]

> romantic in every day life. Moreover, people consider realistics [sic] more than unrealistic things after marriage. So, if government encourages marriage, they should make efforts in realistic areas. (Chen. Score: 4 marks)
>
> I agree with the author in that we should [sic] expect too much from marriage. It is true that no marriage is perfect, we should be realistic to keep the marriage long lasting. But in this article, two examples were given. I don't think they are unrealistic and not suitable to Singapore culture. That is easy to be done and actually they are good methods to let one's husband/wife know that he/she is cared by the other in the family. (Rebecca. Score: 3 marks)
>
> Life is realistic, marriage is part of our life. The romantic and surprises are the practice when dating. After marriage you will face the real life. You have to adjust your mind and thinking to meet the realistic facts, otherwise you will loose your marriage and family. (Frank. Score: 2 marks)
>
> The aim of promotion is to keep marriages going. Good marriages may go along without promotion. Realistic promotion ways can attract people very much and then keep the marriages, which are not so good, going. (Zhang. Score: 2 marks)

By contrast, the ideas given by the students in the FTF group did not seem to be relevant to the writer's argument. According to the expert marker, all the students in this group had some irrelevant ideas. As a result, Alice, Wang and Lee were given only 1 mark for their logical development of ideas while Southeagle was given 3 marks out of 5.

> As an adult, he/she will recongnize [sic] the responsibility he/she takes. A peace and stable family will give children a good education. Human being going to this world do not only enjoy romance and beautiful things, but also has the responsibility of contribution. Romantic passions can not last long. So after passions, people need sense of responsibility to combine their family. (Alice. Score: 1 mark)
>
> The people who are encouraged to marry are young. They accept the idea of western and know what is positive or negative in marriage. The intention of the government is to encourage the people to marry, they should also consider the problem of marriage, and help couples to solve them, let the young know the positive aspect or marriage and help them maintain the marriage is the best way. (Wang. Score: 1 mark)
>
> To reduce divorce rate, keep the marriage permanently couples need more free time to stay together with their family. The children are the most important for marriage. (Lee. Score: 1 mark)
>
> The direct aim of the government is to encourage birth rate, not only the act of marriage. If promote marriage in a idealised way, the marriage will be a trap. When the couple find that they cannot get a happy life, it is very possible that they will make a divorce. (Southeagle. Score: 3 marks)

It was noted that for the CMC group, the ideas written in the worksheets were consistent with those put forward in the discussion. However, for the FTF group, various ideas were found in the student worksheets. This difference was probably evidence that connected with the discussion environment.

There were three possible reasons for such group difference. First, the students in the CMC group could refer to the log on screen when completing the worksheet. Hence they had a more consistent view. Second, as mentioned before, the students in the FTF group had different opinions about the article. Consequently they wrote their own ideas in the worksheet. Third, the students in the FTF group reflected that they did not understand one other, and therefore they had different answers to the last question. The students in the CMC group did not have similar problems.

5.4 Chapter Summary

The results of the qualitative analysis of the retrospective reports, interview records and student worksheets are summaries in Table 5.1. These results indicated that the students in the two groups had similar use of Advance Organisation, Organisational Planning, Monitoring Production as well as Self-assessment. Some group differences were also found. Probably because of the difficulties in reading a large number of messages on screen, the CMC group used Selective Attention to scan for information. The conflicts among them stimulated the students in the FTF group to use Monitoring Comprehension to check their understanding of others.

Regarding the students' opinions about online discussion, it was clear that those students in the CMC group, who had real life experience in online discussion, had more positive comments on such mode of discussion than those in the FTF group. However, all the students held the view that online discussions should not replace face-to-face ones.

Table 5.1 Summary of the Qualitative Results of the Present Study

Group / Areas of Comparison	**CMC (n = 4)**	**FTF (n = 4)**
Planning Strategy Use	Advance Organisation and Organisational Planning were used before discussion.	
	Selective Attention was frequently used to scan for information on screen.	Selective Attention was used by one student when reading the article.
	Males and females used Self-management in a similar way.	Female used Self-management to remain silence while the males use this strategy to support their male counterparts.
Monitoring Strategy Use	Monitoring Comprehension was used to check their comprehension of the article.	Monitoring Comprehension was used to check their listening comprehension.
	Monitoring Production was used in a similar way.	
Evaluating Strategy Use	Both males and females used Self-assessment alone. However, the females also used a combination of Self-assessment and Self-management.	
Comments on Online Discussion and Face-to-face Discussion	The CMC group had more positive comments than negative comments on online discussion.	The FTF group was more sceptical about the success of online discussion.
Comments on Using Online Discussion as a Teaching Tool	The majority thought that online discussion should complement face-to-face discussion but not replace it.	
Students' Task Performance	The discussion environment seemed to help students develop logical and consistent ideas.	The students appeared to have different ideas even after discussion.

