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HOW COMPUTER-MEDIATED COMMUNICATION AFFECTS ELL STUDENTS' WRITING PROCESSES AND WRITING PERFORMANCE

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HOW COMPUTER-MEDIATED COMMUNICATION AFFECTS ELL STUDENTS' WRITING PROCESSES AND WRITING PERFORMANCE

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF INSTRUCTIONAL LEADERSHIP
AND ACADEMIC CURRICULUM

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ABSTRACT

The overarching purpose of this study was to examine the impact of CMC technology on ELL students' writing processes and writing performance through interacting, communicating, constructing knowledge, and collaborating with peers from different cultural and linguistic backgrounds. This study intended to reform teaching methods for ELL writing from a teacher-centered approach to a student-centered approach. In addition to the discussion forum (NICENET), used to address students' individual learning needs, this study incorporated CMC technology tools that supported tutorial writing lessons (Essay Punch, Paragraph punch), interactive multimedia grammar practices (Grammar Fitness), online bilingual dictionaries, and other online writing links (websites/labs) to improve students' writing skills. Offering unlimited time (class time) and place (classroom), CMC technology incorporated both individualized learning processes and social interaction learning to facilitate ELL writing processes and writing outcomes.

Mixed methods were utilized in this study: quantitative methods, including writing difficulties/needs questionnaires, quantity of participation, pre-test quality (score) of writing samples, post-test quality (score) of writing samples, and qualitative research methods, including reflection journals and interviews.

The results of the questionnaire data showed that most ELLs perceived their highest writing difficulties (needs) in linguistic/cognitive deficiencies (M=3.91; SD=.53), next highest in psychological/emotional deficiency (M=2.78; SD=1.20) and the third in sociocultural aspects of writing difficulties(M=2.50;SD=1.00). After CMC technology intervention designed to address students' self-perception of writing difficulties (needs),

sociocultural (percentage gains= -21%) aspects of writing difficulties were reduced the most, cognitive/linguistic (percentage gains= -18%) aspects of writing difficulties were reduced the second, and psychological/emotional (percentage gains=-17%) aspects of writing were reduced the least. In terms of students' writing performance, there was a trend towards an improved level of performance. Students showed improvement in their quantity of writing, organization, thesis statements, ideas, and use of multiple perspectives. However, a majority of students did not show much improvement in grammar usage (run-on sentences and articles) and word choice. Comparing two groups, the CMC technology group outperformed the control group on self-perceptions of sociocutlrual and, psychological/emotional aspects of writing, and in percent gains between pretest and posttest of writing performance. During the writing processes, there were advantages and disadvantages about using CMC technology for ELL writing instruction. A majority of students had a high level of positive perceptions of CMC technology and participation, had a high level of discussion, reduced their writing anxiety, became more confident, and felt that they made progress in multiple perspectives, critical thinking, identifying writing errors, spelling, grammar, implementing writing processes, and adapting to American writing conventions. Participants described advantages most on cognitive/linguistic aspects of writing. On the other hand, the cognitive/linguistic disadvantages included conflicting feedback, longer time for revising, and harder revision. The technological difficulties included lack of creativity and flexibility in the writing software. The sociocultural difficulties were spending much more time on building an online learning community for emotional support and knowledge sharing/building. In the beginning of the study, students were

reluctant to share with their ELL peers about their English writing because they were afraid that their peers might look down upon their writing abilities or they did not have confidence in their ELL peers' writing ability to be able to offer constructive or meaningful feedback and suggestions. However, gradually students began to establish a learning community where they not only helped each other to write but also offered emotional support to their peers by showing empathy and suggesting problem-solving strategies in their writing. Students became actively in using writing to express ideas, negotiate differences, support other people's emotional needs, and solve problems. Metacognitive strategies and higher-order cognitive strategies were facilitated through online discussion and interaction.

CHAPTER 1: INTRODUCTION

Writing Difficulties of English Language Learners in the U.S.

Writing instruction of English Language Learners (ELLs) has become one of the most urgent issues in today's educational practice. As the pace of immigration to the U.S. has accelerated in recent years, increasing numbers of children in U.S. schools come from homes in which English is not the primary spoken language. According to the National Center for Education Statistics, the number of children ages 5-17 who spoke a language other than English at home more than doubled between 1979 and 2004. An estimated 5 million children with limited proficiency in English were enrolled in U.S. public schools during the 2003-2004 school year (2006 United States Government Accountability Office), and they represent about 10 percent of the total school population. These students speak over 400 languages and most of them have difficulties in speaking, reading, writing, or understanding English that interfere with their ability to successfully participate in school. In the 2003-2004 school year, the percentage of students with limited English proficiency reported as scoring proficient on a state's language arts tests was lower than the state's annual progress goals in nearly two-thirds of the 48 states.

Furthermore, the performance of students with limited English proficiency was relatively lower than that of other student groups, such as economically disadvantaged students, African American students, or White students. As the No Child Left Behind policy begins to demand success for all subgroups of children, the writing achievement of ELLs has become even more important. Many schools cannot meet their yearly progress goals, unless their ELLs are doing well in writing. Moreover, according to the 2000 Census, there were over 37 million adults 18 or older who reported speaking a language

other than English at home (U.S. Census Bureau, 2001). Among those 37 million adults, more than 8 million did not speak English well or at all; and an additional 7 million did not speak English very well (U.S. Census Bureau, 2001). In other words, about 15 million adults would need ELL instruction to help them become English proficient. As a result, in recent years, enrollment figures for adult ELLs in higher educational settings have increased dramatically. This trend has created a huge demand for English language instruction for these non-native adult ELLs.

Over the past years, the number of international students coming to the United States to pursue higher degrees has also increased dramatically. According to the Institute of International Education (2005), for the past several years, international students' enrollment has been over 500,000 per year. In 2003, the number of international students enrolled in American colleges and universities was 17 times greater than it was in 1955 (Institute of International Education, 2005). This increase brings issues concerning writing. These second language international students face challenges on the mastering of a foreign language (English) and the sociocultural and linguistic differences in writing conventions and standards.

In addition, persuasive writing is more challenging for ELLs. A number of national assessments have suggested that students' performance in argumentative/persuasive writing needs to be improved (Greenwald et al., 1999). Three major reports demonstrate that the majority of students are found to have considerable difficulty with argumentative/persuasive writing. The first report, the National Assessment of Educational Progress (NAEP) 1998 Writing Report card of the Nation and

the States, presents the results of the 1998 NAEP concerning grades 4, 8, and 12 students' writing assessments for the nation and the states which participated in the assessment.

Student writing performance was reported in terms of three achievement levels: basic, proficient, and advanced. Basic level denotes partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at a given grade. For example, for grade 12, students performing at the basic level should be able to: demonstrate appropriate response to the task in form, content, and language; demonstrate reflection and insight and evidence of analytical, critical, or evaluative thinking; show evidence of conscious organization; use supporting details; reveal developing personal style or voice; and demonstrate sufficient command of spelling, grammar, punctuation, and capitalization to communicate to the reader.

Proficient level represents solid academic performance. Students reaching this level should be able to demonstrate competency in the subject matter. For grade 12 students performing at proficient level, should be able to accomplish all tasks of the basic level in addition to (1) using convincing elaboration and development to clarify and enhance the central idea; (2) showing effective use of transitional elements; and (3) using language appropriate to the task and intended audience.

Advanced level represents superior performance. In grade 12, students performing at the advanced level should be able to accomplish all tasks of the proficient level in addition to (1) showing maturity and sophistication in analytical, critical, and creative thinking; (2) having well-crafted, cohesive organization; (3) showing sophisticated use of transitional elements; (4) using illustrative and varied supportive details; (5) using rich, compelling language; and (6) displaying a variety of strategies such as anecdotes,

repetition, and literary devices to support and develop ideas. Overall the results for the nation on the NAEP 1998 Writing Report card, at grades 4, 8, and 12, show that the percentages of students performing at or above the basic level of writing achievement were 84, 84, and 78 percent respectively (Greenwald et al., 1999, p.14). The percentages at or above the proficient level were 23, 27, and 22 respectively, while only 1 % of students at each of the three grades performed at the advanced level. In other words, the overall levels of writing achievement remained consistently low, with only 22-27 % of the students on grade 4, 8, and 12 managing to perform proficient tasks. In addition, of all the writing genres examined, including narrative, informative, and persuasive, the overall rating on the writing assessment showed poorer performance in persuasive writing than in narrative writing or informative writing for the three age groups, although the difference was not great. It could be that producing persuasive writing is more cognitively demanding than narrative or informative writing (Crowhurst, 1990). According to the Nation's Report Card, Writing Highlights 2002, students in grades 4, 8, and 12 were also writing for three main purposes: narrative, informative, and persuasive. Results for the nation indicated that average fourth and eighth grade students made improvements in writing between 1998 and 2002. However, there was no significant change found in the average performance of twelfth graders over the same period (U.S. Department of Education, 2003).

The second report, the NAEP 1992 Writing Report Card, is based on a survey carried out by the National Assessment of Educational Progress (NAEP), and concerns the writing performance of American school children. Nationally representative samples of grades 4, 8, and 12 students were included in this survey, which examined

approximately 30,000 students. They were asked to respond to various writing tasks consisting of informative writing, persuasive writing, and narrative writing. One of the major findings obtained from the writing assessment was that by grade 12, the majority of students had considerable difficulty with persuasive writing, though they had some understanding of informative and narrative writing (Applebee et al., 1994). The overall finding was that across the three grades, only 7 to 25 % of the students wrote developed (score 4) or elaborated (score 5) responses to the persuasive writing tasks.

The third report, Writing Trends Across the Decade, 1974-84, was conducted by Applebee et al. Levels of task accomplishment were identified as (a) not ratable; (b) unsatisfactory; (c) minimal; (d) adequate; and (e) elaborated. This report is based on three investigations of writing achievement carried out from 1974 to 1984, in which nationally representative samples of 9, 13, and 17 year-olds were asked to respond to a variety of writing tasks. In Trends in Persuasive Writing, 1974-1984, Applebee et al. concluded that, even at age 17, overall levels of achievement in these kinds of writing tasks remained low, with only 20 % of the students managing to write an adequate or elaborated persuasive letter and 34 % unable to write one that was rated above the unsatisfactory level (Applebee et al., 1986). Moreover, the proportion of students at all three age levels, who were able to write adequately or better, remained consistently low in 1984, ranging from 3 to 38 % across the various tasks.

In conclusion, based on the above three major reports, the majority of 17-year-old students are not able to write adequate persuasive essays. For average high school students, persuasive writing can be challenging. Once these high school graduates enter colleges or universities, it can be more challenging for them to learn to write persuasive

papers in academic English. Academic persuasive essays are usually cognitively demanding and time-pressured. Compared with these adult native English writers, adult ELL students can have even more difficulty in writing academic persuasive essays. Besides mastering the linguistic and grammatical features of written English, adult ELLs must learn to think, create, and write in ways that may be quite unfamiliar and different from those in their native language (Kroll, 1990). The writing strategies and processes of writing that ELLs have learned in their native language may not adapt smoothly to academic persuasive writing expectations in American school environments (Kaplan, 1966; Silver, 1993). However, anyone who wishes to pursue college or graduate studies in the U.S. needs to be familiar with persuasive/argumentative writing because it is a genre often required in North American academic contexts. Therefore, there is need for adult ELLs to learn how to write persuasive essays to be able to survive in the U.S. higher education setting.

Diversity of ELL Writers

Learning to write in a second language is a complex procedure. It involves more than simply learning the written symbols for spoken language and translating them into words, sentences, and paragraphs on paper. The process requires the writer to develop higher-level thinking and communication skills, including abstract conceptualization, inference, creativity, organization, and summarization of complex ideas (Scarcella, 1984). Mastering these skills is challenging even for many native writers of English in high school; it can be inferred that ELLs who are not accustomed to writing according to Western discourse conventions and rhetorical genres can have more difficulty.

Generally speaking, ELL writers are a diverse and complex group. They come from a range of national, cultural, religious, ethnic, and linguistic groups. They speak many languages and have extensive educational needs, including students with little formal schooling and students with native language proficiency. Accurately assessing the academic knowledge of these students in English is challenging. Compounding the challenge is a paucity of teaching strategies to address the diversity and complexity of these students' needs and to help them to improve their English proficiency. One size does not fit all in any endeavor to improve ELLs' English proficiency. Teachers need to find out what works for which students. In other words, ELL writing teachers need to look for teaching methods that address individual learning needs. Meanwhile, according to Vygotsky (1978), writing should be learned in social contexts. Human beings use tools or media to communicate with others. The act of writing can be seen as an attempt by a writer to communicate with audiences who will be reading the text. Writing teachers need to design group activities, such as peer reviews, pair work or group work, which can provide students with social contexts to promote interaction and knowledge negotiation. For example, in this kind of ELL writing classroom, students can negotiate and collaborate with their peers and hold conferences with the teacher during the writing process so that students can arrive at higher levels of thinking and writing performance.

Recent ELL research has shown a mismatch between the writing programs offered to ELLs and the realities of their unique writing needs (Matsuda, 1998). According to Matsuda (1998), most writing programs in U.S. schools are more suitable for native English speaking students than non-native English speaking students, because ELL students have different linguistic, cultural, and educational needs than native

English speaking students. Since assessment of student needs is fundamental to the design of a good curriculum, Reid (2001) advises that writing courses for English as a Second Language students should be thoughtfully designed to integrate their immediate needs with institutional values, disciplinary goals, and professional expectations. In Reid's recommendation, there is mention of immediate student needs, indicating that in order for the student to benefit from instruction, instructors must tailor instruction to meet student needs. Many ESL learners lack sufficient familiarity or knowledge about American writing conventions to compose well in English according to academic writing expectations. Moreover, ELLs tend to transfer their native language syntax, thought, and rhetorical patterns into their English writing. In order to learn about the different Western writing conventions, ELLs must have exposure to good writing examples and experience in composing in English rhetorical styles and genres. This experience in English can be formal or informal, but it is an essential element of second language writing development (Leki, 1992).

Computer-Supported Collaborative Learning and Writing

In a traditional ELL writing classroom, it will be almost impossible to develop teaching methods that can address the individual learning needs of linguistically and culturally diverse students, because what works with one linguistic and cultural group may not work with the other. There is a need to find ways to address ELL's learning needs, including both individual and group learning. Computer-Supported Collaborative Learning (CSCL) might be one of the most promising interventions/systems that can incorporate both individualized learning processes and social interaction learning to facilitate ELL writing processes and writing outcomes.

CSCL arose in the 1990s in reaction to software that forced students to learn as isolated individuals, proposing the development of new software and applications that bring learners together and that can offer creative activities of intellectual exploration and social interaction. At that time, the potential of the Internet to connect people in innovative ways provided a stimulus for CSCL research.

According to Stahl (2004), Computer-Supported Collaborative Learning (CSCL), focuses on how Online Collaborative Learning (OCL) environments enhance students' learning via teams to finish academic tasks. Koschmann (1996) extends the term of CSCL to include argumentation, interaction, debate that enhances learning and enables students to think, reflect and collaborate on the process of knowledge societies, fostering collaboration through engaging learners in dialogues, as well as linking ideas and resources to receive multiple reflections and evaluations. Computer-Supported Collaborative Learning (CSCL) encourages students to take roles in their learning process and it motivates them to be more committed to learn collaboratively rather than competitively (Koschmann, 1996).

Computer-Supported Collaborative Learning contexts usually involve writing into a computer-supported synchronous and asynchronous discussion environment. This writing provides reliable records of a community's (or a class') ideas, which students can use to study the development of their ideas over time and to integrate perspectives offered by different students. Studies of CSCL have examined a wide variety of learning influences, including conceptual change, depth of inquiry, and metacognition (Lipponen, 2000; Linn & His, 2000; White & Frederiksen, 1998).

Online Collaborative Writing can be classified under CSCL and is a pedagogical approach that is enhanced and supported by computer shared applications and is facilitated and prompted online by the synchronous and asynchronous Computer Mediated Communication (CMC) tools to enable a group of students from the same writing class, and/or other writing classes in local or international schools, to work in teams in order to exchange ideas, feedback and resources. Online Collaborative Writing is an extension of face-to-face traditional collaborative writing. However, Online Collaborative Writing may include any interaction and communication occurring before, during, and/or after the Online Collaborative Writing process to generate ideas, fix problems, enrich understanding and to help learners make decisions about their shared writing.

Williamson and Pence (1989) argue that computer applications are effective tools that can support the writing process in all stages. Web-conferencing, online forums and shared applications such as Microsoft Word are capable of encouraging students to apply writing processes, including prewriting, drafting, revising, editing, and publishing. However, there have been debates on the effectiveness and practicality of this collaborative writing in the process approach for second language (L2) learners. Berg (1999) argues that there is a need for structured guidelines in peer response and feedback for process writing in second language (L2) writing. The researcher states that without a structured way to implement the process approach, constructive collaboration seems unlikely to happen, especially with young, delayed, or inexperienced writers such as ELL learners. Other researchers such as Delpit (1988) and Gutierrez (1992) proposed the consideration of one's cultural and language needs while implementing the process

writing approach in the ELL classroom. They suggested that the process writing approach in the second language (L2) classroom did not work as effectively as in the first language (L1) classroom because very often the ELLs were not allowed to use their first language (L1) for communicating ideas and their cultural and linguistic background are often overlooked.

Over the past several years, a number of researchers have explored advantages and disadvantages regarding online collaborative learning. Most studies argue for the potential benefits of online collaborative writing, including cognitive (Cohen & Riel, 1989; Lindblom-Ylanne & Pihlajamaki, 2003; Tusi, 2004), socio-cultural (Kern, 1995; Sotillo, 2000; Beuchor & Bullen, 2005; Chung et al, 2005), and psychological (Alias & Hussin 2002; Weasenforth & Meloni 2002; Greenfield, 2003) advantages. None of the studies is in strong disagreement with online collaborative learning or online collaborative writing. Even though a few studies recognize the drawbacks of online collaborative learning (Anderson & Kanuka, 1997; Cifuentes & Shih, 2001; Alexander, 1999), they are not specifically related to writing or ELL writing. Since ELLs' first language backgrounds are very diverse, ELL writing teachers need to understand their students' learning needs and tailors instruction to meet ELLs' special writing needs to maximize the benefits to the students. There is much more we need to know about the relationship between Computer-Mediated Communication technology, ELLs' learning needs, and ELLs' writing, thinking, and emotional processes. For example, we need to analyze what difficulties and challenges students experience during the online writing processes, and how writing teachers can utilize the computer-supported collaborative

learning environment (what teaching pedagogy can be used) to help students solve their difficulties and enhance their writing skills.

Statement of Purpose

The objective of this research project is to collect information regarding how computer-mediated communication (CMC) technology affects ELL students' writing processes and writing performance in order to provide teachers and researchers with a foundation for studying the use of technology in ELL composition and for effectively implementing technology into classrooms to aid students in achieving language goals. Using questionnaires, writing samples, reflection journals, and interviews of participants selected through a purposeful sampling technique, this research intends to investigate the impact of online collaborative writing on ELLs through interacting, communicating, constructing knowledge, and collaborating with peers from different cultural and linguistic backgrounds. Not being limited by time and place, this study will examine how CMC technology can be used as a learning tool to provide ELL students with the opportunity to practice English authentically even as they practice to write to a real audience about topics related to their interests and concerns. In addition, this study aims to explore the benefits as well as the difficulties ELL writers encounter while they are interacting, collaborating, and constructing knowledge with other learners in the online writing environment. In other words, this study will identify factors that may encourage ELL writers to write more and offer higher levels of feedback with peers online. This study will also explore the inhibiting factors that may keep the low participating students from sharing writing with and offering feedback to peers in an online writing environment. Finally, this study will aim to validate whether or not online collaborative

writing can improve ELLs' writing performance and skill. Hopefully, the findings of the study will help ELL writing teachers gain more knowledge of how to integrate computer-collaborative learning tools into writing classes, find better ways to make use of CMC technology potentials, and open up new possibilities for ELL students' composing processes.

Significance of Current Research

This study is significant in several ways. First, it allows a small sampling of adult ELLs in English writing classes to voice their feelings, perceptions, and experiences about their difficulties in learning to compose in a second language. Second, the findings of this study concerning difficulties in second language writing will provide ELL writing teachers some insights into what difficulties can affect ELLs' acquisition of academic writing. Third, ELLs' linguistic and cultural backgrounds are so diverse that this study intends to design a computer-supported learning environment tailored to their learning needs. It tries to reform teaching methods for ELL writing from a teacher-centered approach to a student-centered approach. To address students' individual learning needs, this research incorporates CMC technology tools that can support tutorial writing lessons, interactive multimedia grammar practices, and online bilingual dictionaries to improve students' writing skills. These individual online tutoring lessons are significant because they can individually guide students to write essays, apply writing strategies, and practice specific grammar. Fourth, the results of this study will contribute to pedagogical implications for integrating CMC technology into teaching writing to adult ELLs. Fifth, this study explores the possibility of using the online collaborative writing community as an online writing center that can assist ELL writers in receiving online tutoring and

consultation from their peers and instructors. The online peers and instructors work with ELL writers to guide them through the writing process. Finally, the findings of the study will help writing teachers better understand some of the challenges and problems that many ELLs face when they are attempting to participate in an online collaborative writing environment.

Research Questions

Five research questions are formulated to guide this study:

1. What self-perceptions do ELLs have about writing in English?
2. Do ELL students in the treatment group score significantly differently from ELLs in the control group on a self-perception of writing difficulties survey following six weeks of computer mediated communication technology intervention?
3. Does the online collaborative writing group score significantly higher on a writing performance posttest than the control group?
4. How does computer-mediated communication technology affect ELLs' writing performance?
5. How does computer-mediated communication technology, designed specifically to meet students' learning needs, affect ELLs' writing processes?

Theoretical Framework

Online Collaborative Writing is theoretically framed by various popular learning theories, including: (1) Collaborative Learning Theory (Johnson & Johnson, 1987), (2) Sociocultural Theory (Vygotsky, 1978), (3) Social Constructivist Theory (Bruner, 1966), and (4) Writing Process Approach.

Collaborative Learning Theory

Collaborative Learning Theory (CLT) was developed from the scholarly work of Bruffee (1984, 1987) as well as Johnson and Johnson (1987). Collaborative Learning Theory focuses on group interaction as a very important factor of Collaborative Learning that regards sharing as a fundamental feature of successful collaboration. Sharing is a very broad concept including but not limited to sharing information, insights, personal experiences, and perspectives (Bruffee, 1995). According to Bruffee (1995), when learners share more insights and viewpoints, better opportunities are created for engaging minds in a network of thoughts that lead to more negotiations and multiple perspectives, which empower learning and make it more authentic. Johnson and Johnson (1996) argue that in Online Collaborative Learning settings, students do not learn passively but actively negotiate and discover more meaning through reconceptualization of prior knowledge and through working in an environment that reduces anxiety and uncertainty. Students are motivated to learn with groups because they feel that the encouraging words they get from their peers are motivational rewards. Students develop a positive attitude and become interdependent learners as they help each other through inquiry.

Sociocultural Theory

Sociocultural theory (Vygotsky, 1962,1978, & 1987) reveals a potential application of collaborative language learning through CSCL (Miller 1995, 2001). Vygotsky (1986) argues that learning is embedded within social events and occurs as a child interacts with people, objects, and events in the environment. The sociocultural theory of learning emphasizes that human intelligence originates in our society or culture, and individual cognitive development occurs first through the interpersonal (interaction

with social environment) then the intrapersonal (internalization). Based on Vygotsky's sociocultural theory, Miller (1995) conducted a four-year long ethnographic study to examine the classroom context for open-forum English literature discussions. The teachers in the study promote scaffolding, metacognitive reflection, and inquiry strategies to encourage students to think critically and respond to the context and to each other. One year into the experiment, students were able to internalize the teacher-scaffolded discussion and reflective strategies. However, whether students applied the strategies learned in the open-forum English class to other class content depended on whether the social contexts valued or invited interaction and actively engaged thinking. Miller's study showed how the social environment can influence students' learning and thinking. Forman and Cazden (1985) observed students' discourse in solving collaborative problems. Their results support Vygotsky's two phases of social process. In the initial phase of problem solving, students are often observed encouraging, supporting, and guiding each other. In the second phase, students come to their own conclusions based on experimental evidence, and resolve their conflict by articulating their argumentation. As a result, Forman and Cazden (1985) concluded that students might gain new strategies with peer collaboration through interpersonal discourse.

Another aspect of Vygotsky's theory is the idea that the potential for cognitive development is limited to a certain time span that is the Zone of Proximal Development (ZPD). According to Vygotsky, the Zone of Proximal Development (ZPD) is a region of activities that individuals can navigate with the help of more capable peers, adults, or artifacts. In Vygotsky's view, peer interaction, scaffolding, and modeling are important ways to facilitate individual cognitive growth and knowledge acquisition. ZPD can be

composed of different levels of individual expertise (students and teachers), and can also include artifacts such as books, computer tools, and scientific equipment. According to Vygotsky's Zone of Proximal Development (ZPD), individuals learn through collaborative efforts with others and what they learn eventually becomes part of their independent knowledge (Moll, 1989). Moreover, the purpose of ZPD is to support intentional learning. Vygotsky's sociocultural approach to learning and ZPD can be successfully employed in the study of a CSCL environment.

According to Warshauer (1997) Computer Mediated Communication (CMC) tools increase language input and output while both synchronous and asynchronous interaction motivates learners to read and write in a reciprocal process. Informal and formal learning increases the learners' level of participation and decreases their learning anxieties.

Social Constructivism Theory

Social constructivism has been developed from the theories of Bakhtin (1981), Bruner (1966) and Vygotsky (1978). According to the Constructivist theory, knowledge is not a fixed object but rather is fluid; learners construct their knowledge through engagements in intercollaborative learning activities with other students, with the instructor, and with the learning environment. The Constructivist approach to learning emphasizes authentic, challenging projects that include students, teachers, and experts in the learning community. Its goal is to create learning communities that are more closely related to the collaborative practice of the real world. In an authentic environment, learners assume the responsibilities of their own learning; they have to develop metacognitive abilities to monitor and direct their own learning and performance. When

people work collaboratively in an authentic activity, they bring their own framework and perspectives to the activity. They can see a problem from different perspectives, and are able to negotiate and generate meanings and solutions through shared understanding--members of the learning community work closely together to construct what is learned, each having a specific task and each having a share in building knowledge. What is learned and constructed depends both on the shared experiences and on each member's efforts in the group. Their knowledge can be constructed and reconstructed through dialogue, text-based interaction, web-conferencing, and face-to-face discussions.

In Online Collaborative Learning, the process of building knowledge societies and the process of sharing ideas and feedback among members who work together across cultural boundaries is considered to be one of the highest levels of construction. In addition, Hayes (1996) suggested that writing is a communicative act that requires a social context and a medium. A writing environment should include a social context, audience, and other texts the writers may read while writing. Writing is mainly a social activity because it is not only used for communicative purposes but it is also a social artifact that is carried out in a social setting (Hayes, 1996). In other words, the genres in which we write were invented by other writers, and the phrases we write reflect phrases earlier writers have written.

Writing Process Approach

Until the1970s, the common approach to teaching writing in the United States had been product-based, focusing on a writer's ability to learn to write individually and on his or her final written products (Graves, 1978). In the product approach, students were expected to produce correct usage and mechanics, analyze classic examples of good

form, learn the rules that govern those classic examples, and practice these rules. However, in the 1970's, literacy educators began to believe this product-based approach lacked valuable interactions and dialogues (Vygotsky, 1978, 2000). Since the 1970's, the writing process has become an influential trend in writing research and pedagogy in American educational institutions. The writing process approach is believed to be able to help students become aware of their writing processes, learn to write from a reader's perspective, and promote their participation in editing their own and their peers' writing.

This model addresses two weaknesses in the traditional product-based writing approach. First, it emphasizes the writer as the creator of original written discourse, focusing attention on how he or she produces and revises texts throughout different writing stages. Secondly, it encourages social interaction among the writers and their peers, as well as between the writers and their teachers in the writing stages (Ferris & Hedgcock, 1998). Since the 1980s, the collaborative process writing approach that consists of the prewriting, drafting, revising, editing, and publishing stages has been widely used in both mainstream writing classes and ELL classes.

Applying the writing process approach in first language (L1) and second language (L2) through peer collaboration is emphasized by Bruffee (1987) and Flower and Hayes (1980), who urge composition teachers to teach writing as a process not a product. They argue that in the writing process approach, students examine their writing through reasoning and questioning with their classmates and peers. Bruffee (1987) argued that one of the collaborative writing functions is to externalize the process of writing. During the writing process, writing is used as a reflective thinking device for constructing knowledge through problem solving activities that require adequate planning and

revision. Flower and Hayes (1980) view the writing process as recursive, which requires both readers and writers to plan and revise the text many times. Planning requires a lot of thinking, generating ideas, sharing, and many revisions. Group outlining and group review helps student writers to present their ideas in clear and meaningful structures. Flower and Hayes' (1980) problem-solving mode in writing is a major component of using the peer collaboration approach in the writing process. Graves (1978) also proclaims that advantages of group collaboration in the writing process include the reduction of writing anxiety, overcoming some of the difficulties students encounter in "getting started," emphasizing the importance of addressing a particular audience, focusing on "getting it right" through multiple revisions and drafts, and establishing a norm of critical self-evaluation.

Computer applications are effective tools that can support the writing process in all stages (Williamson & Pence, 1989). Web-conferencing, online forums, and shared applications such as Microsoft Word are capable of engaging students to apply writing processes. These can be divided into three major collaborative writing activities: (1) prewriting activities that include generating ideas, freewriting, outlining and sharing resources; (2) during writing activities that include discussion, cross checking, authentications, generating more ideas, and drafting; and (3) post-writing activities that include editing, revising, reflections, and publishing.

Definition of Terms

General familiarity with the following terms will help readers to follow references to specific terms used throughout this dissertation.

Asynchronous Communication.Asynchronous is the opposite of synchronous communication (see below for a full definition of synchronous.) Asynchronous communication does not require that all parties involved in the communication need to be present and available at the same time. Synchronous communication usually happens in a delayed time and different location between two or more learners. Asynchronous messages can be accessed at any time and can be replied to more than once. Examples of this include e-mail (the receiver does not have to be logged on when the sender sends the e-mail message) and discussion boards (which allow conversations to evolve and community to develop over a period of time.) This type of communication does not occur in real-time or is not synchronous, such as chat rooms or face-to-face communication.

Computer Mediated Communication (CMC). Computer Mediated Communication refers to human communication that takes place through or is facilitated by computers and networked telecommunications system. Two forms of CMC include synchronous communication (real-time communication, such as chat and video conferencing) and asynchronous communication (non-real-time communication, such as e-mail and bulletin boards).

*EFL (English as a Foreign Language).*English as a Foreign Language is the role of English as it is taught as a subject in schools but not used as a medium of instruction in education or as a language of communication (e.g., in government, business, or industry) within the country.

ELL (English Language Learner). English Language Learners refer to non-native speakers of English who use English at school or at work, but may use their mother tongue at home or among friends.

Synchronous Communication. Synchronous communication is direct communication, where all parties involved in the communication are present at the same time from the same place or a variety of locations, and where participant input is immediately conveyed to other users for immediate response. Examples of this include online chat rooms, telephone or real time video conferencing, and face-to-face communication.

CHAPTER 2: REVIEW OF THE LITERATURE

Overview

The purpose of this review of literature is to discuss ELLs' writing needs, ELL writing pedagogy, and technology that can be used to enhance ELL writing. The areas to be reviewed are ELL writing, writing process and ELL writing, technology in the teaching of ELL writing, the development of Computer-Supported Collaborative Learning (CSCL), and the impact of CSCL on Writing.

ELL Writing

Needs assessment is fundamental to the design of a good curriculum. Reid (2001) advises that writing courses for students learning English as a second language should be thoughtfully designed to integrate their immediate needs with institutional values, disciplinary goals, and professional expectations. Reid's concern for student needs presumes a correlation between the benefits of instruction and the extent to which such instruction meets student needs. While the success of writing instruction depends on establishing student needs, he maintains that establishing authentic student needs depends on collecting and analyzing authentic data. Authenticity of data depends, in turn, on the source and methods used in obtaining the data.

Research on ELL writing indicates that, in general, ELLs' writing is distinct from and often simpler and less effective, in the eyes of native English-speaking judges, than that of their native English-speaking peers. Among specific differences, Reid (2001) pointed out that ELL writers wrote with greater difficulty because of a lack of lexical resources and exhibited less ability to revise intuitively by ear, and that at the level of

discourse, ELL writers wrote shorter, less effective texts that contained more errors than their native English-speaking counterparts.

Writing in a second language requires ELLs not only to write using correct English syntax, spelling, mechanics, and appropriate vocabulary, but also to organize their thoughts and ideas into logical discourses appropriate for American composition schema and rhetorical styles. This may mean that ELL writers must learn new ways of thinking, organizing, and writing ideas in English that may be different from the ELLs' culturally inherited patterns of discourse (Kaplan, 1972). Many ELL learners lack sufficient familiarity or knowledge about American writing conventions to compose well in English according to American academic writing expectations. Moreover, ELLs tend to transfer their native language syntax, thought, and rhetorical patterns into their English writing. In order to learn about the different Western writing conventions, ELLs must have exposure to examples of good writing and possess experience in composing in English rhetorical styles and genres. This experience in English can be formal or informal, but it is an essential element of second language writing development (Leki, 1992).

Lightbrown's 1985 research in second language acquisition reveals that the development of second language literacy does not necessarily parallel that of the first language, but consists of the writer reverting to first language linguistic structures that the learner has internalized in the native grammar, generally in an attempt to lower stress and anxiety. Therefore, this study suggests that second language writers may employ a number of coping strategies while they are learning to write in English, including

resorting to previously learned first language linguistic and rhetorical patterns (McLeod & McLaughlin, 1986).

Generally speaking, ELL writers differ from native English writers in several ways (Nelson, 1991). Native English writers acquire English grammatical and linguistic patterns naturally from their cultural environment. On the other hand, ELL writers must acquire these writing skills deliberately, usually as a result of direct instruction. This means that ELL writing samples will probably have more surface-level errors in grammar, spelling, mechanics, vocabulary, and other linguistic features than native-speaking English writers. ELL writers also tend to transfer their native language patterns from first language to second language when they are learning to compose in academic English, especially in the beginning stages (Nelson, 1991).

ELL writing also differs from native writing in the ways the ELL writer's primary language and culture may influence the second language student's rhetorical styles, organization, and expression of ideas. These ELLs must purposely unlearn their native language writing patterns in order to compose in the expected academic American writing styles. This re-learning process is a complex and difficult task for many adult ELLs (Swales, 1990).

The second language writer' ideas may be presented in quite different organizational patterns and rhetorical modes than the essential linear style that characterizes most English writing (Connor, 1996). The adult ELLs' unique form or style of written expression may not easily conform to the expected format, explanation, and organization that American ELL writing classes require. As a result, second language writers' writing samples may be misunderstood, undervalued, or poorly evaluated by

writing teachers who are unfamiliar with ELLs' different styles of rhetorical expression (Hamp-Lyons, 1991).

Another important distinction between first language and second language writers lies in their experience and exposure to academic reading and writing tasks throughout their lives. Native-born English adult writers with at least a high school education have been exposed throughout their lives to written English texts and have practiced academic English writing in some form from elementary school to young adulthood. Second language writers, while literate in their native languages, may not have developed strong literacy skills in academic writing tasks in their native language or in English. This puts adult ELLs at a definite disadvantage when they are trying to acquire good English writing skills in a short period of time (Leki & Carson, 1997).

In conclusion, ELLs have different writing needs. It is necessary to establish the writing needs of students for whom English is a second language; therefore, composition teachers can design teaching activities that address ELLs' writing needs and enhance ELLs' writing processes.

Diversity of the ELL Population

According to Ellis (1999), there is considerable diversity among ELLs. ELL classrooms may contain students from many different cultural, social, and linguistic groups. In terms of educational background, some international students and immigrants may be literate in their first language and may have completed their primary, secondary education, and even college programs in their home countries. Others are refugees and immigrants who may have had interrupted schooling in their native languages. In

addition, some arrived in the United States as young children or are native-born U.S. citizens and may not be literate in their native language.

Overall, ELL learners are predominately Spanish speakers, but Asian, African, and other European languages are also represented among this population (Capps, Passel, Perez-Lopez, & Fix, 2003). There is significant diversity within these broad categories. For example, the term Hispanic or Latino encompasses English language learners from Argentina, Bolivia, Chile, Columbia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Spain, and Venezuela. The term Asian or Pacific Islander includes countries such as China, Taiwan, the Philippines, Korea, and Japan. This diversity presents a special challenge to ELL educators in designing lessons to meet students' learning needs.

Writing Process and ELL Writing

ELL writing process research dates back to the 1970s, when many researchers advocated a change from product to process writing pedagogy. Current second language research suggests that the development of writing skills in a second language involves complex cognitive acts. The overall conclusion of the body of research is that the ability to write well requires ELL writers to have not only a strong familiarization with linguistic and grammatical features of a language, but also to develop a series of cognitive acts, known as the writing process (Connor, 1984). Contemporary trends in teaching the writing process emphasize a step-by-step approach to writing, including prewriting, drafting, editing, and revision, so that the writer can observe how his/her thoughts develop into a piece of writing (Zamel, 1982).

Raimes (1985) conducted a study on the writing processes of unskilled ELL writers. She used think-aloud protocol analysis to investigate eight unskilled college ELL writers. The finding indicated that the ELL writers did not go back to edit as often as the unskilled native speakers because ELL writers were not intimidated by the thought of error. They expected the teacher to correct the language they produced; therefore, they concentrated more on the challenge of finding the right words and sentences to express their meaning.

Another important ELL process writing researcher, Silva (2001), reviewed a large body of writing process research on ELL writing and provided a comprehensive description of ELL writing. According to Silva (2001), in the process of planning, ELL writers did less global but more local planning. ELL writers also had more difficulty in organizing generated material. Their transcribing was more laborious, less fluent, and less productive. In addition, they showed more concern and difficulty with vocabulary. In the reviewing stage, ELLs tended to focus more on grammar, and less on mechanics and spelling. Overall, ELL writers reviewed, reread, and reflected on their written texts less, but revised more due to greater difficulty with the revision process and with intuitive revision.

Technology in the Teaching of ELL Writing

Technology has the power to transform teaching and learning (Meier, 2005). Research on the role of computers in language teaching reflects a paradigm shift of computer-assisted language teaching from structural through cognitive to sociocultural approaches to language teaching.

Computers have been used for language teaching and learning since the 1960s. The 47-year period can be generally divided into three main stages: behaviorist Computer Assisted Language Learning (CALL), communicative CALL, and integrative CALL (Warschauer & Healey, 1998). In the1960s, behaviorist Call was first designed and implemented. The mainframe was a tutorial system and was used mainly for extensive drills, explicit grammar instruction, and translation tests (Ahmad, Corbett, Rogers, & Sussex, 1985).

Moving from the behaviorist view, communicative CALL emerged in the 1970s and 1980s. The communicative CALL movement suggests that CALL should focus more on the use of the language (such as letting students write) rather than on analysis of the language of the language (such as teaching grammar.) At the same time, the mainframe was replaced by the personal computer. It offered great possibilities for individual creativity, exploration, and personal development; and software was created to that end, including text reconstruction programs and simulations (Warschauer & Healey, 1998).

Research in the 1980s focused on using the computer as a replacement for pen and paper in the writing classroom (Farnan & Dahl, 2003). A majority of the studies focused on comparing the quality of writing composition on computer versus pen and paper with often-inconsistent results (Daiunte, 1986; Hawisher, 1989). However, between 1992 and 2002, a meta-analysis of research on computers and writing showed that the use of computers significantly improved the quality and quantity of student writing (Goldberg, Russell, & Cook, 2003).

According to Schofield (1997), when computers entered the classroom, the perception was that students would work independently and social interaction would be

kept at a minimum. However, as computers became networked to the World Wide Web, the perception started to shift. Recently, integrative CALL has been developed because communicative CALL was criticized for using the computer in a disconnected fashion. Many teachers have moved away from a cognitive view of communicative language teaching to a sociocultural view. Integrative CALL focuses on real language use in a meaningful and authentic context. Today research suggests that the effective use of technology fosters a collaborative, interactive environment that nurtures the writing process and supports the social perspective on learning (Hewett, 2000; Jonassen, 2005). Computers with different interaction technologies, such as e-mail, bulletin board, and chat rooms offer many opportunities for learners to collaborate with their peers, tutors, and experts. As a result, CSCL is a new trend for teaching and learning. Hence, the next session reviews what CSCL is.

Computer-Supported Collaborative Learning

Computer-Supported Collaborative Learning (CSCL) refers to the use of computer and Internet technologies to support an instructional method where students can work in groups to accomplish learning tasks. CSCL usually involves multiple methods of computer-based communication combined with the capacity for students to look at and manipulate digital text and objects collectively (Pea, 1993). It is an emerging branch of the learning sciences, concerned with studying how people can learn together with the help of computers. This section provides a review of the development of CSCL and the impact of CSCL on Writing.

The Historical Evolution of CSCL

CSCL arose in the 1990s in reaction to software that forced students to learn as isolated individuals, proposing the development of new software and applications that bring learners together and that can offer creative activities of intellectual exploration and social interaction. At that time, the potential of the Internet to connect people in innovative ways provided a stimulus for CSCL research. In the beginning, three projects including the ENFI Project at Gallaudet University, the CSILE at the University of Toronto, and the Fifth Dimension Project at the University of California, San Diego, were forerunners for what was later to emerge as the field of CSCL. All three involved explorations of the use of technology to improve learning related to literacy.