Finally, it was found that probably because of the absence of conflicts during discussion, the students in the CMC group had similar responses to the article.

Moreover, due to the fact that they could refer to the discussion log, their answers to the questions in the worksheet were more logical and grammatical.

Reported in Chapter 6, the qualitative and quantitative results of the present study will be compared to other related previous studies. In addition, the empirical and pedagogical implications of the present study will be discussed.

6 Discussion and Conclusions

This chapter discusses the quantitative and qualitative results of the present study in response to the research questions raised in Chapter One. Comparisons of the results of this study and those of previous studies are made, from which conclusions are drawn and recommendations are given.

6.1 Students' Metacognitive Strategy Use in the Two Modes of Discussion

In response to Research Question One: "What metacognitive strategies do the students use in face-to-face discussions and computer-mediated discussions?", this study found that the seven metacognitive strategies in Chamot and O'Malley's inventory (Chamot & O'Malley, 1994) had been used by the participants of this study. Before working on the networked computers, most of the students used Advance Organisation to identify the organising principles of a passage. This result is consistent to the findings of a previous research project (Jamieson & Chapelle, 1987).

Besides, like the participants of previous studies (Bull, 1997; Liou, 1997), the students of the present study did use various Planning strategies during task. For example, the students in the two experimental groups used Organisational Planning to plan the parts and sequences of ideas they would like to express before discussion. Also, they used the strategy Selective Attention to focus their attention on a certain area of discussion.

The findings of the present study concerning Monitoring and Evaluating strategy use are also consistent with those of previous studies. Like a previous study (Chapelle & Mizuno, 1989), this study found that the students used Monitoring strategies to monitor their comprehension and production of text or speech. The present work has provided some evidence that the students assessed their task performance from time to time. Moreover, as discussed in the next subsection, this study found both group and individual differences in monitoring and evaluating strategy use.

The qualitative analysis revealed that the participants of this study used a wide variety of metacognitive strategies but might not use them effectively. This finding is in agreement with previous ones (Chapelle & Mizuno, 1989; Liou, 1997). The present study revealed that some students used the Planning strategy Self-management to plan when they would respond to their classmates' ideas; they also used the Evaluating strategy Self-assessment to critique their own task performance. However, the retrospective verbal reports showed that some students did not take any actions after using a metacognitive strategy. Besides, the students did not always use metacognitive strategies in an appropriate way. For instance, as discussed in Chapter 5, some students in the CMC group used the planning strategy Selective Attention to focus their attention on one classmate, and did not collaborate with other group members. It appears that students' ineffective strategy use and the reasons behind such behaviour have not been fully explored. It would appear that further investigations are needed.

The combined use of certain metacognitive strategies, which was favoured by the participants of this study, has not been mentioned in the online discussion literature and therefore deserves research attention. In this study, most of the participants used Advance Organisation and then Organisational Planning before having a discussion in the CMC or face-to-face modes. Furthermore, some students preferred a combination of the Evaluating strategy Self-assessment with a Planning strategy. This finding supports an earlier argument (McDonough, 1996) that there is a hierarchy of strategies in language learning. It would be of research interest to further investigate the patterns of learner strategy use during online and face-to-face discussions.

6.2 Similarities and Differences in Metacognitive Strategy Use by the Two Groups

Regarding Research Question Two: “Are there any similarities and differences in the students’ metacognitive strategy use in face-to-face discussions and computer-mediated discussions?”, this study revealed both similarities and differences between groups and among individuals.

As mentioned in Chapter 4, quantitative analysis of the results revealed little difference in metacognitive strategy use between the two discussion groups. Both groups used similar number of planning and monitoring strategies during discussion. While the figures showed that the CMC group used more instances of evaluating strategies than the FTF group, the differences were probably caused by the excessive use of these strategies by one student. Since there

seemed to be no related previous studies reported in the literature, comparison of findings cannot be made. Nevertheless, on the grounds that transfer of learner strategies to different learning activities is possible in theory (Chamot & O'Malley, 1994; O'Malley, 1987), it is likely that those strategies used in face-to-face discussions could be used in computer-mediated discussions as well.