The Electronic Networks for Interaction (ENFI) Project produced some of the earliest examples of programs for computer-aided composition or computer supported collaborative writing (Bruce & Rubin, 1993; Gruber, Peyton, & Bruce, 1995). Students who attend Gallaudet are deaf or hearing impaired; many such students enter college with deficiencies in their written-communication skills. The goal of the ENFI Project was to engage students in writing in new ways; to introduce them to the idea of writing with a ëvoice' and writing with an audience in mind. The technologies developed, though advanced for the time, might seem rudimentary by today' standards. For example, special classrooms were constructed in which desks with computers were arranged in a circle and software resembling today' chat programs was developed to enable the students and their instructor to conduct textually mediated discussions. The technology in the ENFI project was designed to support a new form of meaning making by providing a new medium for textual communication. According to Day and Batson (1995), Electronic Networks for

Interaction (ENFI) changed the social dynamic of the writing classroom. Because it allowed teachers and students to explore, collaborate, and expand on ideas in class in writing, and allowed them to see each other in the process of developing ideas, writing for each other and not just to the teacher, ENFI supplemented and expanded on the activities teachers could use to help students meaningfully participate in a discourse community and improve their writing.

Bereiter and Scardamalia at the University of Toronto undertook the Computer-Supported Intentional Learning Environment (CSILE) project. Their work had its roots in researching reading comprehension strategies (Rauenbush & Bereiter, 1991). It addressed the question of what schools might do to foster the development of ëmeaning-based reading strategies in young readers. Bereiter and Scardamalia were concerned that learning in schools is often shallow and poorly motivated. They contrasted the learning that takes place in classrooms with the learning that occurs in ìknowledge-building communities (Bereiter, 2002; Scardamalia & Bereiter, 1996), like the communities of scholars that grow up around a research problem. In the CSILE Project, later known as Knowledge Forum, they developed technologies and pedagogies to restructure classrooms as knowledge-building communities. Like the ENFI Project, CSILE sought to make writing more meaningful by engaging students in joint text production. The texts produced in each case were quite different. The ENFI texts were conversational; they were produced spontaneously and were generally not preserved beyond the completion of a class. However, CSILE texts were archival, like conventional scholarly literatures. In terms of Evaluations of CSILE, Scardamalia, Bereiter, Brett, Burtis, Calhoun, & Smith (1992) insisted that CSILE students greatly surpassed students in ordinary classrooms on

measures of depth of learning and reflection, awareness of what they had learned or need to learn, and understanding of learning itself. Furthermore, individual achievement did not suffer. In fact, students did better on standardized tests in reading, language, and vocabulary.

The Fifth Dimension (5thD) Project began with an interest in improving reading skills (Cole, 1996). It started with an after-school program organized by Cole and colleagues at Rockefeller University. When the Laboratory of Comparative Human Cognition (LCHC) moved to UC San Diego, the 5thD elaborated into an integrated system of mostly computer-based activities selected to enhance students' skills for reading and problem solving. The ìMaze, a board-game type layout with different rooms representing specific activities, was introduced as a mechanism for marking student progress and coordinating participation with the 5thD. Student work was supported by more skillful peers and by undergraduate volunteers from the School of Education. The program was originally implemented at four sites in San Diego, but was eventually expanded to multiple sites around the world (Nicolopoulou & Cole, 1993). Mayer, Quilici, Moreno, Duran, Woodbridge, Simon, Sanchez, & Lavezzo (1997) conducted a several years of study on the effectiveness of The Fifth Dimension at Appalachian State University, California State University at San Marcos (CSUSM), and University of California at Santa Barbara. They found that there were positive cognitive outcomes attributable to children's participation in the Fifth Dimension. These cognitive consequences of Fifth Dimension participation include increases in four areas: computer literacy (as measured by a tests of performance of computer operation, tests of factual knowledge about computer operation, and tests of memory for computer terms);

comprehension skills (as measured by tests of mathematics word problem comprehension, tests of game instruction comprehension using a cloze method, and tests involving the ability to follow a printed procedure); problem-solving skills (as measured by the speed and strategic efficiency of learning a new computer-based math game or grammar game); and academic skills(as measured by standardized tests of reading and mathematics.) Overall, students improved in literacy skills including learning to use educational computer games through reading instructions and through oral communication with peers and mentors.

All of these projects ENFI, CSILE and 5thD shared a goal of further orienting instruction toward meaning making. All three turned to computer and information technologies as resources for achieving this goal, and all three introduced novel forms of organized social activity within instruction. Overall, these three beginning projects laid the groundwork for the subsequent emergence of CSCL. The following section will briefly discuss the evolution of CSCL.

From Artificial Intelligence to Collaboration Support

Koschmann (1996) identified the following historical sequence of approaches to using computers in education: (a) computer-assisted instruction, (b) intelligent tutoring systems, (c) Logo as Latin approach, and (d) CSCL. Computer-assisted instruction was a behaviorist approach that dominated the early years of educational computer applications beginning in the 1960s. It conceived of learning as the memorization of facts. Domains of knowledge were broken down into elemental facts that were presented to students in a logical sequence through computerized drills and practice. Many commercial educational software products still take this approach. Intelligent tutoring systems were based on a

cognitivist philosophy that analyzed student learning in terms of mental models and potentially faulty mental representations. Developers of Intelligent tutoring systems rejected the behaviorist view that learning could be supported without concern for how students represented and processed knowledge. Considered particularly promising in the 1970s, this approach created computer models of student understanding and then responded to student actions based on occurrences of typical errors identified in student mental models. Efforts in the 1980s, epitomized by the teaching of the Logo programming language, took a constructivist approach, arguing that students must build their knowledge themselves. It provided stimulating environments for students to explore and to discover the power of reasoning, as illustrated in software programming constructs: functions, subroutines, loops, variables, recursion, etc. During the mid-1990s, CSCL approaches began to explore how computers could bring students together to learn collaboratively in small groups and in learning communities. Motivated by social constructivist and dialogical theories, these efforts sought to provide and support opportunities for students to learn together by directed discourse that would construct shared knowledge.

At the time when mainframe computers were becoming available for school usage and micro-computers started to appear, artificial intelligence (AI) was near the height of its popularity. As a result, it was natural that computer scientists interested in educational applications of computer technology would be attracted by the exciting promises of AI. AI is computer software that closely mimics behaviors that might be considered intelligent if done by a human. The AI approach sought to have the computer handle certain teaching or guiding functions that would otherwise require a human teacher' time

and intervention. Within CSCL, the focus of learning is on learning through collaboration with other students rather than directly from the teacher. Therefore, the role of the computer shifts from providing instruction either in the form of facts in computer-aided instruction or in the form of feedback from intelligent tutoring systems to supporting collaboration by providing media for communication and scaffolding for productive student interaction (Stahl, Koschman & Sutters, 2006).

The primary form of collaboration support is for the computer (i.e., the network of computers, typically connected over the Internet) to provide a medium of communication. This may take the form of email, chat, discussion forums, videoconferencing, instant messaging, etc. CSCL systems typically provide a combination of several media and add special functionality to them.

Furthermore, CSCL software environments provide various forms of pedagogical support or scaffolding for collaborative learning. These may be implemented with rather complex computational mechanisms, including AI techniques. They can offer alternative views on the ongoing student discussion and emerging shared information. They can provide feedback, possibly based on a model of group inquiry. They can support sociability by monitoring interaction patterns and providing feedback to the students. In most cases, the role of the computer is secondary to the interpersonal collaboration process among the students, the teacher, or tutor. The software is designed to support, not replace, these human, group processes.

From Individuals to Interacting Groups

Many researchers agree that it is important to make a distinction between cooperation and collaboration (Dillenbourg, Baker, Blaye, & O'Malley, 1996). The

distinction is based on different ideas of the role and participation of individual members in the activity and cooperative work is accomplished by the division of labor among the participants (Hathorn & Ingram, 2002). It is an activity where each individual is responsible for a portion of the problem solving, whereas collaboration involves the mutual engagement of participants in a coordinated effort to solve the problem together (Roschelle & Teasley, 1995). For example, if students do a collaborative group activity, they work together as a team to accomplish a shared goal. The success of the group depends on every team' effort, responsibility, and contribution. However, if students are cooperating in a group, each student has a different task or goal to accomplish.

According to Dillenbourg et al. (1996), in the 1970s and early 1980s, theories of collaborative learning tended to focus on how individuals function in a group. This reflected a position that cognition was seen as a product of individual information processors, and the context of social interaction was seen more as a background for individual activity than as a focus of research. More recently, the group has become the unit of analysis, and the focus has shifted to more emergent, socially constructed properties of the interaction. In terms of empirical research, Dillenbourg et al. (1996) further stated that the initial goal was to establish whether and under what circumstances collaborative learning was more effective than individual learning. Researchers controlled several independent variables, such as size of the group, composition of the group, nature of the task, communication media, etc. However, these variables interacted with one another in ways that made it almost impossible to establish causal links between the conditions and the effects of collaboration. As a result, empirical studies have more recently started to focus less on establishing parameters for effective collaboration and

more on trying to understand the role that such variables play in mediating interaction. This shift to a more process-oriented account requires new tools for analyzing and modeling interactions (Dillenbourg et al., 1996, p.189).

To comprehend the effects it is necessary to understand in some detail what was going on in the group interactions that might cause the effects. This required the development of methodologies for analyzing and interpreting group interactions as such. The focus was no longer on what might be taking place in the heads of individual learners, but what was taking place between and among them in their interactions. From Mental Representations to Interactional Meaning Making

According to Vygotsky (1930/1978), individual learners have different developmental capabilities in collaborative situations than when they are working alone. His concept of the zone of proximal development is defined as a measure of the difference between these two capabilities. This means that one cannot measure the learning even the individual learning that takes place in collaborative situations with the use of pre- and post-tests that measure capabilities of the individuals when they are working alone. To get at what takes place during collaborative learning, it does not help to theorize about mental models in the heads of individuals, because that does not capture the shared meaning making that is going on during collaborative interactions.

Collaboration is primarily conceptualized as a process of shared meaning construction. The meaning making is not assumed to be an expression of mental representations of the individual participants, but is an interactional achievement. Meaning making can be analyzed as taking place across sequences of utterances or messages from multiple participants. The meaning is not attributable to individual

utterances of individual students because the meaning typically depends upon indexical references to the shared situation, elliptical references to previous utterances, and projective preferences for future utterances (Stahl, Koschman & Suthers, 2006).

From Quantitative Comparisons to Micro Case Studies

To observe learning in collaborative situations is different from observing it for isolated learners. First, in situations of collaboration, participants visibly display their learning as part of the process of collaboration. Second, the observations take place across relatively short periods of group interaction, rather than across long periods between pre- and post-tests.

Methodologies like conversation analysis (Sacks, 1992; ten Have, 1999) or video analysis (Koschmann, Stahl, & Zemel, 2006) based on ethnomethodology (Garfinkel, 1967) produce detailed case studies of collaborative meaning making. These case studies are not merely anecdotal. They can be based on rigorous scientific procedures with intersubjective validity, even though they are interpretive in nature and are not quantitative. Overall, the current trends of CSCL are global community, collaboration support, interacting groups, interactional meaning making, and micro case studies. The following will focus on the impacts of CSCL on writing.

What is Online Collaborative Writing?

Before discussing the impacts of CSCL, it is necessary to define Collaborative Writing. According to Ede and Lunsford (1990), Collaborative Writing is any writing done in collaboration with one or more persons. They suggest Collaborative Writing activities may include written and spoken brainstorming, outlining, note-taking,

organizational planning, drafting, revising, editing, and publishing. Farkas (1991) divided Collaborative Writing into four types:

1. Two or more people jointly composing the complete text of a document;
2. Two or more persons contributing components to a document;
3. One or more persons editing or reviewing the document of one or more people;
4. One person working interactively with one or more people and drafting documents based on the ideas of the person or people.

Jaszi (1994) adds a fifth type, serial collaboration. Two or more people collaborate with their peers in sequential manner to brainstorm, fix errors, and elaborate on their shared topics. In these definitions, researchers view Collaborative Writing as a pedagogical technique.

In recent years, with the rise of the Internet, Collaborative Writing has broadened to embrace the concept of online as a medium of the writing process. The new ability of a networked computer, manipulated by the human mind as a mediator of communication, can have a huge impact on how writing is taught and learned. Computer Mediated Communication (CMC) is being integrated into writing classes because the interactive dynamic and collaborative learning opportunity it brings to the learning environment (Warschauer & Kern 2000).

Adding up the potential of networked computer technology and extending the definitions of Collaborative Writing presented by researchers, Online collaborative writing can be defined as a pedagogical approach that is enhanced and supported by computer shared applications and is facilitated and prompted online by the synchronous and asynchronous Computer Mediated Communication (CMC) tools to enable a group of

students from the same writing class, and/or other writing classes in local or international schools, to work in teams in order to exchange ideas, feedback and resources. Online Collaborative Writing is an extension of face-to-face traditional collaborative writing. However, Online Collaborative Writing may include any interaction and communication occurring before, during, and/or after the Online Collaborative Writing process to generate ideas, fix problems, enrich understanding, and to help learners make decisions about their shared writing. Generally speaking, Online Collaborative Writing is classified under Computer-Supported Collaborative Learning.

Effects of Computer-Supported Collaborative Learning on Writing

Large and growing studies have been conducted for exploring the area of Computer Assisted Language Learning (CALL). However, there have not been many studies conducted on the effects of Computer-Supported Collaborative Learning (CSCL) on writing. To date, there have been even few empirical studies conducted to determine the effectiveness of CSCL on ELL/EFL writing.

Online Collaborative Learning Benefits

The benefits could be abstracted into the following major categories: cognitive benefits, social/cultural benefits, and psychological benefits. Cognitive benefits receive the most attention. The first citation of a research study will include a description of the study in detail including the major benefits indicated by the study, but thereafter only the researchers' names and their findings within other benefit categories will be mentioned.

Cognitive Benefits

Three studies place greater emphasis on cognitive benefits. Two of the studies use qualitative research methods, and describe many cognitive advantages resulting from

online collaborative learning. Cognitive benefits are the most frequently mentioned benefits among the studies.

Cohen and Riel (1989) conducted a quantitative study to examine the quality of students' writing in two seventh-grade classrooms. There were 22 students in each classroom. The study examined the quality of students' Hebrew writing based on two conditions: towards their teacher for a term assessment and towards online peers to share ideas. Forty-four grade 7 students wrote two compositions on the same topic, one addressed peers in other countries via a computer network and the other teachers for their semester grade, counterbalanced for order effects across the two classrooms. The results indicated that the papers written to communicate with peers on the network were scored higher than those written to the teacher for grades, regardless of the order in which the papers written to peers were written in both classrooms. The students' compositions, written online for peer audiences, appeared more fluent, better organized, and their ideas were more clearly stated and supported than those written for a grade.

However, there are a few flaws with this study. In terms of a quantitative study, this study uses a small sample size. There are only 44 students for each condition (treatment), one for writing with peers online, and the other for writing for a class grade. Second, the duration for the two treatments is short and done only once. Short-term effects of a particular treatment on writing research can change over time.

Lindblom-Ylanne and Pihlajamaki (2003) examine whether a computer supported learning environment enhances essay writing by providing an opportunity to share drafts with fellow students and receive feedback from a draft version. Twenty-five law students participated in this qualitative study. Data for this study were collected by both the

students' and the teacher' interviews. The results showed that the students deepened their understanding, elaborated their own ideas, improved critical and independent skills, and developed self-regulative skills. Additionally, the active use of a computer supported learning environment was related to good essay grades.

Tuzi (2004) conducted a study to explore the relationship between electronic feedback (e-feedback) and its impact on second-language (L2) writers' revisions. Twenty ELL college writers participated in this study. Participating students wrote, responded, and revised on a database-driven website specifically designed for writing and responding. The forms of feedback students received included oral feedback from friends and peers and from face-to-face meetings with university writing center tutors. Data were collected from the participants through interviews, observations, written drafts, and responses. The results of the study show that although students preferred oral feedback, e-feedback had a greater impact on revision, helping ELL writers focus on adding new information to the original text. In addition, e-feedback affected ESL writers' revision at a higher structural level, such as revisions at the sentence and paragraph levels.

In addition, other studies briefly discuss the cognitive advantages. In terms of syntactic complexity, the delayed nature of asynchronous discussions gives learners more opportunities to produce syntactically complex language. Learners used more subordinate and embedded subordinate clauses in their writing (Sotillo, 2000), and appropriated a variety of language practices (Chung, Graves, Wesche, & Barfurth, 2005). Moreover, students participated in expert and novice discursive practices in the construction of meaning (Weasenforth & Meloni, 2002; Chung, Graves, Wesche, & Barfurth, 2005). Overall, the studies concluded that students gain more skills in critical reflection

(Weasenforth & Meloni, 2002). According to Alias and Hussin (2002), students perceived the information search, email, and on-line forum as helpful to the writing process. Some web sites created for ELLs/EFLs were perceived to be especially useful in providing knowledge and drills on the usage of the language; e-mail was perceived to have helped students in gathering ideas, peer editing, and revising; and forum discussions were perceived to have allowed students to contribute ideas and to stimulate their thinking process.

Sociocultural Benefits

Four studies focused on the socio-cultural benefits in an online collaborative learning environment and one study briefly mentioned the benefits. Four of them used mixed methods combining quantitative and qualitative design.

Kern (1995) examined the use of Daedalus InterChange, a local area computer network application, to facilitate communicative language use through synchronous, written classroom interaction. This mixed method study compares the quality and characteristics of the discourse produced by two groups of second-semester French students (totally 40 students) during an InterChange session and during an oral class discussion on the same topic. Three types of data were collected including scripts of students' writing, transcriptions of students' oral discussion, and students' and teachers' responses to a questionnaire regarding their impressions of using InterChange. The study found that students had more turns, produced more sentences, and used a greater variety of discourse functions when working in InterChange than they did in their oral discussions. There were more student-to-student interactions and it resulted in more peer learning, reducing students' reliance on the instructor. Moreover, a majority of students

found that the networked computer environment was motivating and that it reduced their communication anxiety. Students who were often reluctant to participate in oral discussions participated more actively in Interchange (online) discussions. The Kern (1995) study uses a small sample size (40 participants), and no random assignment or pretest-post comparisons; therefore, the generalization of this study to other populations should be made cautiously.

Sotillo (2000) investigates discourse functions and syntactic complexity in English-as-a-Second-Language (ESL) learner output obtained via two different modes of Computer-Mediated Communication (CMC): asynchronous and synchronous discussions. Two instructors and 25 students from two advanced ESL writing classes participated in this study. Data collected through postings to synchronous discussions and asynchronous discussions were analyzed and coded. The results of this mixed method study showed that the quantity and types of discourse functions present in synchronous discussions were similar to the ESL face-to-face conversations. Synchronous discussion was highly interactive and primarily controlled by students. Students produced more informal electronic speech and utilized a variety of discourse functions when they exchanged ideas and information with their classmates in a synchronous discussion than when posting to the asynchronous discussion forum. Negotiations focused on meaning/content between and among students in synchronous discussions. On the other hand, discourse functions in asynchronous discussions were more constrained than those found in synchronous discussions and were similar to the traditional language class discourse: teacher question student response teacher evaluation. However, there is no controlled experiment in the Sotillo (2000) study. Students are not randomly assigned to

an experimental or control group (Chung, Graves, Wesche, & Barfurth 2005).

Beuchor and Bullen (2005) conducted a mixed method longitudinal study to evaluate the amount and type of interaction and interpersonal content in messages posted by Learning-English-as-Foreign Language (EFL) online graduate students in small group asynchronous forums. The qualitative data included the analysis of the content of the discussion forums. The quantitative data involved counting and categorizing the units of content analysis that took the form of numeric values assigned to explanatory and response variables. Sixteen doctoral students in education took part in this study. The results of the study suggest that cultivating interactive and reactive online messages leads to increased participation and expands the depth of discussion; therefore, it facilitates online collective knowledge building. Meanwhile, the social issues of learners' communicative processes, such as the complexity of interactions and the development of a cohesive group of participants may have an impact on students' cognitive learning outcomes.

Beuchor and Bullen's (2005) study is not particularly designed to study writing. Moreover, the study uses a small sample, only sixteen students. There is no experimental design, such as control groups or pretest-posttest comparisons. As a result, the generalization of this study to other populations should be made cautiously.

Chung, Graves, Wesche, and Barfurth (2005) conducted a qualitative study to investigate language learning as a socially mediated process through computer-mediated communicative tasks in an international languages class. Twenty-six high school students participated in this study. The study paired Korean- and English-speaking peers, each learning the other's language, which collaborated on chat homework assignments. The

findings of the study reveal on-line collaborative discourse supports knowledge building within this cross-linguistic learning environment. Data from chat exchanges show these students were able to learn and teach contextually meaningful and appropriate linguistic and cultural behavior through socially mediated actions, using the meaning-making resources within their own learning community. In other words, the ideas, language, and the cultural ways of one partner can become the ideas, language, and the cultural ways of the other. Specifically, the findings show students developed awareness of self in relation to others.

One study briefly discusses the socio-cultural benefits. According to Weasenforth and Meloni (2002), online discussion enhances social skills, including social interaction, interpersonal relationships, communication, and collaboration.

Psychological Benefits

Three major studies suggest the psychological benefits of an online learning environment. They all use different research methods, including one quantitative, one qualitative, and one mixed method.

Alias and Hussin (2002) conducted a quantitative study to investigate the degree of helpfulness of E-learning activities in students' writing processes. Twenty out of 50 college students enrolled in an English-as-a- Foreign-Language (EFL) writing course were selected based on a stratified sample. Data were collected using two questionnaires and one log-book assignment. The activity questionnaire was administered at the end of every session and the log-books containing student records of their online activities were also collected at the end of each session. In addition, to investigate the changes in the students' emotional level, an attitude survey was administered at the beginning and at the

end of the program. The findings reveal e-mail and online discussion raised the students' motivation, confidence, and reduced their anxiety level. However, Alias and Hussin' (2002) study uses a small sample size, and there are twenty participants. Statistically, it may not be adequate to generalize the finding of this study to other populations.

Weasenforth and Meloni (2002) use constructivist principles as a framework to evaluate the extent to which their implementation of threaded discussions fulfills constructivist curricular goals. Fifty-two international students from advanced-level ESL reading/writing classes participated in this qualitative study for three consecutive semesters. The findings of the study indicate that the technology addressed affective factors, such as reducing threatening feelings and enhancing motivation.

Greenfield (2003) conducted a mixed method study to examine secondary ESL students' perceptions of a collaborative e-mail exchange between a tenth grade ESL class in Hong Kong and an eleventh grade English class in Iowa for a period of 12 weeks. The finding shows that the majority of Hong Kong students enjoyed the exchange, gained general confidence in English and computer skills, and felt that they made significant progress in writing, thinking, and speaking.

In summary, through a CSCL environment, including e-mail, online forums, and web-conferencing tools, students benefit cognitively, socially, culturally, and psychologically.

Online Collaborative Learning Difficulties

Several studies have recognized numerous problems and difficulties that hinder students online learning, including Kern' study (1995) already discussed in the benefit category. None of them is completely against online collaborative learning. All of them

still argue for online collaborative learning but have diagnosed problems that inhibit students' online learning. None of the six studies focuses on online writing difficulties; most studies consider general online collaborative learning difficulties. These difficulties could be categorized into the following major difficulties: cognitive, social, psychological, and technological. Social difficulties receive the most attention.

Cognitive Difficulties

No major study focuses on cognitive difficulties. Kern (1995) briefly mentions that networked computer environments have problems, including giving less attention to grammatical accuracy and less coherence and continuity to discussions.

Social Difficulties

Three studies conclude that there are social disadvantages in an online learning environment. Two studies use mixed methods and one study utilizes a qualitative design. Anderson and Kanuka (1997) conducted a mixed method study to evaluate the output, level of participation, and perceptions of effectiveness and value among participants in a virtual forum. Twenty-three experts in the field of adult education and community development participated in a three-week interactive session using a WWW-based, asynchronous computer conferencing system. Data gathered through surveys, interviews, transcript analysis, and on-line discussion revealed that online forums are less satisfying than face-to-face forums. Most participants felt that it was more difficult to socialize with other participants than in a face-to-face interaction. In addition, they felt that the quality of information exchanges during the on-line forum did not match the quality of information that would have been exchanged in a face-to-face forum, and they felt more

limited in their ability to communicate (such as discussing and asking questions) with other participants than they would in a face-to-face forum.

Cifuentes and Shih (2001) conducted a qualitative study to examine the documentation of the online teaching and learning experiences to identify some online teaching strategies, benefits, and limitations of online teaching and learning, and to discover cultural aspects associated with this cross-cultural collaboration. Thirty-seven American university preservice teachers were paired with 37 university-level Taiwanese students. Data were collected through printouts of the correspondences, preservice teachers' formative evaluations, preservice teachers' reflective journal entries, and surveys of Taiwanese partners.

The findings of the study show that participants identified some limitations associated with the online teaching and learning experience, including dependence on an unresponsive partner and a sense of detachment. Students felt frustrated because of the lack of immediate feedback, or no feedback at all from their peers. Some students also complained that the inability to know when a response might come contributed to a feeling of detachment, and the detachment led to misunderstandings.

Curtis and Lawson (2002) conducted a mixed method study to investigate the extent to which evidence of collaborative learning could be identified in students' textual interactions in an online learning environment. Twenty-four college students were involved in the study. Through the analysis of students' posted messages and evaluation forms, the findings revealed that there is a lack of observable challenges in online interaction because most participants like to share ideas which they agree on, but if an idea threatens their world view they skim over it and do not want to communicate.

Psychological Difficulties

Only one study discusses psychological difficulties. Fisher, Phelps, and Ellis (2000) conducted a qualitative study to examine group processes in an online environment. Five college students participated in the study. Data were gathered through students' journals, assignments, and their online communications. The findings indicate that students felt uncomfortable with communicating online because of the lack of non-verbal cues, facial and body cues, and the difficulty of expressing emotion through text. Also, students were worried that the lack of visual cues can lead to misunderstanding and miscommunication.

Technological Difficulties

One major study suggests technological difficulties and another study briefly mentions them. Alexander (1999) conducted a qualitative study to examine a collaborative instructional design project using constructivist theory, exploratory and resource-based learning, electronic communities, and integrated information technology immersion. Five college students from the Public Policy and Administration Department participated in a survey for this study. Data gathered from student and faculty evaluations, and reports of experiences indicate that students ranked learning to use various technology tools as the most time consuming activity among nine main activities. Students commented that technical difficulties were barriers in online discussions.

In another study concerning the vulnerability to technical failure (Cifuente & Shih 2001), some students have expressed concerns about the risk of computer failure and time lost waiting for the problem to be solved because there is no other way to communicate.

Summary

The latter section has explored some advantages and disadvantages regarding online collaborative learning. Studies show that online collaborative learning environments can have cognitive, socio-cultural, and psychological advantages, including enhancing writing skills, critical thinking skills, and knowledge construction, while increasing participation, interaction, motivation, and reducing anxiety. The most frequently mentioned advantages among these studies are cognitive achievements and the least frequently mentioned advantages are psychological benefits. However, a few studies also reveal that online collaborative learning environments can have cognitive, social, psychological, and technological disadvantages, including mechanical errors, conflict, fear, discomfort, and time wasted on technological problems. Most studies argue for the potential benefits of online collaborative writing. None of the studies is strongly against online collaborative learning or online collaborative writing. Even though a few studies recognize the drawbacks of online collaborative learning, they are not specifically related to writing or ELL writing.

Overall, by reviewing ELLs' writing needs, the development of CSCL, and its application to online collaborative writing, one could make two inferences. First, the majority of the studies published by academic journals favor online collaborative writing. Not a single one is strongly against online collaborative learning or online collaborative writing. It is possible, but unlikely, that studies with positive effects simply have much better opportunities to be published. There is much more we need to know about the difficulties (problems) students experience within the online writing processes, how students deal with the problems, and how writing teachers can help students solve their

difficulties and support their learning. Hopefully, writing teachers can gain a more comprehensive understanding of online collaborative writing so that they can approach online collaborative writing with realistic expectations about its strengths and weakness and apply the knowledge that is accumulated to develop their own writing courses. Second, most online writing studies utilize qualitative or mixed methods research designs. The number of participants in most studies is small. This is trend shifting from a large sample size of quantitative studies to a small sample size of qualitative or mixed methods studies in the online writing area.

In summary, the diversity of ELLs' first language backgrounds leads to a number of complex problems. ELL writing teachers should understand their students learning needs and tailor instruction to meet those needs in order to maximize benefits to the students. One way to accomplish this goal is to learn a good deal more about the relationship between Computer-Mediated Communication technology and ELLs' learning needs, along with their writing, thinking, sociocultural, and emotional processes. For example, we need to analyze not only what benefits but also what difficulties students experience during the online writing process so that writing teachers can have a more comprehensive understanding of how to integrate online collaborative writing into a writing class.

CHAPTER 3: RESEARCH METHOD

Overview

This chapter focuses on the research methods and procedures used in this study. The chapter begins with an overview of the research design and a rationale for using mixed method research. Next a description of the methods used to conduct the study is provided. The third section contains a description of the data collected. This chapter ends with a discussion of the data analysis procedures. The research questions in this study are as follows:

1. What self-perceptions do ELLs have about writing in English?
2. Do ELLs in the treatment group score significantly differently from ELLs in the control group on a self-perception of writing difficulties survey following six weeks of computer mediated communication technology intervention?
3. Does the online collaborative writing group score significantly higher on a writing performance posttest than the control group?
4. How does computer-mediated communication technology affect ELLs' writing performance?
5. How does computer-mediated communication technology, designed specifically to meet students learning needs, affect ELLs' writing processes?

Overview of the Research Design

Since computer networks were developed, computer-mediated communication (CMC) technology has come to influence how we read, how we write, and how we use written language to communicate with others. Teachers began to integrate computer-

mediated communication (CMC) technology into language teaching in the late 1980s. A number of researchers have started to use social learning theory and constructivist theory as frameworks to examine the relationship of technology to learning. Most studies are not specifically related to the writing process or the ESL writing process. Even though a few studies investigate writing, they emphasize the cognitive and social perspectives. There is not much about the psychological aspect of ESL writing. Moreover, CMC technology can only offer new opportunities and means for supporting collaborative learning theory. Technology and writing process materials cannot be guaranteed to enhance ELL writing processes and writing quality. There is much more we need to know about the difficulties students experience during the online writing process, how students deal with the problems, and how a computer-supported collaborative learning environment can be integrated to help students solve their difficulties and support their learning. In addition, to provide a more comprehensive understanding of how CMC technology can affect ELLs writing processes and writing performance from a collaborative learning, sociocultural, constructivist, and writing process perspective, mixed methods combining quantitative and qualitative design were employed.

Research Design

A mixed method design was utilized in this study. The quantitative method was a randomized pretest-posttest experimental and control group design with an online collaborative writing strategy experimental group. The quantitative data consisted of a self-perception of writing difficulties questionnaire administered as a pre and posttest, writing samples administered as a pre and posttest, and measures of the quantity of online participation by the experimental group. The qualitative data consisted of reflection

journals collected from the experimental group, and interviews from a subset of the experimental group, three open-ended questions at the end of Self-Perception of Writing Difficulties Questionnaire. Triangulations were achieved in this study through using multiple sources of data.

Rationale for Using the Mixed Method Design

Creswell (1994) has stated that the mixed method approach can enable a researcher to make the best of quantitative and qualitative designs by providing rich information from different perspectives. Frechtling, Sharp, and Westat (1997) have reported that the best results can be achieved through the use of mixed method evaluations, which combine quantitative and qualitative designs. They have emphasized that the mixed method design can provide a more comprehensive and believable set of understandings about a projects accomplishments than studies based on either quantitative or qualitative data alone. Chenail (2000) has stated that the mixed method approach can help a researcher to examine the subject from multiple perspectives by triangulating the theory, participants, observations, data, and analyses to produce expansive descriptions, explanations, and interpretations.

Method

Participants

The participants for this study were students enrolled in an ESL composition class during the summer semester of 2007 at the Center for English as a Second Language (CESL) at the University of Oklahoma. These students took English composition courses in preparation to take the Test of English as a Foreign Language (*TOEFL*) writing exam, with the goal of studying in an American university as international graduate students.

These students are full time students. Most students were not able to study at any colleges or universities until they passed the *TOEFL*. However, some students had already passed the *TOEFL* but they attended CESL to improve their English proficiency before their formal graduate studies started. Usually, before starting a session, CESL assigns ELLs to one of four different levels of English language ability class according to their scores on the Michigan Test (1989). This standardized examination tests students' English proficiency level on grammar, vocabulary, reading, listening, and writing. For writing, students are given 30 minutes to write their essay papers. There are about 18 to 20 students per level in four different levels including Beginner, Intermediate, Advanced, and Expert at CESL.

CESL offers an intensive English language program designed for students who wish to CESL. Generally speaking, CESL offers two six-week sessions in the fall, summer, and spring semesters, with 25 hours of instruction per week. The researcher began recruitment of these participants by posting fliers on CESL's bulletin board and distributing fliers in ESL composition classes at CESL. The fliers explained the purpose of the study and invited participation. Once the ESL students decided to participate, they were asked to join the first session of writing and to sign a consent form. This informed consent form explained the purpose of the study, the experimental procedures, the amount of time required for the subject's participation, confidentiality, and potential risks and benefits of participation. Before the study began, the researcher received informed consent letters from the Director of CESL and the participating students to get permission to conduct the study. The researcher conducted the study during the summer semester of 2007.

There were, in total, 26 volunteers who participated in the study. These participants were assigned to either an experimental or control group using stratified random assignment. The researcher randomly assigned 50 % of the participants from each of four levels (strata) listed above to either the experiment group (online collaborative writing group) or the control group. Every participant in the study took the self-perception of writing difficulties questionnaire and pretest writing sample. To determine that the two groups, experimental and control, were initially equivalent, a t-Test was performed to compare the two groups overall score on the questionnaire and on the writing sample. There was no significant difference between the two groups on either the self perceptions of writing difficulties questionnaire (P= .99) or on the writing sample provided (P=.716). In the beginning thirteen volunteers participated in each group. Eventually, there were 13 participants in the online collaborative writing group, but only 11 participants stayed in the control group because two volunteers dropped out after the second session.

Role of the Researcher

The researcher herself is an ELL writer. She has always struggled to improve her English writing skills. Since she came to the U.S. to study, most of her instructors had learning objectives for the courses they taught. Most instructors assumed that since ELLs come to the U.S. to study, they have to learn the language in order to meet the academic English writing standard. As a result, most instructors set up their learning objectives and learning activities based on their curricular standards without consulting their ELLs writing needs. As an ELL writer and teacher, the researcher began to question this

approach to teaching ESL writing, especially with regard to the learning needs of ESL students. Through this study, the researcher sought to explore the difficulties ESL students experience in their writing development and how teachers can tailor their teaching to ELL students learning needs to improve their chances of success in English writing. In this study, the researcher taught two sections, the experimental class and the control class. The researcher used the writing process to teach argumentative/persuasive writings. Both groups were taught the same content and provided the same handouts. The only difference between the two groups was the researcher integrated CMC technology with face-to-face teaching in the experimental group whereas the control group had only face-to-face teaching.

Software, Online Native Speaking Tutors, and Materials

There were four software programs used with the experimental group. These software programs include a group discussion forum, Nicenet, and three individualized tutoring software programs, Grammar Fitness, *Paragraph Punch*, and *Essay Punch*. Nicenet was used as an online discussion medium in the study. There were five features in the Nicenet web-based discussion forum used to facilitate online collaborative writing:

1. Conferencing: The researcher and students created threaded conferencing on specific topics they wanted the class to discuss.
2. Scheduling: The researcher put the class schedule on-line in advance; therefore, students' had a display of upcoming assignments and group events.
3. Document Sharing: Students and the researcher published their writings on line, giving their peers feedback on published essays, and receiving feedback/ comments.

4. Personal Messaging: Personal Messaging was similar to email but fully integrated with Document Sharing and Conferencing features. Students and the researcher used it to communicate with and between individuals in class, comment privately on conferencing topics, or give private feedback on published essays.
5. Link Sharing: The researcher and students used this feature to share links to tutoring programs or Internet resources sorted by writing difficulties/concerns that they [students, instructor, or both] created.

Moreover, three main types of tutoring software were utilized to address students' individual writing difficulties/needs:

1. *Grammar Fitness*: This software provided students with interactive grammar exercises that helped the student solve difficult issues of English grammar. The researcher and students were able to track improvement through the record management system.
2. *Paragraph Punch*: This software provided help to students as they developed their paragraph writing skills. Students chose from a menu of topics, developed an idea, and wrote their own topic sentence, body, and conclusion. The program prompts guided students step by step through pre-writing, writing, organizing, editing, rewriting, and publishing.
3. *Essay Punch*: This program provided students who were already familiar with writing a paragraph with help as they began to write short essays. It guided students to write a persuasive essay following the writing process of prewriting, outlining, organizing, editing, rewriting, and publishing.

In addition, here were two online native English-speaking tutors. One was a senior

linguistics major student and the other was a senior English major student. They participated in the discussion to offer feedback to individual students writing and questions.

Finally, seven handouts were posted online or distributed to students. They were an introduction to writing process as a writing strategy, the steps and strategies for pre-writing, drafting, peer-responding, revising, editing, publishing, and examples of good and bad argumentative/persuasive essays. Those handouts are included in Appendix A. The materials were posted online in the experimental group but the handouts were distributed to participants in the control group.

Research Procedures

The study consisted of three major phases: (1) pre-testing, (2) treatment, and (3) posttesting. Overall, the study lasted for six weeks, totaling 12 sessions. Every week participating students met twice together for one and a half hours (90 minutes) in a classroom. The experimental group interacted with computer laptops and software programs to perform their writing project; the control group did not use the technology.

Phase One: Pre-testing. In the first session, before students received any instruction, all the participants-- the online collaborative writing and the control group-- took 30 minutes to complete the pre-test questionnaire regarding their perceptions about writing difficulties. Then, the researcher took 30 minutes to collect a pre-test writing sample to determine students' starting points and their writing abilities. All participants were asked to write an argumentative essay on the following topic: People should attend colleges or universities. State whether you agree or disagree and support your argument with specific reasons and examples.

Phase Two: Treatment. There were two groups, the online collaborative writing group (treatment group) and the face-to-face teaching writing group (control group). The researcher used the writing process to teach argumentative/persuasive writing. The curriculum was developed and revised through a pilot study in the summer semester of 2006. Both groups were taught the same contents and provided the same handouts. The only difference between the two groups is the experimental group integrated CMC technology into face-to-face teaching but the control group had only face-to-face teaching. The teaching content and topics are outlined in Table 1.

Table 1

Teaching Contents for Online Collaborative Writing and Face-to-Face Teaching Writing Groups

Online collaborative writing group	Face-to-face teaching writing group
Session 1:Pre-testing	Session 1: Pre-testing
Session 2:- Introducing the Writing Process - NICENET Training	Session 2: Introducing the Writing Process
Session 3:- Strategies for Pre-Writing - NICENET Practice	Session 3: Strategies for Pre-Writing
Session 4:- Examples of Good and Bad Argumentative or Persuasive Essays - Modeling Persuasive Writing	Session 4: -Examples of Good and Bad Argumentative or Persuasive Essays - Modeling Persuasive Writing

Session 5: Strategies for Drafting	Session 5: Strategies for Drafting
Session 6: Cultural and Emotional Aspect of Writing	Session 6: Cultural and Emotional Aspect of Writing
Session 7: Strategies for Peer-Responding	Session 7: Strategies for Peer-Responding
Session 8: Strategies for Revising	Session 8: Strategies for Revising
Session 9: Grammar and Mechanics	Session 9: Grammar and Mechanics
Session 10: Strategies for Editing	Session 10: Strategies for Editing
Session 11: Ways for Publishing	Session 11: Ways for Publishing
Session 12: Post-testing	Session 12: Post-testing

In the treatment phase, both groups were taught about the steps and strategies of the writing process, including the following: the writing process and the strategies for pre-writing, drafting, peer-responding, revising, editing, publishing; examples of good and bad argumentative/persuasive essays; cultural and emotional aspect of writing; and grammar and mechanics. In addition the learning strategies of the writing process, participants in the treatment group also received online collaborative writing training and practice. During the second session, the researcher trained students to use NICENET and coached them on effective creation of writing and responding. The training included creating individual notes, commenting on other students' notes, reflecting on other students' notes, giving feedback to other students about their notes, and writing an essay

at the end of this meeting period. Finally, each student spent five minutes writing a reflective journal.

In the third session, the participants practiced logging onto the Nicenet online supportive writing class, engaging in online discussion, and writing an essay. Participating students were guided and informed about their roles as student writers and feedback givers in an online collaborative writing environment. Students were briefly introduced to how to write argumentative/persuasive essays by applying a writing process strategy prior, during, and after writing their essays. Then, students were encouraged to apply the following steps to share writing and feedback with online peers:

1. Students share ideas about their topics to generate or brainstorm ideas and resources related to the topic they are to write.
2. Students write their first draft and share it with other peers to get feedback.
3. Online peers and instructor give feedback that can enrich the writer's ideas, organization, coherence, and language.
4. Writers receive the comments, discuss them further with feedback givers and decide what to incorporate in their final drafts.
5. The process is repeated until students publish a final draft.