Qualitative analysis of the retrospective verbal reports showed group differences in the use of the Planning strategy Selective Attention. The students in the CMC group used this strategy when they had to read a large number of messages which appeared on screen simultaneously. This strategy was particularly useful for these students since they had to understand the incoming messages before replying to their group members. Unlike the traditional discussion forum, the virtual environment allows members to “speak” simultaneously. Selective Attention seemed to be a suitable metacognitive strategy which helps learners to screen out the messages and keep the discussion going. Nevertheless, as discussed in the previous section, students should not overuse this strategy by responding to one group member only.

Qualitative strategy also showed that the students used monitoring strategies differently in the two modes of discussion. While the students in the CMC group used Monitoring Comprehension to check their understanding of the article, those in the FTF group used the same strategy to check how well they could understand their group members. Such difference might be due to the presence or absence of comprehension problems during discussion. As mentioned in subsection 5.1.2, some students in the FTF group did not understand the ideas

of one of their group members. As a result, they had to use monitoring strategies to solve their listening comprehension problems. The constant use of these monitoring strategies seemed to help students focus on the topic.

In a nutshell, this study revealed similarities in the students' use of metacognitive strategies in the face-to-face and computer-mediated discussion modes. However, I would suggest that other researchers conduct similar studies so that the findings could be compared and verified.

6.3 Students' Participation in Computer-Mediated and Face-to-Face Discussions

Concerning Research Question Three: "Are there any similarities and differences in the students' participation in face-to-face discussions and computer-mediated discussions?", the results of this study lend support for the argument that computer-mediated discussions tend to equalise students' participation (Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996). In terms of turn-taking, the students in the CMC group took similar turns while those in the FTF group took a wider range of turns.

This study has also provided some answers to an unanswered research question regarding the relationship between modes of small group discussion and gender (Warschauer, 1996). The males constructed more sentences than the females, but such gender difference was less prominent in the CMC group than in the FTF group (see subsection 4.1.2). This is probably because in

computer-mediated discussions, all students have an equal opportunity to type and send their messages. As a result, both males and females could express their opinions freely. The gender difference in sentence production was possibly due to the fact that a male student (Zhang) resent some of his messages during online discussion and that a female student (Rebecca) reported that she had deleted some of her unsent messages.

Gender difference appeared to be more prominent in face-to-face discussion. One possible reason was that only one person could speak at a time, and the floor could be dominated by one or two students (Pincas, 1999). Another possible reason was the females' self-management strategy use during discussion. As shown in the retrospective verbal report data, the two female students chose to remain silent and listen to their male counterparts. Hence the females in the FTF group constructed 2.4 times fewer sentences than the males.

6.4 Students' Completion of Task in Computer-Mediated and Face-to-Face Discussions

In respect of Research Question Four: "Are there any similarities and differences in the students' completion of language tasks in face-to-face discussions and computer-mediated discussions?", it appears that the two groups were similar in terms of their comprehension of the article. While the FTF group scored higher than the CMC group regarding identification of the main ideas of the article, such difference was minimal.

However, there were some differences between groups regarding the students' construction of arguments. The students in the CMC group outperformed their FTF counterparts in terms of logical development of arguments. This was probably because the students benefited from the instant written record of online discussion, which served as a good reference for the completion of task. According to the results of blind review, the answers of the four students in the CMC group were more consistent, grammatical and logical. On the contrary, as reported in section 5.3, the students in the FTF group had different ideas during discussion, so their answers to the questions were less consistent. In fact, according to the expert marker, some of the answers were even irrelevant to the topic.

Despite the differences, the students in the two groups could successfully complete the task. Also, in the interview sessions, the students reflected that the experimental nature of the present study had not affected their task performance. Nevertheless, I would suggest that future studies should include a control group, in which the students complete the same task in a non-experimental setting so that the above results could be verified.

6.5 Pedagogical Implications

It would appear that appropriate use of metacognitive strategies helps learners analyse a passage. As such, tutors could encourage their students to use metacognitive strategies in the language classroom. During the pre-task phase, students could be encouraged to plan and organise their ideas before having a

discussion online. During task, students should constantly monitor their comprehension of the text as well as their understanding of their classmates' speeches. They should also monitor their production to ensure that they are addressing the topic. During the post-task phase, students should evaluate their strategy use constantly.

Post-task assessment of metacognitive strategy use can be achieved by at least three ways. First, the students could share the effective metacognitive strategies they have used with their peers. This would consolidate what they have learned. Second, students could keep a learner diary, which has been used as a tool to raise language learners' metacognitive awareness of English learning (Young & Fong, 2001). The advantage of it is that learners could keep track of their strategy use and replace those less effective strategies with more effective ones. Finally, students could assess their metacognitive strategy use via retrospective reporting. While this method was used as a data collection technique in this study, its potential as a learning tool has been examined by another study (Anderson & Vandergrift, 1996), which argued that verbal reporting could help learners better understand their learning process, and it could be used as a language activity.