In the last 35 minutes, students spend 30 minutes writing their choices of argumentative/persuasive writing drafts and posting them online. Again, students spend 5 minutes writing their reflection journal.

In the fourth session, the researcher modeled how to write an argumentative/ persuasive essay by applying a writing process approach, providing students with good argumentative writing examples (See Appendix F), and guiding students to practice

writing argumentative essays. First, the researcher brainstormed ideas for the argument and created a rough draft. Then, students were encouraged to help the researcher revise the essay. Finally, students helped the researcher edit and publish the essay. Afterward, students were encouraged to come up with features of good argumentative essays by analyzing the samples of good argumentation. At the end, the researcher spent 10 minutes facilitating students to discuss the following topic: Do you agree or disagree with the following statement? Teachers should use technology to make learning enjoyable and fun for their students. Use specific reasons and examples to support your position. Then, students used 30 minutes to write an argumentative essay on the above assigned topic. Lastly, students were asked to write in their own reflective journal.

During the remaining seven intervention sessions, the ELL writers developed more essays using technology and the activities of collaborative response. The researcher (a) guided students to use the technology at all stages of the writing process, including prewriting, drafting, revising, editing, and publishing in a collaborative manner; (b) created topics and tasks that require group interaction and negotiation; (c) provided guidelines for the group process; (d) guided each group of students to lead the discussion of particular topics; and (e) asked students to write an argumentative essay and reflective journal at the end of each session.

Phase Three: Post-testing. In the third phase, during the twelfth session, the researcher administered a-30-minute post-testing writing assessment to all participants in both groups to see if there was any improvement in the students' writing performance. This posttest writing assessment is the essay on technology use described above. Next, all

participants took 30 minutes to complete a post-testing questionnaire regarding their perceptions about writing difficulties/needs.

Finally, the researcher conducted one-hour face-to-face interviews with nine participants in the treatment group to explore in greater depth how technology influenced their writing processes and writing performance. The participating students were interviewed in a private location of their choice. These interviews followed a semi-structured format. The researcher asked preplanned eight questions (see Appendix C) and then probed and clarified anything unknown from the questions.

Description of Data Collected

This study employed mixed methods design. The instruments and objects of data collection included pre-testing writing difficulties/needs questionnaire (see Appendix B), quantity of participation in Nicenet based on the number of entries contributed to the database, quality of writing samples, post-testing writing difficulties/needs questionnaire (see Appendix B), reflection journals, and hour-long, semi-structured personal audio-taped interviews (see Appendix C). The researcher collected the data for the study in Summer Semester from June 2007 to July 2007. Table 2 gives a visual representation of the research questions and the corresponding data collection instruments the researcher used to answer the research questions.

Table 2

Research Questions and the Research Instruments Used

Research Questions	The Research Instruments Used
1. What self-perceptions do ELLs have about writing in English?	1. The writing difficulties/needs questionnaire
2. Do ELL students in the treatment group score significantly differently from ELLs in the control group on a self-perception of writing difficulties survey following six weeks of computer mediated communication technology intervention?	1. Pre-test self-perception of Writing difficulties; 2. Post-test self-perception of Writing difficulties
3. How does computer-mediated communication technology affect ELLs' writing performance?	1. Pretest writing samples 2. Posttest writing samples
4. Does the online collaborative writing group score significantly higher on a writing performance posttest than the control group?	1. Quality of pre and posttest writing samples

5. How does computer-mediated communication technology, designed specifically to meet students' learning needs, affect ELL students' writing processes?	1. Quantity of participation in the database; 2. Reflection journals 3. Writing difficulties/needs Questionnaire; 4. Interviews

Self-Perception of Writing Difficulties Questionnaire

The writing difficulties questionnaire was composed of 50 items; the first 8 items related to demographical information, the second 42 items measured students' self-perception of his/her writing difficulties, and the last three open-ended items queried regarding the degree of writing difficulty, problem solving strategies with writing difficulties, and the students' feelings about English composition. This instrument was developed based on the literature review of ELL writing difficulties. The demographic items elicited participants ages, gender, countries of birth, native languages, the number of years spent learning English composition, and the number of hours per week spent using the computer and the Internet. This questionnaire is located in Appendix B.

The 42 items measuring self-perception of writing difficulties consisted of three different scales: (a) cognitive/linguistic dimension of writing difficulties, (b) sociolcultural dimension of writing difficulties, and (c) psychological/emotional dimension of writing difficulties. Cognitive and linguistic dimensions are different; but, for many second language adult learners, writing in a new language involves combining cognitive and linguistic aspects of writing simultaneously, making a clear distinguish

between linguistic and cognitive dimensions problematic. There were 25 items measuring the cognitive/linguistic dimension of writing difficulties, five items measuring the sociocultural dimension of writing difficulties, and 12 items measuring the psychological/emotional dimension of writing difficulties. The 42 items used a six-point Likert-scale, from "strongly disagree" to "strongly agree." Items were structured so that the highest score (6) indicated the greatest difficulty with an aspect of writing and the lowest score (1) indicated the least difficulty. According to Brown (2001), a major problem with the Likert-scale questions arises when the neutral non-opinion is given because most respondents may tend to take that opinion; therefore, no definite opinion is stated. To avoid this problem, the researcher forced respondents to express a definite opinion by having an even number of options. In this study, a six-point Likert-scale contained the following options: (1) Strongly Disagree, (2) Disagree, (3) Somewhat Disagree, (4) Somewhat Agree, (5) Agree, or (6) Strongly Agree.

Questionnaire Development. To ensure content validity, several drafts of the questionnaire were reviewed, revised, and edited by ELL writing teachers and instructors from the Department of Instructional Leadership and Academic Curriculum for the appropriateness of language level, relevance, and representativeness of the construct defined in this study. Moreover, the questionnaire was tested on 20 ELL writing students during the pilot study to ensure clarity of the survey statements. Finally suggestions were made on providing simple wordings and examples to avoid ambiguities. Then, the questionnaire was reedited and tested for reliability. The survey scored .84 Cronbach's Alpha and .85 for inter-item consistency. According to the survey guideline (De Vellis, 1991), the reliability is good.

Writing Samples. The second data set consisted of students writing samples. Before students received any intervention, the researcher administered a pre-test to all participants (the online collaborative writing group and control group) to determine the students starting points and their ability to write an essay in the first session. The researcher asked the students to write an essay based on the following prompt: People should attend colleges or universities. State whether you agree or disagree and support your argument with specific reasons and examples. Again, in the last session, the researcher conducted a post-test to all participating students from the online collaborative writing group and control group with a similar argumentative essay based on the following topic: Technology can solve problems and make life better. State whether you agree or disagree and support your argument with specific reasons and examples. The purpose was to verify whether or not students participating in online collaborative writing improved their quality of writing at a higher level than students participating in the control group.

Quantity of Online Participation. The third data set analyzed the participation rate of production of students in the online collaborative writing group to determine their contributions. Online participation included creating individual notes, commenting on other students' notes, giving feedback to other students about their notes, writing a first draft at the end of each session period, and revisions. The researcher measured the quantity of participation in NICENET by using the Analytic Tool Kit (ATK) (see Appendix D).

Reflection Journals. The fourth data type was composed of reflection journals. Students in the online collaborative writing group were asked to write reflection journals

about their online writing after each of the 12 sessions, excluding the first and last session. In these reflections, students wrote about achievements/benefits as well as problems/challenges encountered in the online collaborative writing class based on the writing process teaching approach.

Interviews. The fifth data set consisted of semi-structured interviews with ELL writers from the online collaborative writing group. In-depth personal interviews, approximately one hour in length, were conducted with participants to explore more deeply students' perceptions about online collaborative writing difficulties and strategies for dealing with online writing identified in the questionnaire. The researcher used the purposive sampling approach to select three students who participated in online collaborative writing at the highest rate, three students who participated at an average rate, and three students who participated at the lowest rate. In other words, the highest three students who created the highest number of essays, notes, and comments during the six-week online collaborative writing; the average three students who wrote the average number of essays, notes, and comments during the six-week online writing; and the lowest three students who contributed the lowest number of essays, notes, and comments during the online writing intervention participated in the interviews. By doing so, the researcher made sure that the selection of interviewed students would be representative of the students who participated in the study. The interviews were tape-recorded.

Data Analysis Procedures

The mixed methodology of this study required analysis of both quantitative and quantitative data. In order to maintain anonymity, all participants' names were removed from any data and they were assigned to an identification number. All quantitative data

were analyzed using the Statistical Package for the Social Sciences (SPSS) version 13. Qualitative data were analyzed for categories, patterns, and themes that are related to all areas of the phenomenon under investigation Qualitative data were analyzed for categories, patterns, and themes that are related to all areas of the phenomenon under investigation.

Self-Perception of Writing Difficulties Questionnaire

Prior to scoring the questionnaire items, the researcher put all items on the same scale by reversing all positive worded statements. This questionnaire was analyzed using descriptive statistics, such as frequency, means, and percentages, and inferential statistics. The writing difficulty was represented by summing up the frequency, percentages, and the average of all item mean scores from 'strongly agree' to 'strongly disagree' on the Likert-point scale. A t-test was performed to verify that there was no difference between the treatment and control groups at the start of this study on the self-perceptions of writing difficulties questionnaire. A 2 (group) by 2 (time) repeated measures analysis of variance was performed to determine whether there was a main effect for group, a main effect for time, or a group by time interaction for self-perceptions of writing difficulties. In this study the independent variable was group (the online collaborative writing group and the control group). Group was the between-subject factor. The repeated measure was time from pre-test to a post-test. The dependent variable was self-perceptions of writing difficulties.

The three open-ended questions were used to analyze ELL writing difficulties in greater depth. Analysis began by taking notes for potential themes regarding the ELLs' overall perceptions of writing difficulties and their problem solving strategies. After

rereading and grouping notes by similarity, the notes were color-coded by groups for later comparison with questionnaire quantitative data results.

Writing Samples

The researcher asked two native ELL writing teachers to rate all essays before and after the research. The two raters used *TOEFL* independent writing rubrics (see Appendix E), rating each essay from zero to five: Score of 0 copying words from topic, rejecting the topic, or being written in a foreign language; Score of 1 - serious disorganization, little or no detail, and serious errors in sentence structure or usage; Score of 2 - limited development in response to the topic, inadequate organization, insufficient exemplifications, explanations, or details, inappropriate choice of words or word forms, an accumulation of errors in sentence structure or usage; Score of 3 - using somewhat developed explanations, exemplifications, and details, displaying unity, progression, and coherence, though connection of ideas may be obscured, demonstrating inconsistent facility in sentence formation and word choice, displaying limited syntactic structure and vocabulary; Score of 4 - addressing the topic well, though some points may not be fully elaborated, being well organized and using sufficient explanations, displaying unity, progression, and coherence, though it may contain redundancy, digression, or unclear connections, displaying facility in the use of language, demonstrating syntactic variety and range of vocabulary, though it may have noticeable minor errors in structure, word form, or use of idiomatic language; Score of 5 - effectively addressing the topic, being well organized, using clearly appropriate explanations, displaying unity, progression, and coherence, displaying consistent facility in the use of language, demonstrating syntactic variety, appropriate word choice, and idiomaticity.

The researcher asked the raters to do a reliability check. Prior to rating the writing essays, two raters met to discuss the rating scale and how to approach the task of scoring the essays. They practiced rating sample essays from the NICENET database. Practice allowed raters to become familiar with scoring procedures, evaluate practice samples, and then compared their results to one another. After reaching a reasonable level of consensus [the percentage of agreement was 80%] on all sample essays, the two raters began to score the essays that had been coded so that the participants would remain anonymous. Using Pearson correlation coefficients, the researcher calculated and produced an inter-rater reliability of .90. A t-test was performed to verify that there was no difference between the treatment and control groups at the start of this study on writing ability. A 2 (group) by 2 (time) repeated measures analysis of variance was performed to determine whether there was a main effect for group, a main effect for time, or a group by time interaction for writing ability. In this analysis the independent variable was group (the online collaborative writing group and the control group). Group was the between-subject factor. The repeated measure was time from pretest to a posttest. The dependent variable was a *TOEFL* rubric score on the writing sample measure.

Analysis of the Quantity of Notes on Nicenet

To investigate the process of students' participation in terms of number of entries to the database, the researcher used descriptive statistics to analyze the total number (sum) and the mean number of comments by each student. The data were analyzed to obtain the highest activity, the medium activity, and the least activity among participating students in the treatment group.

Reflection Journals

All reflection journals were read carefully multiple times and then were categorized. Analysis began by taking notes for potential themes regarding writing difficulties and problem solving strategies on the first reflection journal. Next, a separate list of themes was compiled for the second reflection journal. These two lists were compared and a shorter group of categories began to emerge. This master list was used to initially analyze the remaining eight reflection journals and then any additional categories were added to support the areas under investigation in this research. To ensure the trustworthiness of the data, the researcher had the coded data reviewed independently by one independent reviewer familiar with qualitative analysis.

Transcription and Coding of the Interview Data

The audio tapes for individual interviews were transcribed by the researcher. Qualitative data analysis involved reducing and interpreting the data to identify categories, themes, and patterns. The interview was transcribed and the transcripts were line numbered and coded using Microsoft Word's commenting and then by hand. The comments were color coded by categories and subcategories that directly related to the research questions. To further insure validity, the researcher returned to verify data across the sub-set of data drawn from other sources. To further insure validity, the researcher returned to contributors when points needed clarification. For example, the researcher read each interview several times. While reading, the researcher extracted students' responses to the questions and maintained the text in their own words. Then the researcher used color-coding to highlight similarities of themes while reading. For more

clarification and validation, the researcher rechecked again with participating students by telephone or email.

Summary

This chapter described the methodologies used in this study to investigate how CMC affects students' writing processes and writing performance. The research design was described and specifics of the methodologies were discussed. The following information was included: type of research and design, participants, instruments, software and materials, intervention method, and data analysis procedures.

CHAPTER 4: RESULTS

This chapter reports the results of a study that examined the effects of CMC technology on the ELLs' writing processes and writing performance. Quantitative data were collected from all 24 students participating in this study; qualitative data were collected from online writing groups. The demographics of the participants collected from initial items on the Self-Perception of writing Difficulties Questionnaire are reported below.

Among the 24 participating students, 11 were male (46 %) and 13 female (54%). Participating students originated from nine countries, including China (n=9, 38%), Taiwan (n=4, 17%), Saudi Arabia (n=4, 17%), Angola (n=2, 8%), Abu Dhabi (n=1, 4%), Cameroon (n=1, 4%), Thailand (n=1, 4%), Korea (n=1, 4%), and Venezuela (n=1, 4%). The average age was 24 years old with the two youngest participants being 19 and the one oldest being 40 (See Table 1). In terms of participants' first language, 13 (54.2%) participants spoke Chinese. The remaining participants spoke Arabic (n=5, 20.8%), Portuguese (n=2, 8.3%), French (n=1, 4.2%), Spanish (n=1, 4.2%), Tai (n=1, 4.2%), and Korean (n=1, 4.2%). The majority of participants had practiced written English for less than one year in the United States and had studied part time English in their home countries for fewer than eight years (See Table 2).

Table 3

Age of Participants

Age	N	%
19	2	8.33

20-22	9	37.5
23-25	5	20.83
26-28	5	20.83
29-31	2	8.33
40	1	4.18
Total	24	100

Table 4

Number of years studying English in home country

Number of years	N	%
3-4	4	16.7
5-6	9	37.5
7-8	11	45.8
Total	24	100

The average hours of computer usage per week was 29, ranging from one hour to 100 hours. Most students (n=14, 58.3%) spent less than 25 hours a week using a computer, but there were four students (16.7%) who spent 40 hours per week using a computer. Among the hours of computer usage (1 hour-100 hours), the majority of students (n=15, 62.7%) spent less than 10 hours using the internet; there were three students (12.5%) who spent 20 hours every week on the internet.

The remainder of the results reported in this chapter is organized around the five questions guiding this research. These questions are:

1. What self-perceptions do ELLs have about writing in English?
2. Do ELLs in the treatment group score significantly differently from ELLs in the control group on a Self-Perception of Writing Difficulties Survey following six weeks of computer mediated communication technology intervention?
3. How does computer-mediated communication technology affect ELLs' writing performance?
4. Does the online collaborative writing group score significantly higher on a writing performance posttest than the control group?
5. How does computer-mediated communication technology, designed specifically to meet students' learning needs, affect ELLs' writing processes?

Results of research Question 1: What self-perceptions do ELLs have about writing in English?

In the pretest, all 24 participants were asked to rank items from strongly disagree (1) to strongly agree (6) on a 'Self-Perceptions of Writing Difficulties' questionnaire. The questionnaire was designed to measure three dimensions of writing difficulty: psychological/emotional, sociocultural, and cognitive/linguistic. Although some items may cross dimensions, in this questionnaire items were categorized according to their literal meanings without consideration of the interactions among these three dimensions of writing. Three open-ended questions were included on the questionnaire to analyze

ELL writing difficulties in depth. Table 5 reports descriptive data to show the rank of questionnaire items from strongly agree to strongly disagree.

Table 5

Writing Difficulty (pretest) from Most to Least Difficulty

Rank	Survey Item	Dimension	M	SD
1	11. I have difficulty with word choice (such as choosing "quarrel" or "debate").	Cog/Lin	5	.98
2	16. I have difficulty adjusting my way of writing in my native language writing to American thought patterns.	Socio/cultural	4.96	1.08
3	29. When I write in English, I stop many times to think about what to write.	Cog/Lin	4.79	.88
4	30. I have anxiety about writing in English.	Psych/Emo	4.58	1.18
5	13. I use few idioms (such as "Butterflies in my stomach" or " Hit the road").	Cog/Lin	4.50	1.69
6	36. I am a skillful English writer.	Cog/Lin	4.25	1.32
7	14. I have difficulty spelling correctly.	Cog/Lin	4.21	1.47
7	23. I have difficulty writing a thesis statement.	Cog/Lin	4.21	1.18
9	26. I have difficulty summarizing my larger argument into a conclusion.	Cog/Lin	4.17	1.13
10	8.I have difficulty using prepositions (such as "on," "in," "at").	Cog/Lin	4.08	1.10
11	6. I have difficulty writing closing sentences for my paragraphs.	Cog/Lin	4.04	1.16
11	15. I have difficulty generating ideas for writing	Cog/Lin	4.04	1.08
11	27. When writing an English essay, I have trouble writing an introduction, some paragraphs to make my points, and a conclusion.	Cog/Lin	4.04	1.08

14	17. I am aware of what sentence fragments are, but I still use them.	Cog/Lin	4.00	1.14
15	2. It is easy for me to get started writing an English essay.	Cog/Lin	3.92	1.28
15	22. I feel that I have trouble writing logically and systematically in English.	Cog/Lin	3.92	1.25
15	33. I don't have enough time to finish my English writing exams or assignments in a limited time period.	Cog/Lin	3.92	1.18
15	24. I have trouble focusing ideas (arguments) that are related to the points that I am trying to make.	Cog/Lin	3.92	1.10
15	3. It is easy for me to keep my English writing going and write smoothly.	Cog/Lin	3.92	1.02
20	4. I write short and simple English sentences.	Cog/Lin	3.88	1.30
20	25. I had difficulty organizing ideas.	Cog/Lin	3.88	1.44
22	20. I know what run-on sentences are, and I don't use them.	Cog/Lin	3.83	1.44
23	21. I find it difficult to go from one paragraph to another with smooth, well-connected transitions.	Cog/Lin	3.79	1.21
23	5. It is easy for me to write my ideas into English paragraphs.	Cog/Lin	3.79	1.02
25	32. I have confidence in English writing.	Psycho/Emo	3.71	1.49
26	18. I am aware of what sentence fragments are, and I don't use them.	Cog/Lin	3.58	1.35
27	28. Sometimes I start writing something, then in the end I write something else.	Cog/Lin	3.54	1.22
28	7. I have difficulty using articles.	Cog/Lin	3.50	1.45
29	19. I know what run-on sentences are, but I still use them.	Cog/Lin	3.38	1.61
30	12. I have difficulty using punctuation.	Cog/Lin	3.33	1.34
30	34. I feel comfortable revising my writing in English.	Psycho/Emo	3.33	1.31
32	10. I have difficulty with word order in English sentences.	Cog/Lin	3.21	1.29

33	9. I have difficulty using verb tenses within a paragraph.	Cog/Lin	3.04	1.12
34	1. I like to write English essays.	Psycho/Emo	3.03	1.31
35	41. I feel my writing assignments are interesting and meaningful.	Psycho/Emo	2.46	1.36
36	35. I like to use computer technology (such as e-mail, online discussion or internet) in my writing class.	Psycho/Emo	2.46	1.29
37	37. I feel comfortable with sharing my English writing with other ELLs.	Socio/Cult	2.29	1.00
38	40. I like to give feedback and suggestions to other people's English writing.	Socio/Cult	2.04	1.08
39	39. I feel comfortable with sharing my English writing with native English speakers.	Socio/Cult	1.92	1.06
40	38. I like to share my English writing with my English teachers.	Socio/Cult	1.67	.76
41	31. I am confident in my writing in my native language writing (such as Chinese, Korean, or Arabic).	Psycho/Emo	1.63	1.01
42	42. I am motivated to learn English writing in the future.	Psycho/Emo	1.29	.46
	Average		3.54	.44

Most Difficult Aspects of Writing

The mean was measured by the average score for the total 24 participants (including online writing and control group) in each item on the questionnaire. The standard deviation was defined as the measure of the dispersion of the scores from mean for the total 24 participants in each item. In this study, the primary criteria used to define items into most and least difficulty categories were mean scores (M=3.54) and standard deviations (SD=.44). The mean score of each item larger or equal to 4 (3.54+.44≈ 4) constituted placement in the most difficult item. On the other hand, the mean score of

each item less than or equal to 3 (3.54+44≈3) consists of placement in the least difficult item. Over all, 14 items were ranked as the highest writing difficulties. In other words, 14 items were ranked as somewhat agree, agree or strongly agree.

Participants agreed that word choice (M=5; SD=.97) was the chief writing difficulty. Participants indicated in their open-ended questions that when they were not sure about certain English words, they usually looked up those words in the bilingual dictionary. However, translations from a bilingual dictionary frequently came out as a jumble of words to the students. ELL writers found it very difficult to choose the most appropriate one in a given sentence (context). One participant stated:

> I had problems of choosing the right words to express my ideas. When I had difficulties and uncertainties, I always looked up those words in my bilingual dictionary. But there were so many translational words coming out from my dictionary, I found it was very hard for me to choose the most appropriate one in a sentence to express my thoughts correctly. (Sue, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Adjusting to American thought patterns (M=4.96; SD=1.08) was the second greatest writing difficulty. Many participants indicated that they had problems adjusting their ways of writing in their first language to American thought patterns. Students still thought in their first language and used the rhetorical patterns of their first language to write English essays. Many students expressed that they had difficulty switching from their first language rhetorical patterns to English linear rhetorical patterns. Because writing patterns or styles are not only cognitively but also culturally embedded, many ELL writers in this study found it takes a significant amount of time to adapt to different thinking patterns when communicating through written English. Two participants expressed their concerns about adjusting to American thought patterns:

I had difficulty adjusting my way of writing from my native language writing to American thought patterns. For example, I still had tendency to let my readers to infer from my writing and I had problems of using direct, concise, to the point type of American thought patterns. (Megan, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

> I think I had a lot of problems in organizing my ideas in American logic and reasoning. I got used to use my first language way of writing many fancy words to repeat ideas. I usually wrote more philosophically and I forgot to provide examples or statements. (Jack, Self-Perception of Writing Difficulties Questionnaire , Open-Ended Question 1)

Writing fluency (M=4.79; SD=.88) was the third ranked writing difficulty. Students stated that they stop many times to think about what to write when they write English essays. They often think for extended periods of time but find only a few words to express a quite complicated idea; therefore, they have serious problems with fluency.

For instance, one participant said:

> I usually plan and thought my ideas in my first language and it was not difficult. But once I have ideas, I stopped many time to think how to translate my ideas and meaning into American style of organization, logic, and sentence structure. I often ended up struggling to think for a long period of time but could only find simple and few sentences to express my comprehensive and complicated ideas. I felt I had serious problems in writing fluency and I felt I was handicapped to express my ideas fully and fluently. (Nancy, Self-Perception of Writing Difficulties Questionnaire, Open-ended Question 1)

Anxiety (M= 4.58; SD=1.18) was the fourth-ranked writing concern. All participants felt anxious about English writing. This anxiety often manifested itself in low self-confidence in writing, whether in regard to how they organized their ideas or whether they could adequately detect their own grammar errors. Sometimes they emphasized the mechanics of writing, sacrificing meaning and creativity. One participant expressed such anxiety:

> The more I prepared for the paper, the more confused I got with so many things going on in my head. How could I organize my ideas in English in a limited time! But if I couldn't make it in time, I would get lower grade and my efforts would be

totally ruined! (Wendy, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Idioms (M=4.50; SD=1.69) were the fifth most cited writing difficulty. Participants indicated that they used few idioms in their English writing, often using knowledge of their first language to understand and construct English idioms. In essays they found it hard to be able to memorize and use those idioms whose meanings were not figuratively transparent and opaque. In addition, participants stated that they had problems in using idioms appropriately; therefore, they used fewer idioms to avoid slang or colloquialisms in their writing. Two participants reported:

I was used to use my first language to help me to understand and memorize English idioms. When writing English essays, I had problems with memorizing and using those idioms whose actual meanings were very different from their literal meanings and my first language expressions. (Andy, Self-Perception of Writing Difficulties Questionnaire, Open-ended Question 1)

I had hard time figuring out which English idioms were academic writing and which idioms were just colloquial expressions. Also I had difficulty in using right idioms at the right place and at the right time in my sentences; therefore, I tended to use few idioms to avoid mistakes. (Jenny, Self-Perception of Writing Difficulties Questionnaire, Open-ended Question 1)

Low self-confidence (M=4.25; SD=1.69) in English writing was the sixth writing difficulty. Most of the participants expressed a deep concern about their low self-confidence in their English writing proficiency. Participants felt that their lack of confidence made them somehow inferior to native speakers and only added to the nervousness they felt writing English essays. In addition, quite a few participants said they lacked confidence in English writing proficiency in comparison to their native language writing proficiency. For example, one participant expressed:

If I could write in the same way as in Arabic, I would feel more confident in my writing. Now even if I know quite a lot about the topic that teachers give us to write for my class, I still struggle very much about how to organize my ideas into

> English essays. I tend to be worried about my sentence structure, grammar, transitional words, and word choices. After long hours of writing, I still write fewer sentences, few paragraph in my essay and I feel so bad about my writing. (Mark, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Both thesis statement (M=4.21; SD=1.47) and spelling (M=4.21; SD=1.18) were ranked seventh among writing difficulties. In terms of thesis statements, several participants indicated that writing a thesis statement was difficult in English essays. Some of them linked the reason why it was difficult to write a thesis statement to their inability to summarize their ideas in one sentence. Thesis statements were also considered by participants to be unnecessary requirements. Participants felt that writers needed to have freedom to write and to express the meaning they wish to convey in a way they deemed appropriate. Participants think thesis statements limit their expression. One participant said the following:

> I have difficulty writing thesis statements. I don't see the importance to have a thesis statement. Summarizing my ideas in just one sentence is tough for me. (Garry, Self-Perception of Writing Difficulties Questionnaire , Open-Ended Question 1)

With regard to the difficulty about spelling, a few participants indicated that English is not always spelled as it is pronounced. The rules are complex and there is always an exception. The following statement was made:

> I learn English from listening to native speakers. When I spell a word, I try to match letters with pronunciations. However, in English you often pronounce in one way, then you write it the other way. That's why I always spell wrong. (Hannah, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Summarizing a large argument into a conclusion (M=4.17; SD=1.13) was the ninth greatest wiring difficulty. Participants felt that it was difficult to summarize their

whole essay in just one paragraph. They said that putting a larger piece into a short, concise paragraph was difficult for them. One participant expressed:

> My problem is how to summarize the long essay I write into conclusion and how to make it shorter to fit into just one paragraph. That is the most difficulty that I have. (Lucy, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Using prepositions (M=4.08; SD=1.100) was the tenth-most cited writing difficulty. Prepositions were presented as one of the most troubling aspects of writing in English. Most participants had difficulty using prepositions correctly because the participants felt that every preposition has a number of possible meanings and only vague definitions. It is sometimes tremendously difficult for participants to decide on a preposition. One participant expressed:

> It was always hard for me to decide appropriate prepositions. When I look up a preposition in a dictionary, I often find about ten or twenty meanings. To me, all are very vaguely and confusingly defined. I don't know which one the right choice is. (Mickie, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Organization, generating ideas, and paragraph conclusion (M=4.04; SD=1.08) tied for a ranking as the 11th greatest writing difficulty. First, with regard to organization, all participants expressed their problems with having to follow a specified organizational pattern in presenting their ideas in English writing. Participants shared that they did not have experience in following specific American organizational patterns in their first language writing. Therefore, they felt it unnatural to conform their writing to a specific organizational design. The following are two participants' statements about organization:

> I usually just write whatever comes to my mind about a topic. However, when I have to do introduction, body, conclusion, and all that, that part bothered me very much. (Sissy, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

> It is very hard for me to follow a certain structure. I usually spend more time organizing my ideas to show what is cause and what is effect. When it comes to structure, I have to separate my ideas to go in different place (like different paragraph). Most of the time, I end up losing my ideas when I try to think the structure. In the end, I usually write less paragraphs and less sentences in my essays. (Nina, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Making grammatical mistakes in sentence fragments (M=4.04; SD=1.16) was the 14th ranked writing difficulty. Many participants indicated that when they wrote, they tended to think in their first language. Then they translated those ideas word-by-word into English; therefore, they often ended up writing incomplete sentences and forgetting to follow the rules of English sentence structure. For example, Mark expressed:

> When I wrote English essays, I often had a tendency to think my ideas in my native language first. Then I translated my ideas and meaning word-by-word into English and I usually forgot to follow the rules of English sentence structure and boundary. As a result, I often ended up writing many incomplete sentences. (Mark, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 1)

Least Difficult Aspects of Writing

The mean score of each item less than or equal to 3 (3.54-.44=3) is used to define the least difficult item. In general, participants had less difficulty in psychological/emotional and sociocultural aspects of writing. For example, participants did not find English writing boring and meaningless (M=2.46; SD=1.36); they did not dislike using computer technology (M=2.46; SD=1.29). Students did not have difficulty in sharing writing with other ELL students (M=2.29; SD=1.00); giving feedback to others (M=2.04; SD=1.08); or sharing writing with native speakers (M=1.63; SD=1.06). Overall, students indicated the following eight as the least difficult aspects of writing:

Motivation in learning English writing (M=1.29; SD=.46) was ranked the least difficult. Participants know that they are not proficient English writers, but they are

motivated to learn more about English writing to enable them to be successful in their academic writing. For example, one participant indicated:

> I had been here in the U.S. for six months but I still got low grade on many of my term papers. Many of my professors understood that I had ideas but they encouraged me to learn how to use American academic writing convention to express my ideas. I was motivated to take every opportunity to learn and improve my English writing to make my professors (readers) understand my meaning (Kim, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 3)

Another participant said:

> My government offered me scholarship to come to US to study petroleum engineering one year ago. So far I had not passed my *TOEFL* test yet and I often did poorly on my essay part. I really wanted to get out of the Center for English as a Second Language and I started to study my major. I was strongly motivated to learn and improve my English writing to pass the *TOEFL* test in this summer session (Kevin, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 3).

Confidence in native language writing (M=1.63; SD=1.01) was the next least difficult writing issue. All the participants expressed that compared with English writing, they were more confident in their first language writing. They had written in their native language for a long time and they knew the format, rules, and words.

Sharing writing with English teachers (M=1.67; SD=.76) was ranked as the third least difficult writing issue. Most participants indicated that they were used to writing for a grade so they did not have any problem with letting English teachers read their writing and with sharing their essays with English teachers. For example, Chris indicted in his questionnaire:

> My English writing teachers usually put writing topics on the whiteboard and guided us to discuss about the topics. Then we wrote our own essay and handed it to English teachers. I was used to let English teachers grade my writing and give me feedback; therefore, I did not have difficulty sharing writing with my English teachers. (Chris, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 2).

Sharing writing with native English speakers (M=1.92; SD=1.06) was ranked as the fourth least difficult writing issue. Many participants expressed that after they finished their drafts, they liked to ask native English speakers to edit for them. They felt comfortable with sharing their writing with native speakers and those native writers were able to help them with grammar, word choice, and organization. One participant wrote:

> When I had writing difficulty, I always liked to ask native speakers for help. I felt no problems of asking English speakers to check my grammar, word choice, logic, and organization. English speaking people were usually very good at helping me those areas that I made mistakes without self-awareness. Those mistakes even I do self-check, I might not be able to do self-correction. (May, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 2)

Giving feedback to others (M=2.04; SD=1.08) was ranked as the fifth least difficulty. Some participants said that they would like to give feedback and comments to other people's writing if they thought they had some ideas to offer to improve other's writing or they were sure that certain grammars were wrong on the writing.

For instance, Sue expressed:

> When I first came to the United States, I was not confident in my own English writing. In the beginning if other people came to share their writing with me, I was hesitate to offer any feedback and suggestions. But gradually I found out that in order to give good suggestions, I need to think more and search for more information to prove my ideas and suggestions. As a result, I often ended up learning more and clarifying more about my misconceptions. Right now I liked to offer other people feedback to their writing. By offering suggestions, I learned more and improved me. (Sue, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 2)

Sharing writing with other ELLs (M=2.29; SD=1.00) was ranked as the sixth least writing concern. Participants indicated that after they finish their English essays, they not only asked native speakers to check their grammar or logic but also asked other ELLs to suggest ideas to broaden their perspectives. Students felt comfortable with sharing their

essays with other ELLs because other ELLs might understand more about their ideas and could help them to expand those ideas. Andy wrote:

> When native English speakers didn't understand what I was trying to say in my essays, I often liked to share those sentences with other ELL. Especially if those ELLs had the same first language and culture like me, they usually could understand more about what I was trying to say and help me rephrase my meaning to make my English readers understand my ideas. Sometimes my ideas were very pretty narrow and limited because I did not have enough vocabulary to express my complicated ideas. Other ELLs often understood my limitation and they often could help me to expand my ideas and express my ideas fully. (Andy, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 2)

Both using computer technology in my writing class (M=2.46; SD=1.29) and writing assignments boring and meaningless (M=2.46; SD=1.36) were ranked seventh among least difficulty writing issues. Several participants expressed that they were used to use computer technology (such as e-mail, online discussion, or internet) in their daily living; therefore, they also liked to use computer technology in their writing class. One participant shared:

> I used e-mail or online chatting to talk with my friends all the time. I also liked to use internet to search for information. I had no problem of using computer technology in my writing class but I had much problem of using paper and pencil for my writing class. (Sam, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 2)

In terms of writing assignments boring and meaningless, a few participants indicated that since they came to the U.S. to study, their teachers have given them choices in writing their assignments; therefore, they felt they could often choose writing topics that are more interesting and meaningful for them. For example, Nancy said the following:

> When I was in my country, my English writing teachers always just assigned us one topic to write. There were no choices for us to write. Most of the writing assignments were related to writing tests. Many of the writing assignments and topics were boring. However, since I came to the United States to study, my

> writing teachers have offered us choices for our writing topics. I often picked up topics that were interesting and meaningful to me so that I didn't feel writing assignments here are boring or meaningless. (Cathy, Self-Perception of Writing Difficulties Questionnaire, Open-Ended Question 3)

Linguistic, Psychological, and Sociocultural Aspects of Writing

The mean for linguistic, psychological, and sociocultural aspects of writing was measured by the average score for the total 24 participants on items categorized in each of these specific aspects of writing. The standard deviation was defined as the measure of the dispersion of the scores from mean for the total 24 participants on items categorized in each of these specific aspects of writing. Further analysis of the data collected from the questionnaires showed that ELLs had the most writing difficulty in cognitive/linguistic aspects (M=3.91; SD=.53) of writing (see Table 6). The psychological/emotional dimension (M=2.78; SD= 1.20) of writing was the second ranked writing difficulty category (see Table 7), followed by the sociocutural aspect (M=2.58; SD=1.00) of writing (see Table 8).

Table 6

Cognitive/Linguistic Dimension of Writing Difficulties (Pretest) from Most to Least Difficult

Survey Item	M	SD
11. I have difficulty with word choice (such as choosing "quarrel" or "debate").	5	.98
29. When I write in English, I stop many times to think about what to write.	4.79	.88
13. I use few idioms (such as "Butterflies in my stomach" or " Hit the road").	4.50	1.69
36. I am a skillful English writer.	4.25	1.32
14. I have difficulty spelling correctly.	4.21	1.48

23. I have difficulty writing a thesis statement.	4.21	1.18
26. I have difficulty summarizing my larger argument into a conclusion.	4.17	1.13
8. I have difficulty using prepositions (such as “on,” “in,” “at”).	4.08	1.10
6. I have difficulty writing closing sentences for my paragraphs.	4.04	1.16
15. I have difficulty generating ideas for writing	4.04	1.08
27. When writing an English essay, I have trouble writing an introduction, some paragraphs to make my points, and a conclusion.	4.04	1.08
17. I am aware of what sentence fragments are, but I still use them.	4.00	1.14
2. It is easy for me to get started writing an English essay.	3.92	1.28
22. I feel that I have trouble writing logically and systematically in English.	3.92	1.25
33. I don’t have enough time to finish my English writing exams or assignments in a limited time period.	3.92	1.18
24. I have trouble focusing ideas (arguments) that are related to the points that I am trying to make.	3.92	1.10
3. It is easy for me to keep my English writing going and write smoothly.	3.92	1.02
4. I write short and simple English sentences.	3.88	1.30
25. I have difficulty organizing ideas.	3.88	1.40
20. I know what run-on sentences are, and I don’t use them.	3.83	1.44
21. I find it difficult to go from one paragraph to another with smooth, well-connected transitions.	3.79	1.22
5. It is easy for me to write my ideas into English paragraphs.	3.79	1.02
18. I am aware of what sentence fragments are, and I don’t use them.	3.58	1.35
28. Sometimes I start writing something, then in the end I write something else.	3.54	1.22
7. I have difficulty using articles.	3.50	1.45
19. I know what run-on sentences are, but I still use them.	3.38	1.61
12. I have difficulty using punctuation.	3.33	1.34

10. I have difficulty with word order in English sentences.	3.21	1.29
9. I have difficulty using verb tenses within a paragraph.	3.04	1.12
Overall Cognitive/Linguistic M and SD	3.91	.53

Table 7

Psychological/Emotional Dimension of Writing Difficulty (Pretest) From Most to least Difficulty

Survey Item	M	SD
30. I have anxiety about writing in English.	4.58	1.18
32. I have confidence in English writing.	3.71	1.49
34. I feel comfortable revising my writing in English.	3.33	1.31
1. I like to write English essays.	2.79	1.59
41. I feel my writing assignments are interesting and meaningful.	2.46	1.35
35. I like to use computer technology (such as e-mail, online discussion or internet) in my writing class.	2.46	1.26
31. I am confident in my writing in my native language writing (such as Chinese, Korean, or Arabic).	1.63	1.01
42. I am motivated to learn English writing in the future.	1.29	.46
Overall Psychological/Emotional M and SD	2.78	1.20

Table 8

Socio-cultural Dimension of Writing Difficulty (Pretest) From Most to Least Difficulty

Survey Item	M	SD
16. I have difficulty adjusting my way of writing in my native language writing to American thought patterns.	4.96	1.08

37. I feel comfortable with sharing my English writing with other ELL students.	2.29	1.00
40. I like to give feedback and suggestions to other people's English writing.	2.04	1.08
39. I feel comfortable with sharing my English writing with native English speakers.	1.92	1.06
38. I like to share my English writing with my English teachers.	1.67	.76
Overall Socio-cultural M and SD	2.58	1.00

Summary

Over all, the 14 highest ranked writing difficulties items fell within all three dimensions. The linguistic/cognitive dimension of writing difficulties included word choice, stopping many times to think, idioms, writing skills, thesis statements, organization, spelling, conclusion, paragraph development, preposition, and sentence structure. The psychological/emotional dimension of writing difficulties consisted of anxiety, and adjusting to American thought patterns represented the sociocultural dimension of writing difficulties. Consistent with what is reported in the literature, participating students saw their worst writing difficulties in linguistic/cognitive deficiencies, second most challenging in psychological/emotional deficiencies, and the third least difficult in the sociocultural dimension.

Some of the difficulties could overlap across dimensions. For example, word choice and idioms were seen as linguistic/cognitive writing difficulties, but selecting appropriate words and idioms that best expressed the meaning intended in a written context went beyond linguistic/cognitive difficulties to include cultural dimensions of knowledge. Thesis statements, organization, and paragraph development were in the linguistic/cognitive dimension of writing, but following an American linear writing style

that required a thesis, supporting paragraphs, and a conclusion also included culturally engendered rhetorical issues. Besides the linguistic/cognitive dimension of writing difficulties, these rhetorical writing difficulties seemed to have their origin in cultural and traditional differences.

Results for Research Question 2: Do ELLs in the treatment group score significantly differently from ELL students in the control group on a self-perception of writing difficulties survey following six weeks of computer mediated communication technology intervention?