It was found that the students in the two groups did not seem to question their group members for clarification. Besides, negotiation among members did not occur explicitly. Some students remained silent even though they had different ideas in minds. As such, it would seem that students need more training in both verbal and virtual communications. For verbal communication, students should

learn how to analyse others' speech and how to voice their opinions during discussions. For virtual communication, students should be given clear guidelines for negotiating online, learning collaboratively, and expressing their opinions concisely.

The interview results suggest that most of the students would like their tutors to use computer-mediated discussion activities to complement traditional face-to-face instruction. However, as discussed in the instructional technology literature (Dabbagh, 2002), one of the problems encountered by tutors is that integrating web-based component into a face-to-face programme may double the workload for tutors and students. For this reason, tutors who would like to integrate online discussion activities into their face-to-face language courses should try their very best to find the right balance between face-to-face and computer-mediated activities. For example, tutors should inform their students in advance about the time required to participate in online and offline activities. In particular, they should set a time limit for computer-mediated discussion activities.

6.6 Methodological Implications

This study has triangulated a number of data collection techniques such as retrospective verbal reporting, computer tracking and interviews. The present work was exploratory, and suggestions rose for further research.

6.6.1 The Use of Retrospective Verbal Reporting

All the participants of this study reflected in the student interview that retrospective verbal reporting had not affected their task performance. To further improve this data collection method, I would suggest that researchers provide verbal reporting training for the participants. Warm-up exercises (Ericsson & Simon, 1993) could be used prior to the verbal reporting session. Whilst this warm-up phase would help participants understand the requirements of the researchers, such session would increase the data collection duration.

The retrospective verbal reporting session could also be further improved by having several trained researchers collect the data. In this study, I was the only researcher, and I met the students individually after the discussion task. Consequently, the four students had to wait for 1 to 90 minutes before giving their verbal reports. The possible disadvantage of this arrangement is that the time interval between task and reporting might lead to data loss. The suggested method would reduce the time gap, but a caveat is that different researchers might have different influence on the students.

It would appear that retrospective verbal reporting, which enables students to describe what they have been doing during the online and face-to-face discussion tasks, make explicit students' strategic knowledge that would otherwise remain implicit. While retrospective reports as a learning tool was not the focus of this study, this finding is similar to those reported in the literature (Anderson & Vandergrift, 1996). Empirical evidence is needed to verify the

effects of retrospective verbal reporting on students' discussion performance in the two modes.

6.6.2 The Use of Computer Tracking

This study confirms that computer tracking is an effective means of recording students' online discussion behaviours. It could not only keep a written record of the process, but also include the time when a student posts a message to the forum. These advantages have been proved to be beneficial to both students and researchers. By reading the discussion log, students could be reminded about the discussion process, and therefore could effectively reflect upon their learning. Researchers could know the duration of the discussion instantly and discover the time gap between messages. In addition, researchers could save the time for transcribing, which is generally regarded as a time-consuming and tedious process.

Despite its advantages, this data collection technique could be further improved in two aspects. It was observed in this study that for some reasons, some students deleted certain messages they had typed. Since such unsent messages might be of research value, programs should be designed to keep track of all changes students have made during online discussion. Secondly, like the present study, future studies on computer-mediated discussions should print the discussion log immediately for reference purposes. Hence a printer should be available at the venue where the experiment is to be conducted.

6.6.3 The Use of Quantitative and Qualitative Methods of Analyses

In this study, the strategy data were analysed both quantitatively and qualitatively. This technique of data triangulation, as argued elsewhere (McDonough, 1999), has improved interpretive clarity in the present study.

The quantitative method of analysis would enable researchers to understand the frequencies of strategy instances used by students during discussions. However, it would appear that such approach is less effective in a small scale study such as the present one. In this study, there were four students in each discussion group, and therefore no inferential statistical tests were performed. While the descriptive statistics reported in this study could offer valuable information to researchers, future research may consider increasing the sample size. In this way, statistical tests could be performed to examine differences between discussion groups or correlation between metacognitive strategies.

Given the relatively small sample size, the qualitative analysis of the data has been proved to be valuable to researchers. I would like to suggest that other researchers should cite students' protocols to illustrate the use of a certain metacognitive strategy. Whereas the present cross-sectional study has provided useful information about students' metacognitive strategy use in the face-to-face and online modes, future comparative studies could have a longitudinal and ethnographical design, which would keep track of students' changing metacognitive strategy use in the two discussion modes over time. To ensure the success of such studies, students should be carefully selected so

that the two groups would be represented by students of similar language learning experiences, cultural backgrounds and discussion skills.