The self-perception of writing difficulties questionnaire was administered as a pre- and posttest to determine whether the online writing (treatment) group decreased their perceptions of writing difficulties. The questionnaire was designed to measure three dimensions of writing difficulty, psychological/emotional, sociocultural, and cognitive/linguistic. The mean was measured by the average score for each group (13 participants in the online collaborative group and 11 participants in the control group) in all (41) items in the questionnaire. The standard deviation was defined as the measure of the dispersion of the scores from the mean in each group in all items in the questionnaire. The means and standard deviations for the pre- and post-test administration of the self-perception of writing difficulties for the two groups are presented in Table 9. Results of the independent sample t-test ($t=.02$, $p=.99$) confirm that initially students in the two groups did not differ statistically on their pre-test self-perceptions of writing difficulties.

Table 9

Group Means and Standard Deviations of the Pretest and Posttest Self-Perception of Writing Difficulties for Online Writing Group and Control Group

Treatment	Pretest M (SD)	Posttest M(SD)
Online Writing	3.54 (.30)	2.86 (.44)
Control	3.54 (.59)	3.47 (.68)

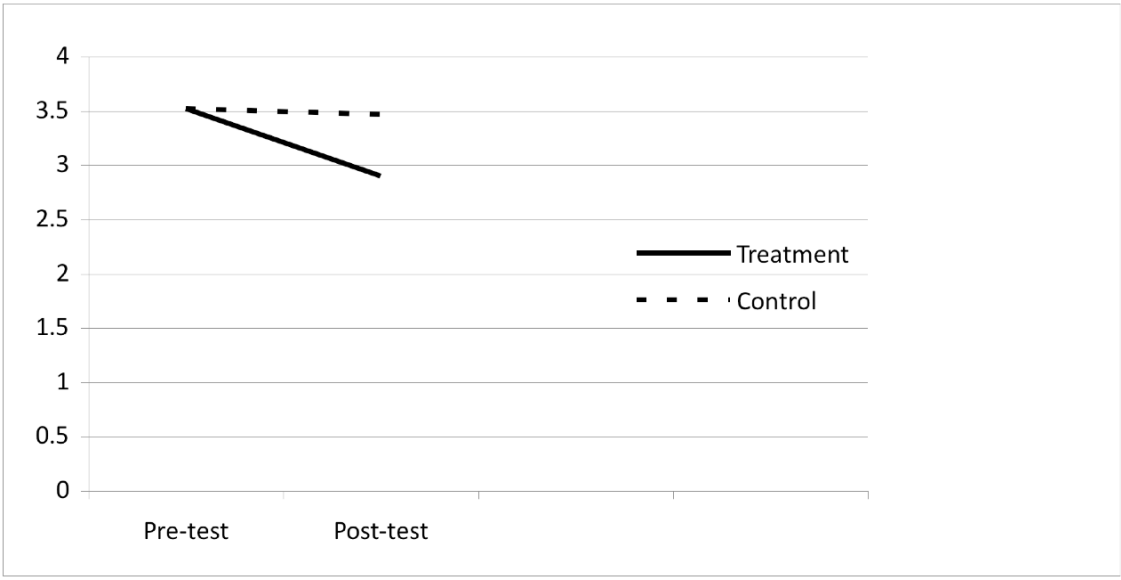
To determine if the online writing (treatment) group scored significantly different from the control group on their perception of writing difficulties following six weeks of online writing intervention, a 2 (group) X 2 (time) repeated-measures analysis of variance was performed to determine whether there was a main effect for group, a main effect for time, or a group by time interaction for self-perceptions of writing difficulties. For this analysis the independent variable was treatment (the presence or absence of CMC technology) and the dependent variable was the total score on the self-perceptions of writing difficulties questionnaire administered at two points in time (pre-test and post-test). An alpha level of .05 was set to determine statistically significant differences. Partial Eta Squares is being included because the percentage of variance explained gives an index of the magnitude of the effect found.

When examining the time effect from pretest to posttest changes for both the treatment group and the control group, the tests of within-subjects effects indicated a significant main effect for treatment over time, F (1, 23) =17.42, P=.00 (< .05), Partial Eta Square=.43. This suggests that both the treatment group and the control group had lower means on the posttest of self-perceptions of writing difficulties than on the pretest. The treatment group had significantly lower means on the posttest of the self-perception of writing difficulties than on the pretest (from the pretest M=3.54 to the posttest M=2.86; percentage decrease= 19% from pretest to posttest). However, the control group had no significant lower means on the posttest than on the pretest (from the pretest M=3.54 to posttest M=3.47; percentage decrease=2%).

The effect of time and treatment test revealed a significant interaction across time, F (1, 23) =17.42, P= .00 (< .05), Partial Eta Square=.98. The interaction is graphed in Figure 1. Changes in means on the self-perceptions of writing difficulties survey were significantly different between the CMC (treatment) group and the control group on the posttest with the CMC group scoring significantly lower than the control group. To further explore the effect of time and treatment, the test of between-subjects effects revealed significant interaction across time, F (1, 23) = 1113.32, P=.00(< .05). The results suggested a strong relationship between treatment and the post-test self-perceptions of writing difficulties. In other words, ELLs in the treatment group score significantly lower than ELLs in the control group on a self-perception of writing difficulties survey following six weeks of CMC technology intervention. Overall, ELLs in the treatment group perceive writing less difficult.

Figure1.

Interaction of time and treatment for self-perception of writing difficulties.



A univariate analysis of the comparison of means and standard deviations (found in Table 9) supports apparent decreases in participants' perceptions of writing difficulties across treatment (M=2.86; SD=.44) and control (M==3.47; SD=.68) groups from pre-test to post-test measures. Compared to the participants' pre-test and post-test self-perception of writing difficulties, all participants' self-perception of writing difficulties in the online writing group (group score M=2.86 ; group reduced score M=.68; percentage change captured by reduction between pretest and posttest =-19%) and control group (group score M= 3.47; group reduced score M=.07; percent change captured by reduction between pretest and posttest=-2%) have been reduced on the post-test, but the online writing group has been reduced the most (group reduced score M=.68; percentage changes between pretest and posttest=-19%) . To further support the effect for the online writing treatment, the percentage reduction from pre-test to post-test is substantially larger for the online writing group compared to the control group's percentage change.

Additional analyses were performed to examine the effect size on the differences between means for the online writing (CMC) treatment and control group from pretest and posttest to provide further support for the effect of the online writing treatment on student perception of writing difficulties. The effect size of the online writing group between pretest and posttest was very large (Cohen's d = 2.27 > .8; Cohen's d larger than .8 suggests large effect); however, the effect size of the control group was small (Cohen's d = .1; Cohen's d smaller than .2 suggests small effect). Because there was a small sample size in this study, the analyses of effect size verified that online writing (CMC) is very effective and meaningful in reducing self-perceptions about students' writing difficulties.

Differences among Linguistic, Psychological, and Sociocultural Writing

As an extension of the second research question, the impact of treatment on perceived writing difficulties across three dimensions was explored. The three dimensions include the linguistic, psychological, and sociocultural writing difficulties. To further examine writing difficulties on the linguistic, psychological, and sociocultural dimensions of writing difficulties, items on the Self-Perception of Writing Difficulties questionnaire were categorized as representing one of these three dimensions. Means and standard deviations were computed for treatment or control group on each dimension at pre- and post-testing. These means and standard deviations are reported in Table 10.

Independent sample t-tests were conducted to determine whether there was a significant difference in participant's self-perception of writing difficulties in the treatment group as compared to the control group on the pretest on each of the three dimensions. There were no significant differences between the two groups on any of the

three dimensions at the pre-testing (linguistic t= .33, P= .74; psychological t=-.45, P= .66; sociocultural t=-.60, P= .55).

Table 10

Comparison of Means and Standard Deviations across 3-dimensions of writing Difficulties Self-Perception on pre-test and post-test measures

Treatment	Pretest			Posttest		
	M			M		
	(SD)			(SD)		
	Linguist	Psycho	Sociocult	Linguist	Psycho	Sociocultural
Online	3.94	3.14	2.51	3.15	2.62	1.98
	(.31)	(.49)	(.47)	(.50)	(.63)	(.47)
Control	3.86	3.23	2.65	3.64	3.23	3.22
	(.75)	(.45)	(.72)	(.89)	(.58)	(.68)

A 2 (group) X2 (time) repeated measures MANOVA was conducted to compare the perceptions of the treatment and control groups on the three dimension of the Self-Perception of Writing Difficulties survey at pretest and posttest. Scores yielded from the linguistic, psychological, and sociocultural items on the survey were used for this analysis. In terms of the interaction of time and treatment, the multivariate analysis indicated that the psychological (F=5.93, P=.03), and sociocultural (F=27.13, P=.00) dimensions of writing difficulties were significant difference between the treatment and the control group. This result suggests that the changes in means on the sociocultural dimension and psychological/emotional dimension of self-perceptions of writing

difficulties across time (testing intervals) were significantly different between the treatment group and the control group (see Figures 2 and 3).

Figure 2.

From Pretest to Posttest for Sociocultural Dimension of Writing Difficulties between the Treatment and the Control Group

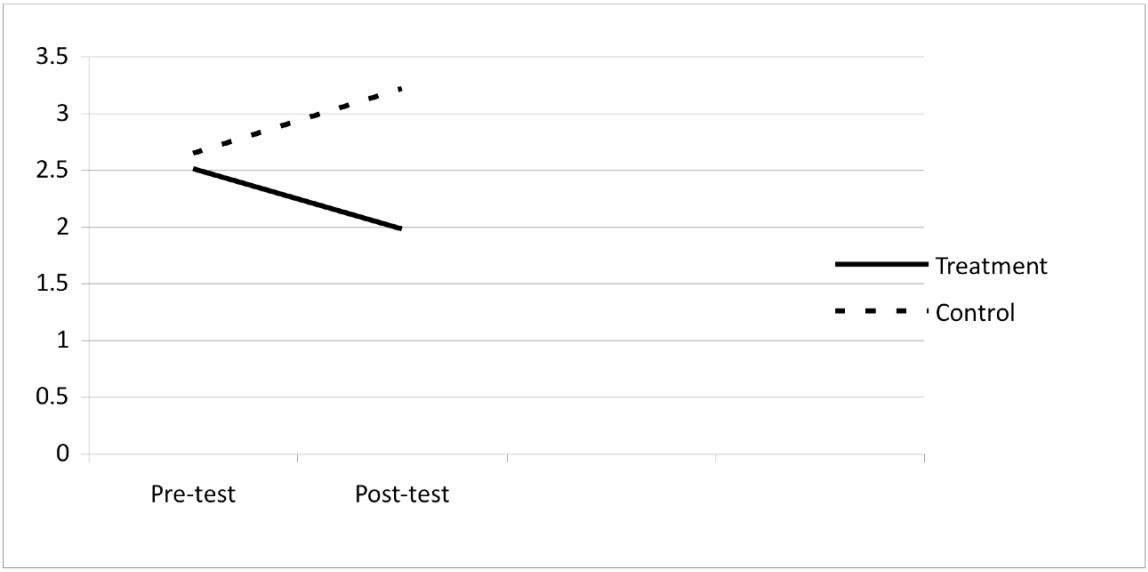
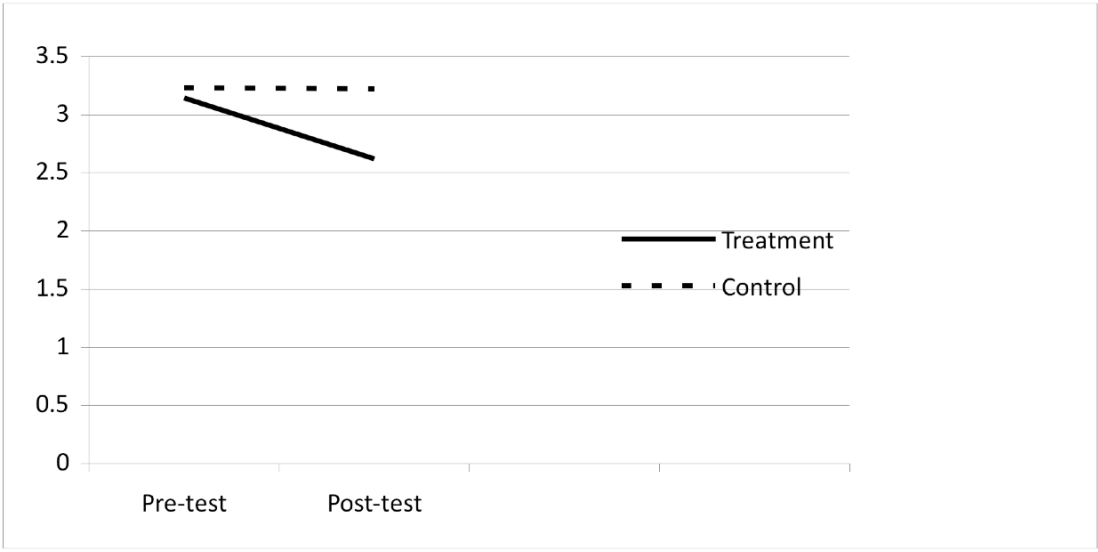


Figure 3.

From Pre-Test to Post-Test for Psychological Dimension of Writing Difficulties between the Treatment and the Control Group



Further analysis of the changes in means across time (pre-test and post-test scores) and percent change of self-perception of psychological, sociocultural, and linguistic dimension of writing difficulties for the online writing group and the control group (see Table 11) shows that the online writing group decreased writing difficulties 21% in the sociocultural dimension, 17% in the psychological/emotional dimension, and 18% in the cognitive/linguistic dimension between the pre-test and post-test. In comparison the control group decreases were 6% in cognitive/linguistic and .3% in psychological/emotional dimensions. Interestingly the control group did not decrease but increased 21% in the sociocultural dimension of writing difficulties. In other words, participants in the control group reported experiencing 21% more sociocultural writing difficulties at posttesting.

Additional analyses were performed to examine the size of effects on the differences among means on the three dimensions (sociocultural, psychological/emotional, and cognitive/linguistic) of writing difficulties regarding online writing (CMC) treatment and control groups between pretest and posttest. The results indicated that the online writing group had a large effect size in the sociocultural dimension (Cohen's d = 2.14 > .8; Cohen's d larger than .8 suggests large effect) and psychological/emotional dimension (Cohen's d = 1.00 > .8; Cohen's d larger than .8 suggests large effect) of writing difficulties between pretest and posttest); however, the effect size of the cognitive/linguistic dimension (Cohen's d = .7 > .5; Cohen's d larger than .5 suggests medium effect) was medium. An effect size analysis was performed due to small sample size. The analyses of effect size suggested that online writing (CMC) is effective for the differences among means in sociocultural and psychological/emotional dimension of writing difficulties between he pretest and the posttest.

Table 11

Pre-test and Post-test Mean Scores and Percentages Changes of Self-Perception of Psychological, Sociocultural, and Linguistic Dimension of Writing Difficulties for the Online Writing Group and Control Group

	Online writing Group		Control Group	
Dimension	M (SD)	Percent Changes	M(SD)	Percent Changes
Psycho/Emotional				
Pretest	3.14(.49)		3.23(.45)	
Posttest	2.62(.63)	-17%	3.22(.58)	- .3%

Sociocultural				
Pretest	2.51(.47)		2.65(.72)	
Posttest	1.98(.47)	-21%	3.21(.68)	21%
Cog/Linguistic				
Pretest	3.84(.31)		3.86(.75)	
Posttest	3.14(.50)	-18%	3.63(.89)	- 6%

Mean Differences between Groups

As an extension of the second research question, difference on specific item between the treatment and the control groups was explored to support the impact of the treatment on perceived writing difficulties. Mean differences larger than 1 were captured. A larger than one difference would presumably indicate about 17 percent (in six-point Likert-scale) differences in perceiving difficulties in writing. Compared to the mean differences between the treatment group and the control group post-test (see Table 12), the treatment group had much less self-perception of writing difficulties in sharing writing with ELL (mean differences= -2.27), sharing writing with native speakers (mean differences= -1.80), confidence (mean differences= -1.38), giving feedback (mean differences= -1.31), writing logically (mean differences= -1.19), not having enough time (mean differences= -1.19), not liking to write (mean differences= -1.19), anxiety (mean differences= -1.14), run-on sentences (mean differences= -1.13), sentence fragments (mean differences= -1.09), and spelling (mean differences= -1.06).

Table 12

Mean Differences between Online and Control Group performed at the Post-test

Pretest Whole Group Rank	Survey Item	Posttest Control Group Rank (M)	Posttest Treatment Group Rank (M)	Mean Difference between Treatment And Control Group
1	11.Word choice	2 (4.45)	1 (4.62)	.17
2	16.American thought pattern	9 (4.00)	3 (4.15)	.15
3	29.Stop to think	1 (4.55)	4 (4.08)	-.47
4	30. Anxiety	2 (4.45)	13 (3.31)	-1.14
5	13. Idioms	14 (3.73)	2 (4.38)	.65
6	36. Skillful writer	5 (4.09)	5 (3.85)	-.24
7	14. Spelling	11 (3.91)	22 (2.85)	-1.06
7	23. Thesis statement	5 (4.09)	11 (3.38)	-.71
9	26. Conclusion	5 (4.09)	9 (4.46)	.37
10	8. Prepositions	21 (3.64)	13 (3.31)	-.33
11	6. Closing sentences	12 (3.82)	7 (3.54)	-.28
11	15. Generating ideas	32 (3.09)	20 (2.92)	-.17
11	27. Organization	23 (3.55)	20 (2.92)	-.63
14	17. Writing sentence fragments	5 (4.09)	18 (3.00)	-1.09
15	2. Starting to write	30 (3.18)	15 (3.23)	.05
15	22. Writing systematically	23 (3.55)	11 (3.38)	-.17

15	33. Not enough time	4 (4.27)	17 (3.08)	-1.19
15	24. Focusing ideas	14 (3.73)	22 (2.85)	.80
15	3. Writing fluently	36 (2.82)	15 (3.23)	.41
20	4. Writing short essays	21 (3.64)	6 (3.62)	-.02
20	25. Organizing ideas	26 (3.36)	32 (2.47)	-.89
22	20. Aware of run-on sentences	12 (3.82)	26 (2.69)	-1.13
23	21. Transition	26 (3.63)	22 (2.85)	-.78
23	5. Writing a paragraph	25 (3.45)	7 (3.54)	.09
25	32. Confidence	9 (4.00)	30 (2.62)	-1.38
26	18. Aware of sentence fragments	14 (3.73)	32 (2.46)	-1.27
27	28. Writing logically	14 (3.73)	31 (2.54)	-1.19
28	7. Articles	14 (3.73)	9 (3.46)	-.27
29	19. writing run-on sentences	14 (3.73)	26 (2.69)	-1.04
30	12. Punctuation	36 (2.81)	25 (2.77)	-.04
30	34. Revising	28 (3.27)	18 (3.00)	-.27
32	10. Word order	39 (2.36)	26 (2.69)	.33
33	9. Verb tenses	34 (2.91)	34 (2.23)	-.68
34	1. Like to write	28 (3.27)	35 (2.08)	-1.19
35	41.Writing is interesting	34 (2.91)	26 (2.69)	-.22
36	35. Computer technology	41 (2.09)	38 (1.46)	-.63
37	37.Share/ ELL students	14 (3.73)	38 (1.46)	-2.27
38	40.Give feedback	32 (3.00)	36 (1.69)	-1.31
39	39.Share/ native speakers	30 (3.18)	40 (1.38)	-1.80

40	38.Share/teachers	40 (2.18)	42 (1.23)	-.95
41	31. Confidence in 1st language writing	38 (2.55)	37 (1.62)	-.93
42	42. Motivation	42 (1.82)	41 (1.31)	.51

The above findings from the questionnaire data (regarding less difficulties with anxiety, confidence, spelling, sharing writing with ELLs and native speakers, and giving feedback) were also supported by the data from interviews and reflection journals. Online writing students felt they had less anxiety about English writing, and they became more confident in their writing. For example, Mark stated in his interview that he felt writing was like talking to friends, and he was not worried too much about grammar and sentence structure. He focused more on communicating meaning and ideas with online peers. Several online writing students indicated that they liked to share their writings with other online ELLs and give feedback to others. Grace stated in her interview that, through reading other ELLs' posted writings, she found out that other ELLs also made writing mistakes. Therefore, she was not afraid to expose her writing errors and weakness to other people. She realized that people all made writing mistakes in different areas. The more she wrote in English, the more she could make mistakes. Many times she made unconscious/unintentional errors, but maybe her weakness was another person's strength and her strength was another's weakness. By receiving and giving comments or feedback, ELLs helped each other correct, improve, and enrich their English writing. All participants in the treatment group stated in their interview that they liked to share their English writing with native speakers because online native speaking tutors can help them with American writing conventions, word choice, organization, and sentence structure.

Fourth, all treatment group students indicated in their reflection journals that writing software, Microsoft Word, and online searches helped their English spelling.

Summary

The comparisons made in regard to the students' posttest (administered after six weeks of CMC intervention) responses on the self-perception of writing difficulties between treatment and control groups suggested that the treatment group scored significantly lower on the self-perception of writing difficulties posttest than the control group. When looking at linguistic, psychological, and sociocultural dimensions of writing difficulties, the data analysis revealed that the treatment group scored significantly lower on psychological and sociocultural dimensions of writing difficulties than the control group at posttesting.