6.6.4 The Use of Video- and Audio-taping

Video- and audio-taping may be useful in recording the face-to-face discussion, verbal reporting and interview sessions, but it cannot effectively record students' online discussion process. In this study, four video-cameras and a tape-recorder were used to record the online discussion session. However, during the retrospective verbal reporting sessions, all the students chose to read the discussion log rather than to view the video clips. This is probably because the video clips could not help the students recall immediately what they had been doing during the discussion session although both the computer screen and the student's face were captured. For this reason, I would like to suggest that future studies on computer-mediated discussions use video- or audio-taping in verbal reporting and student interview sessions only.

6.6.5 The Use of Student Interviews

The interviews with individual students have provided useful data about students' opinions on the integration of online discussion into the English teaching course. It was observed that the students appeared to be frank during the interviews. However, such observation needs verification. It would be of research interest, for example, to know whether the gender of an interviewer would affect the interview results. Also, other similar studies could examine the effect of different interviewers on the interview results. Finally, future studies

could also consider using post-task questionnaires to collect data about students' opinions. The advantages of such design are that it is less time-consuming and that researchers do not need to take the burden of transcribing the interviews. A disadvantage is that researchers could not modify their questions according to the reactions of the students.

6.6.6 The Use of Expert Markers

The expert marker in this study had made valuable comments on the students' task performance. I would therefore like to suggest that future studies should use expert markers to evaluate the performance of the students in task. The use of expert markers could be further improved in two aspects. First, future studies with more students involved could investigate the effects of discussion modes on students' logical development of ideas. Second, to avoid any biases, future studies could include two or more expert markers so that a more balanced view could be obtained.

6.7 Concluding Remarks

This study has provided some evidence of how students used metacognitive strategies in the traditional face-to-face and computer mediated communication discussion modes. Regardless of the learning environment, students do use a wide range of metacognitive strategies to help them accomplish a discussion task. Yet certain strategies might be more suitable for some students and some learning environments than others. Therefore, it is necessary that the instructors help their students choose appropriate strategies to complete a discussion task.

While this study has answered some questions, it has also raised more questions which need to be answered. An urgent need is to establish a theory of strategy use in computer mediated discussion. The use of a cluster of strategies during online and face-to-face discussion tasks also deserves more research attention. Finally, the relationship between discussion mode and a number of factors such as strategy use, gender, and proficiency level is so complicated that more empirical studies are needed to explain students' strategic behaviours in the natural and virtual learning communities.

References

Anderson, N. J., & Vandergrift, L. (1996). Increasing metacognitive awareness in the L2 classroom by using think-aloud protocols and other verbal report formats. In R. L. Oxford (Ed.), *Language Learning Strategies Around the World: Cross-cultural Perspectives* (pp. 3-18). Honolulu, HI: University of Hawaii, Second Language Teaching & Curriculum Center.

Atkinson, R. C., & Shiffrin, R. M. (1971). The control of short-term memory. *Scientific American, 225*, 82-90.

Bialystok, E. (1978). A theoretical model of second language learning. *Language Learning, 28*(1), 69-83.

Bull, S. (1997). Promoting effective learning strategy use in CALL. *Computer Assisted Language Learning, 10*(1), 3-39.

Bull, S., Pain, H., & Brna, P. (1993). Student modelling in an intelligent computer assisted language learning system: The issues of language transfer and leanring strategies. In T.-W. Chan (Ed.), *ICCE'93 : Proceedings of the 1993 International Conference on Computers in Education : Applications of Intelligent Computer Technologies* (pp. 121-126). Taipei: Software Research Center, National Central University.

Chamot, A. U., & O'Malley, J. M. (1994). *The CALLA Handbook: Implementing the Cognitive Academic Language Learning Approach*. Reading, MA: Addison-Wesley.

Chapelle, C. (1997). CALL in the Year 2000: Still in search of research paradigms? *Language Learning & Technology, 1*(1), 19-43.

Chapelle, C., & Mizuno, S. (1989). Student's strategies with learner-controlled CALL. *CALICO Journal, 7*(2), 25-47.

Cohen, A. D. (1998). *Strategies in learning and using a second language*. London: Longman.

Cohen, A. D., & Scott, K. (1996). A synthesis of approaches to assessing language learning strategies. In R. L. Oxford (Ed.), *Language Learning Strategies Around the World: Cross-cultural Perspectives* (pp. 89-106). Honolulu, HI: University of Hawaii, Second Language Teaching & Curriculum Center.

Dabbagh, N. (2002). Using a web-based course management tool to support face-to-face instruction. *The Technology Source, March/April (2002)*. Available: http://ts.mivu.org/default.asp?show=article&id=938 [2002, July 16].

Ericsson, K. A., & Simon, H. A. (1993). *Protocol Analysis: Verbal Reports as Data* (Rev ed.). Cambridge, MA: MIT Press.

Hosenfeld, C. (1976). Learning about learning: Discovering our students' strategies. *Foreign Language Annals, 9*, 117-129.

Jamieson, J., & Chapelle, C. (1987). Working styles on computers as evidence of second language learning strategies. *Language Learning, 37*(4), 523-544.

Kelm, O. R. (1992). The use of synchronous computer networks in second language instruction: A preliminary report. *Foreign Language Annals, 25*(5), 441-454.

Kern, R. (1995). Restructuring classroom interaction with networked computers: Effects on quantity and quality of language production. *Modern Language Journal, 79*(4), 457-476.

Kern, R., & Warschauer, M. (2000). Introduction: Theory and practice of network-based language teaching. In M. Warschauer & R. Kern (Eds.), *Network-based Language Teaching: Concepts and Practice* (pp. 1-19). Cambridge: Cambridge University Press.

Liou, H.-C. (1997). Research on on-line help as learner strategies for multimedia CALL evaluation. *CALICO Journal, 14*(2-4), 81-96.

Liou, H.-C. (2000). Assessing learner strategies using computers: new insights and limitations. *Computer Assisted Language Learning, 13*(1), 65-78.

McDonough, S. H. (1995). *Strategy and Skill in Learning a Foreign Language*. London: Edward Arnold.

McDonough, S. H. (1996). *A hierarchy of strategies.* Paper presented at the 11th World Congress of Applied Linguistics, Jyväskylä, Finland.

McDonough, S. H. (1999). Learner strategies. *Language Teaching, 32*(1), 1-18.

McLaughlin, B., Rossman, T., & McLeod, B. (1983). Second language learning: An information-processing perspective. *Language Learning, 33*, 135-158.

National University of Singapore. (n.d.-a). *IVLE Background*. Available: http://ivle.nus.edu.sg/public/background.asp [2002, July 28].

National University of Singapore. (n.d.-b). *What is a Chatroom?* Available: http://ivle.nus.edu.sg/help/staff/chatroom/chatroom.htm [2002, July 18].

Nunan, D. (1996). Learner strategy training in the classroom: An action research study. *TESOL Journal, 6*, 35-41.

O'Malley, J. M. (1987). The effects of training in the use of learning strategies on acquiring English as a Second Language. In J. Rubin & A. Wenden (Eds.), *Learner Strategies in Language Learning* (pp. 133-144): Prentice-Hall International.

O'Malley, J. M., & Chamot, A. U. (1990). *Learning Strategies in Second Language Acquisition*. Cambridge: Cambridge University Press.

Ortega, L. (1997). Processes and outcomes in networked classroom interaction: Defining the research agenda for L2 computer-assisted classroom discussion. *Language Learning and Technology, 1*(1), 82-97.

Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know*. Boston, MA: Heinle & Heinle.

Oxford, R. L. (Ed.). (1996). *Language Learning Strategies Around the World: Cross-cultural Perspectives*. Honolulu, HI: University of Hawaii Press.

Pincas, A. (1999). *Features of online discourse for education.* Unpublished manuscript.

Salaberry, R. (1999). CALL in the Year 2000: Still developing the research agenda. A commentary on Carol Chapelle's CALL in the Year 2000: Still in search of research paradigms. Language Learning and Technology, Vol.1, No.1. *Language Learning and Technology, 3*(1), 104-107.

Scholfield, P. (1995). *Quantifying language: A researcher's and teacher's guide to gathering language data and reducing it to figures*. Clevedon, Avon, England: Multilingual Matters.

Sengupta, S. (2001). Exchanging ideas with peers in network-based classrooms: An aid or a pain? *Language Learning and Technology, 5*(1), 103-134.

Sullivan, N., & Pratt, E. (1996). A comparative study of two ESL writing environments: A computer-assisted classroom and a traditional oral classroom. *System, 24*(4), 491-501.

Warschauer, M. (1996). Comparing face-to-face and electronic discussion in the second language classroom. *CALICO Journal, 13*(2), 7-26.

Warschauer, M., Shetzer, H., & Meloni, C. (2000). *Internet for English Teaching*. Alexandria, VA: TESOL.

Wenden, A. L., & Rubin, J. (1987). *Learner Strategies in Language Learning*. Englewood Cliffs, NJ: Prentice-Hall.

Young, M. Y. C. (2001). Knowing more about our students' English learning processes through diaries. Invited lecture at the SEAMEO Regional Language Centre, Singapore, 17 February 2001.

Young, M. Y. C., & Fong, Y. S. (2001). Learner diaries as a tool to heighten Chinese students' metacognitive awareness of English learning. *Reflections on English Language Teaching, 1*, 125-138.

Appendix 1 Discussion Task Designed for this Study

Analysing an Article

Instructions:

1. Work individually. Read the article entitled 'Promote Marriage in a Realistic Way' carefully;

2. Underline the thesis statement and main arguments of the article;

3. Work with your group members. Answer the following questions:

a) What does the author want you to believe?

_____

_____

_____

b) To what extent do you agree with the author?

_____

c) Why do you argue for/ against the author? Use examples / facts / your observation / your personal experience to support your arguments.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Appendix 1 (cont.)

Promote Marriage in a Realistic Way
Anthony Yeo

[1]Concerns over the rising divorce rate in Singapore should alert us to the need for some careful thinking about how marriage should be promoted. [2]It is commendable that various committees have been formed to map out ways to encourage people to marry and have children. [3]Unfortunately, the Government's enthusiastic effort may be giving people undue idealism.

[4]It can be observed that marriage has been idealised as the most desirable state of life for everyone, especially the young and educated. [5]Ideas have also been given on how people should get hitched and, if they should do so, how they can enhance their marriage. [6]For instance, the Ministry of Community Development and Sports had a full-page advertisement on Valentine's Day (*The Straits Times*, 14 Feb 2001), which gave six ideas for injecting spontaneity and romance into marriage.

[7]One wonders if these ideas are appropriate to our culture, way of life and the ability to attempt any or all of the recommendations. [8]Furthermore, the ideas seem like some middle-class, Western practices which may be alien to many in Singapore. [9]It would be rather surprising if there were couples who would surprise their spouses with roses on the bed, draw faces on eggs to say 'I love you', or have the time or energy to do jigsaw puzzles together.

[10]In our enthusiasm to promote marriage, we may be giving people false expectations of marriage. [11]In reality, married people are more familiar with the mundane, unromantic and daily routine of life. [12]Over-idealising and raising false expectations may result in disappointment and disillusionment when couples' needs and expectations go unmet. [13]The obvious result is an increasing trend towards divorce.

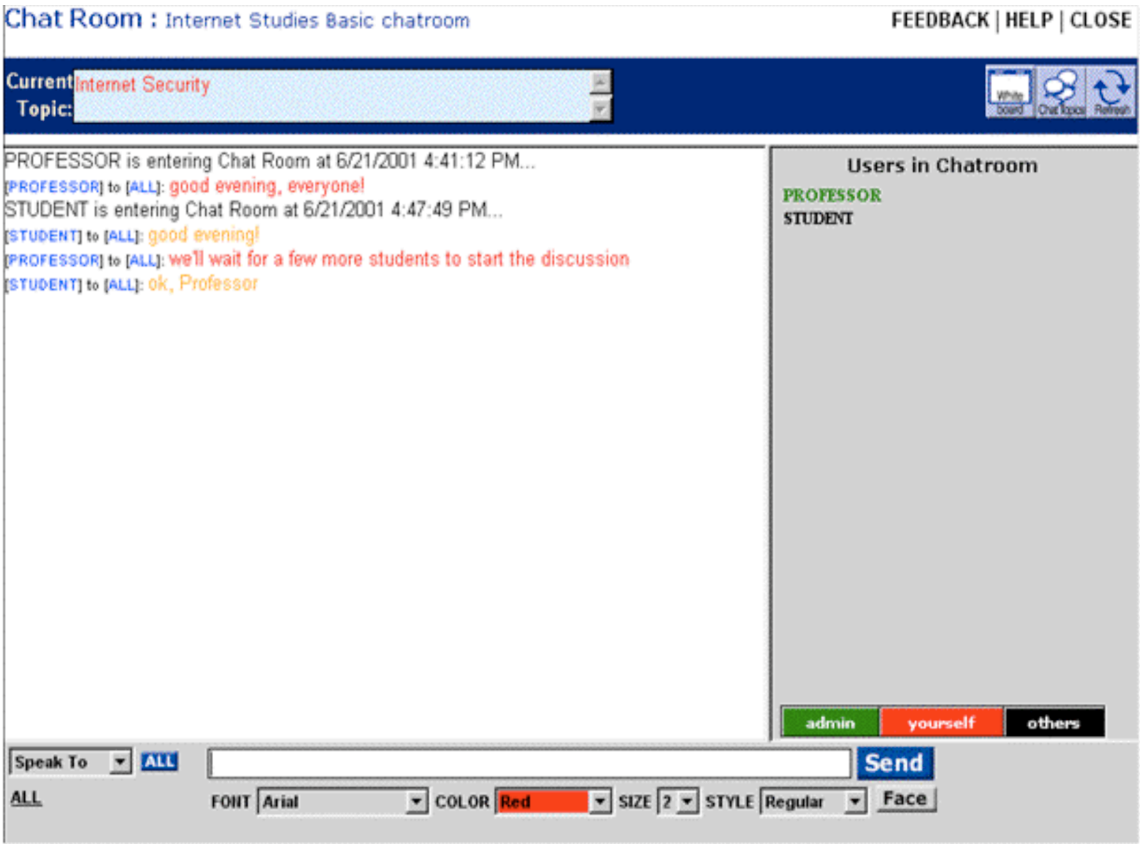
[14]While we may wish to encourage marriage, we should consider culturally-appropriate expressions of the relationship, realistic portrayal of marriage, helping people appreciate the demands of marriage and reviewing national goals to support strengthening marital ties.

(Source: Adapted from *The Straits Times*, 6 March 2001)

Appendix 2 Marking Scheme for the Discussion Task

Categories / Scores	**Identification of Main Ideas**	**Logical Development of Arguments**	**Grammar**
1 = Very Poor	Main ideas of the article not identified.	The student's arguments are irrelevant to the topic.	Very limited vocabulary. Errors in almost every sentence. Many unidiomatic expressions.
2 = Poor	Some of the main ideas of the article identified.	The student's arguments remain flawed on the logical level.	Mainly simple sentences. Many grammatical errors.
3 = Fair	The thesis and some of the main ideas of the article identified.	Some of the student's arguments have errors on the logical level.	Fairly grammatical sentences. Fair vocabulary.
4 = Good	Both the thesis and most of the main ideas identified.	The student's arguments demonstrate occasional errors on the logical level.	Basically grammatical sentences.
5 = Very Good	Both the thesis and the main ideas of the article clearly identified.	The student's arguments are logically presented.	Well-written sentences. Very good vocabulary.

Appendix 3 Screenshot of IVLE Chat Room



Appendix 4 Excerpt of a Coded Protocol

Researcher: Can you tell me what you were thinking from the time you received the worksheet to the time the group finished the discussion?

Zhang: Sure. I think I feel it's like what I do in the normal class. Like in normal class, I read the text and discuss with others and then write the answer.[i]

Err just the way of discussion is different. I… I read the worksheet and… just think about how can I answer the questions[ii] as in the normal class… Because I often discuss with others online, I don't think there's anything special since I've used to talk to others online.

Then I tried to express my opinion and then give comment on the opinions of others. If I can type faster, I can express my opinions much. I type normal fast normal fast not very fast but I think it's enough to talk with others.[iii] [Reads the chat log and watch the video clip]. Um I think if we discuss face-by-face, sometimes we cannot understand others very clearly. But in the chat room, there is no such a problem.

Researcher: How did you discuss with your classmates?

Zhang: Um I understand them based on their sentences typed on the screen. Because this is reading written English and so if my spoken and listening comprehension is not very good I also can understand them very well…[iv] [short pause] Um I think sometimes we need a leader in the chat room, a administrator to…to manage the top- to keep the topic in a in a correct way and not too far away. Sometimes we chat and then we'll talk about other topic and we don't even feel it. So an administrator can do this job.

[Short pause] When we talked about the the movie, I think we have we are I think we are talking about another topic. It's not very related to the… topic. I I can err come back to the right topic, but err, other students need maybe need a reminder from the administrator.[v]

[After reading the discussion log] If there're too many people in the chat room and… there will be a flock of messages on the screen. Sometimes I just read the sentences on the screen something on the on the top of the screen.[vi]

---

[i] Planning (Organisational Planning): Planning how to accomplish the task.

[ii] Planning (Advance Organisation): Skimming the worksheet to identify the organising principle.

[iii] Evaluating (Self-assessment): Judging how well he has accomplished the task. Zhang thought that his typing speed was fast enough to discuss with his group members.

[iv] Evaluating (Self-assessment): Judging how well he has accomplished the task. Zhang thought that his spoken English did not need to be good to do the task well.

[v] Evaluating (Self-assessment): Judging how well he has accomplished the task. When talking about a movie, Zhang found that they were not addressing the topic.

[vi] Planning (Selective Attention): Read selectively, attending to the sentences on top of the screen. Zhang used this strategy to solve the problem with overflow of information on screen.