Results for Research Question 3: Does the online collaborative writing group score significantly higher on a writing performance posttest than the control group?

The writing samples produced at the pretest and posttest were used to examine whether the online collaborative writing groups score significantly higher on a writing performance posttest than the control group. The *TOEFL* independent writing rubrics were used to rate students' pretest and posttest writing samples. A 2(group) X 2 (time) repeated measures ANOVA was conducted to compare the writing performance (scores) of the treatment and the control group at pretest and posttest. Means and standard deviations for the pre- and post-test administration of writing performance measure, and percent gain from pre to posttest for the two groups are presented in Table 13. Results of an independent sample t-test revealed that there were no significant differences between the two groups on the pretest for writing scores (t=-.37, P= .72).

Table 13

Means, Standard Deviations, and Percent Gain of the Pre-Test and Post-test Writing Scores for the Online Writing and Control Group

Treatment	M (SD)	Percent Gains
Online Writing		
Pretest	2.65 (1.13)	51%
Posttest	4.00 (.41)	
Control		
Pretest	2.82 (1.06)	24%
Posttest	3.50 (.87)	

Notes M refers to Mean. SD refers to Standard Deviations.

The 2 X 2 repeated-measures ANOVA tested whether there was a main effect for treatment group, a main effect for time, or group by time interaction for writing performance. The between subjects variable was group, the online writing group or the control group; the within subjects variable was time (pre-test and post-test); and the dependent variable was the writing scores (performance) administered at the two points in time (pre-test and post-test). An alpha level of .05 was set to determine statistically significant differences. Partial Eta Squared was reported because the percentage of variance explained gave an index of the magnitude of the effect found.

Effect of Time

When examining the time effect from pretest to posttest changes for both the online writing group and the control group, the tests of within-subjects effects indicated a

significant main effect for treatment over time, F (1, 22) =37.62, P=.00 (< .01), Partial Eta Square= .63 (See Table 14). This suggests that both the treatment group and the control group had significantly higher means on the posttest of writing scores (performance) than on the pretest.

Table 14

Results of the ANOVA with Repeated Measures of Writing Scores

Dependent variable	F-value	df	MS	2-Tai Sig	Partial Eta Squared
Group	.26	1	.34	.62	.01
Time	37.62	1	12.25	.00	.63
Time by group	4.04	1	1.32	.06	.16

Note. MS refers to Mean Square.

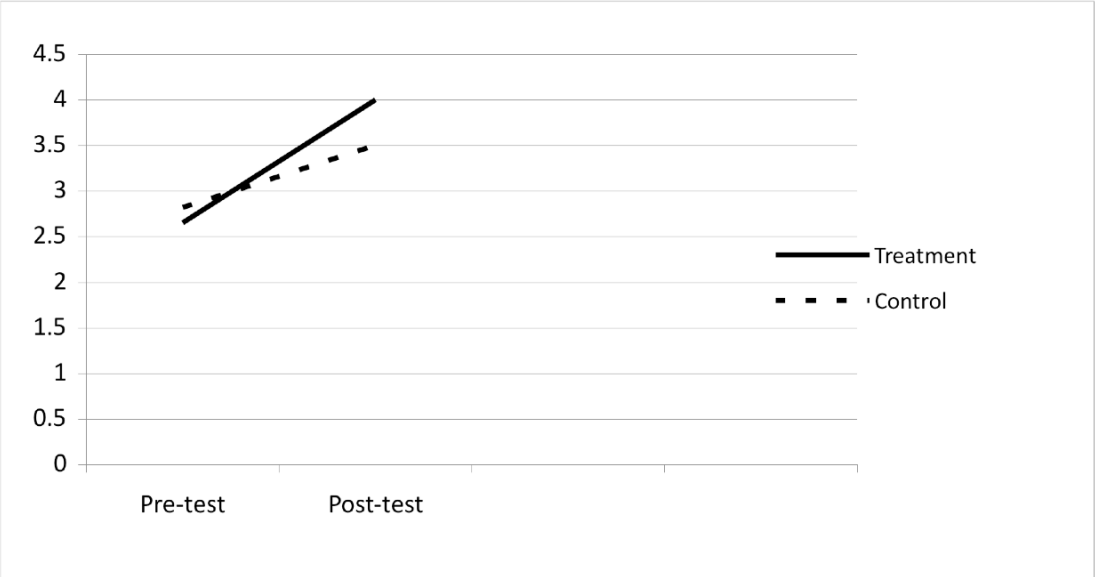
Effect of Time and Treatment

When statistical evaluations were conducted to explore the effect of time and treatment, the tests of between-subjects effects revealed no significant interaction across time, F (1, 22) =4.04, P= .06 (> .05), Partial Eta Square= .16 (see Table 14). Changes in means of the writing performance were not significantly different between the online writing (treatment) group and the control group with a p value set at .05 suggesting that the online collaborative writing group did not score significantly higher on a writing post performance posttest than the control group. However, considering a small sample size (13 participating in the treatment group and 11 participating in the control group) and length of the treatment (6 weeks), and a computed p value of .06; the results do approach significance. The interaction is graphed in Figure 5. In other words, a p value of .06 suggested that in 94% of the cases the outcome was the result of the treatment. That

along with the percent gain (discussed in the following paragraph) makes a strong case for the validity of the treatment effects.

Figure 4.

Interaction of Time and Treatment for Writing Performance Percent Gains for Online Writing Group vs. Control Group



Percent gains for the online writing group writing samples were evaluated using the pretest and posttest means (see Table 11). Both groups showed overall gains in the scores of their writing samples. The online writing group showed an increase of 51% between the pretest (M=2.65, SD=1.13) and posttest (M=4.00, SD=.41), while the control group showed an increase of 24% between the pretest (M=2.82, SD=1.06) and posttest (3.5, SD=.87). Although both groups increased their writing performance between pretest and posttest, the percent gains exhibited by the online writing group were more than twice the control group.

Summary

A comparison was made between the writing performance of the online writing group and the control group. With a p-value set at .05, the online writing did not score significantly higher on a writing performance posttest than the control group, however, the difference between the two groups approached significance with a computed p-value of .06. Furthermore, when examining the mean scores and the percent gains, the online writing (treatment) group clearly made larger gains between the pretest and the posttest writing performance (see Table 11). The increases in writing performance by the online writing group were more than twice the amount of the control group.

Results of Research Question 4: How does CMC technology Affect ELLs' Writing Performance?

The pretest and post writing samples of the 13 participants from the CMC group were used to examine how CMC Technology affects students' writing performance. The *TOEFL* independent writing rubrics were used to rate students' pretest and posttest writing samples. As reported in the results for Question 3, students earned higher mean writing scores on the posttest (M=4.00; SD=.41) than on the pretest (M=2.65; SD=1.13); there was a 51% increase in writing scores from the pretest to the posttest. Overall, on the post-test, on-line writing group students demonstrated that their essay writing performance improved. A distribution of the scores on the pretest and posttest writing samples is presented in Table 15. This distribution illustrates the shift in scores on the ratings from pre to posttest.

Table 15

Distribution of Scores on the Pretest and Posttest Writing Samples

	Percent of Writing Samples Rated	
Rating	Pretest	Posttest
1	22%	0%
2	8%	0%
2.5	8%	0%
3	38%	0%
3.5	8%	22%
4	8%	62%
4.5	8%	8%
5	0%	8%

Comparing the mean writing scores based on the writing rubrics scoring standards from pretest to posttest students' posttest writing samples showed improvement on ideas (from addressing the topic and task somewhat limitedly to addressing the topic well);organization (from inadequate organization to well organized); multiple perspectives (from using insufficient to sufficient exemplifications, explanations, or details). Moreover, comparing the comments made by raters regarding students' writing weaknesses and strengths from pretest to post writing samples in the treatment group, the comments revealed that students made progress in ideas (84% of the participants), organization (100% of the participants), multiple perspective (92% of the participants), sufficient arguments (92% of the participants), thesis statement (100% of the

participants), spelling (100% of the participants), and quantity of writing (100% of the participants). Students wrote more, with an increase of 82% in the average number of words written between pretest and posttest). However, according to raters' comments, students still had weaknesses on word choice (100 % of the participants) and grammar (articles and run-on sentences). There were 92% of the participants still having problems on articles and 78 % of participants having difficulties on run-on sentences.

According to the interview data and the reflection journal entries, the majority of online writing participants expressed that they improved their ideas, reasons, and content in writing by reading from other ELLs' posted writings on the same writing topics, and from comments and feedback on the Nicenet discussion forum. ELL students had similar cultural experiences and could understand better their positions and meaning. In contrast, several online discussion students indicated that they learned their organization, word choice, transitional words, logic (coherence), and grammar from reading comments and suggestions from online native speaking tutors, because those writing difficulties are related to American writing conventions. Overall, they thought that they improved their organization because organization was easy to imitate and follow. However, they believed word choice, articles, and run-on sentences would take more time to improve. They still had difficulty choosing the appropriate words to use in a sentence. Switching their first language rhetorical patterns to English rhetorical patterns was difficult. Using articles correctly and detecting run-on sentence still posed problems for the students. For example, Larry indicated:

> When I write, I always write what I think. Many times my reasons, ideas, or examples are very subjective and limited. After reading other ELLs' online writings, I often come out more ideas about how to support my own position and think of more reasons and examples. Besides, some ELLs in the Nicenet forum

> may point out my weak reasons or ideas and offer me suggestions on how to revise to have more multiple perspectives and ideas. I think other ELLs understand more about my meaning and have more cultural understanding of my writing. Then, I also get many comments from online native speaking tutors about how to revise my organization, word choices, transitional words, logics, and grammar. I think this kind of online discussion with native tutors is very helpful because organization, word choices, or logics are more related to American writing convention and cultures. It will take time to learn these writing skills. I often make these mistakes without awareness and these kinds of mistakes are hard for me to do self-editing anyway. Online native speaking tutors' feedbacks can help me correct these mistakes and improve my writing. (Larry, Interview question 3)

All CMC group students indicated in their reflection journals that writing software, Microsoft Word, and online searches helped their English spelling.

In summary, there was an improved level of writing performance between pretest and posttest writing samples. CMC technology had positive effects on ELL students' quantity of writing, organization, thesis statement, ideas, spelling, and use of multiple perspectives. However, CMC did not have much impact on student's word choice, articles, and run-on sentences.

Results for Research Question 5: How does CMC Technology Affect ELLs'

Writing Process

To answer this question, the quantity of participation in the Nicenet Forum database, formal interviews, and refection journal analysis were used to gather information. The data reported were triangulated across these three sources.

Quantity of Participation

With respect to the quantity of participation, writing increased for all 13 online writing participating students from Week 1 to Week 6. The average number of essays (first drafts and revisions) written by the 13 participants rose from 2 in Week 1 to 5 in

Week 6 (see Table 16); the average number of notes (topic discussions and conferences) created by the participants increased from 2 in Week 1 to 6 in Week 6; and the average number of participants commenting on, reflecting on, or giving feedback to other students' essay writing and notes (topic discussions and conferences) increased from 3 in Week 1 to 15 in Week 6. In general, the analysis of these data revealed a general trend during the six-week intervention towards greater participation.

Table 16 *Quantity of Participation of Online Writing Group at Beginning and End Week*

Week and Item	Average number of essays written per user	Average number of notes created per user	Average number of comments, reflection, and feedback per user
Week 1	2	2	3
Week 6	5	4	15

Formal Interviews

A purposeful sampling was utilized to select 9 students from the online writing group to participate in semi-structured interviews. Three students were selected from each of three participation levels: high participation (M=28), average participation (M=24), and low participation (M=10). The participation was defined as the number of student's entries (comments) to the Nicenet Forum. The mean was measured by the average entries (comments) made by the three students within each group (high, average, and low participation) per week. Interviews were conducted to explore in greater depth these students' experiences and perceptions about how CMC technology influenced their writing process (see Appendix C for Interview Questions).

Participants

The following is a description of each participant.

Mark, a 21-year-old male, was a high school graduate from South Arabia. Before he came to the U.S., he had never composed academic work in English. Mark had studied how to write English at CESL for ten months. Nevertheless, he considered himself a poor English writer and felt he had the greatest difficulty in spelling and word choice. When he had problems with writing, he usually looked up the words in a bilingual dictionary first. If he was still not sure, he would go to composition teachers for help. Gradually, he felt his English writing was improving since he was reading and writing with greater frequency. Mark had high participation in online writing.

Tom was a 22-year-old Chinese male from China. Before coming to the U.S., he earned a college degree in political science. He had learned English writing before coming to the U. S. and passing the *TOEFL* test. Tom had been in the U.S. for two months and had studied English composition in a summer session at CESL to prepare for his academic writing and teaching assistant's written test. Tom considered himself an average English writer but he still needed to learn to follow American convention and organization to write logically. When he had problems with writing, he usually asked composition teachers or went to the writing center for consulting and editing. He also used computer software (Dr. EYE) to help him understand the meaning of words and their usage. Overall, he still felt that it was hard to write in English because his background knowledge and experience in his first language (Chinese) still interfered with his second language (English) writing. Tom enjoyed sharing his writing and ideas with others and had high participation in the Nicenet discussion forum.

Garry was a 23-year-old Portuguese speaking male and a graduate of the university in Angola. He had been in the U.S. for 10 months at the time of the study. He wrote some English composition back home, but he felt that he still had a lot of problems in English writing including limited vocabulary, spelling, word choice, and thesis statements. Among those problems, he felt word choice was the most difficult. When he had problems with writing, he liked to ask composition teachers for advice or consult an online bilingual dictionary. Generally speaking, he considered himself a bad English writer because he was not used to writing in English to express his ideas and meaning. Garry was selected for interview because of his high participation in online writing and discussion.

Amy was a 20-year-old French-speaking woman from Cameroon with strong writing skills in English based on her writing assessment test at CECL. Amy was a high school graduate and intended to study economics in college. She had learned English composition for almost one year at CESL but she still felt that he had problems, including limited vocabulary, organization and anxiety in her English writing. When she encountered difficulties, she always asked her American roommate to solve the problems. In addition, she liked to use the English dictionary for word choice because she thought using the English dictionary might increase her vocabulary and help her understand more about word usage in sentences. She thought her English composition was gradually improving. Amy was motivated to learn how to use the computer to write because she had no formal training in computer and writing in her country and she wanted to improve her writing score on the *TOEFL* test. Amy was selected for the interview based on her average participation in the online discussion.

Kevin was a 27-year-old man from Thailand who spoke Thai, and had low writing skills based on his writing assessment test at CESL. Kevin earned a college degree from Thailand and planned to focus on religious studies in graduate school. He had studied at CESL for six months and had just started to take a beginning composition class. Kevin was eager to learn English writing because he knew he had to write many academic papers in his department. He thought his greatest writing problems were a limited vocabulary and grammar. When Kevin had problems, he liked to check with a textbook and bilingual dictionary for assistance. Moreover, he would take every opportunity and resource to improve his writing and he enjoyed using the computer to write. Kevin was selected for the interview based on his medium level of participation in the Nicenet Forum.

Larry was a 27-year-old male from Taiwan who spoke Chinese and had strong writing skills based on his writing assessment test at CECL. He graduated from graduate school in Taiwan and was studying in a Ph.D program in geology. Larry had taken several intensive English writing classes in Taiwan and already passed his *TOEFL* test. Larry had taken English composition at CESL for two months with the intention of improving his academic writing and passing his teaching assistants written test. Larry was interested in using the writing process approach (from brainstorming to publishing) to write and was motivated to use technology and computers to help his writing. Larry thought he wrote well but he still had difficulty with word choice. When he had problems with writing, he often searched for information from the internet or books for reference. Larry was chosen for interview based on his average participation in online discussion and writing.

Grace was a 41-year-old female from South Korea. She had average writing skills based on her writing assessment test at CECL. She had a B.A degree in education from Korea and had studied in a higher education graduate program for one semester. She was referred by her professor to enroll in a composition class at CESL to help improve her academic writing skills. Grace had no problems brainstorming ideas but she had great problems in putting the ideas into English sentence structures and American organization. Moreover, even though she finished writing sentences and paragraphs, she still faced difficulty in word choice. When she had problems with writing, she liked to ask her American friends for help or read more professional journals in her field to improve her organization and word choice skills. Grace had low participation in online discussion because she preferred face-to-face interactions and personal contact.

Simon was a 20-year-old male from Mexico with low writing ability. Simon was a high school graduate from Mexico and intended to attend college in the U.S. but he had not yet decided on a major. He had been in the U.S. for three months and had studied English composition at CESL for two months. Simon was motivated to learn English writing because he wanted to improve his essay writing scores on the *TOEFL* test. He thought he had problems with prepositions and word choice. When Simon had problems with writing, he usually consulted with English teachers or used a bilingual dictionary to help him write. He had limited experience using technology and computer for English writing prior to coming to the U.S. Simon was selected for interview because of his low participation in online discussion.

Faye was a 26-year-old Chinese-speaking woman from China with average writing skills. Faye had a computer science college degree from China and planned to

attend graduate school in the United States. Faye had taken English composition classes at CESL for six months to help her prepare to write the essay on the *TOEFL* test. Faye was good at writing scientific papers but she felt she still had difficulties in organization and word choice. When she had problems with her writing, she liked to consult with native English speakers; she sometimes sacrificed meaning to write simple sentences. Faye had a desire to learn to write well but sometimes she became frustrated at waiting too long for somebody's feedback and comments. Faye was selected for interview based on her low participation in the online discussion.

The interview questions (see Appendix C) were intended to get more in depth information about how CMC technology affected students' writing processes. Content analysis was used to examine responses on each question of the interview. The researcher coded the interview narrative by writing in the margin key words or phrases that related to the interview question being analyzed. These codes were grouped into categories and patterns to discern themes among ELL students' perceptions and experiences about how CMC affects their writing processes.

Results

The results presented reflect a classification of experiences or perceptions based on an analysis of the data collected from the participants' interviews. The experiences and perceptions of using CMC technology during the writing process were classified into four major categories: advantages of CMC, disadvantages of CMC, problem solving (writing) strategies, and pedagogy of integrating CMC into writing.

Advantages of CMC

Advantages of CMC comprised spelling and grammar check, reinforcing the writing process, becoming aware of patterns of writing errors, taking multiple perspectives, facilitating thinking skills, adapting to American writing conventions (organization, logic, coherence, format, and argumentative genre), and not being afraid of exposing writing weaknesses to others.

Spelling and Grammar Check. According to the interview data, all the participants stated that writing software, such as *Paragraph Punch* and *Essay Punch*, helped them check spelling and basic grammar errors and offer suggestions for correction. Information about spelling and grammar check were expressed in statements such as:

> *Paragraph Punch* can check spelling and grammar so that I can start to write very quickly as long as I have ideas and know the word's pronunciation. I don't need to worry too much about spelling and grammar. (Simon, Interview Question 2)

Reinforcing the Writing Process. Six participants indicated that the writing software and online publishing/writing helped them cultivate the habit of writing using a process that included brainstorming ideas, writing drafts, revising, editing, to publishing online, as well as revising their ideas in print. The following statements expressed this experience:

> *Essay Punch* guides me step by step for brainstorming two sides of arguments, next prompts me to write draft, revise, edit, eventually publishing. It is good to help me cultivate the habit of writing process. It takes a lot of time to write an essay but once you finish it, you feel a sense of accomplishment. (Larry, Interview Question 1)

> *Paragraph Punch*, *Essay Punch*, and online publishing help me realize writing is a recursive process. I can always go back to revise and edit my drafts. I can just start to write and write faster. I don't need to worry too much about grammar. (Grace, Interview Question 1)

Awareness of Patterns of Writing Errors. All nine student participants stated that the data recorded in the writing software and discussion forum (Nicenet) regarding the mistakes that they made on their writing helped them become aware of the patterns of their writing errors. This kind of writing error awareness actually helped them do self-evaluation of their writing problems and look for problem solving strategies for correcting their difficulties. For example, Mark, Kevin, and Larry expressed:

> Before I always thought that I had problems with word choice. But because of error record from *Essay Punch* and online feedback, I found out that I also have a lot of problem using articles. Making a decision on using 'a' or 'the' is like speaking English with an accent and I just don't have the right sense of making the right choice. Right now to avoid making mistakes on articles, I think I need to find native speakers to edit my drafts. (Mark, Interview question 1)

> In the beginning of the class, I thought that I had a tendency to write sentence fragments. However, from my online feedback data and writing software error record, I begin to be aware that in fact I make many mistakes on writing run-on sentences not sentence fragments. Now I think I need to know the rules of writing correct [compound] sentences and keep practice it until I can eliminate the problems. (Kevin, Interview Question 1)

> Online feedback helps me have awareness of my writing patterns and mistakes. If I only write by myself, I may never have awareness of these mistakes. For example, through other online peers' feedback and *Essay Punch* software, I come to realize that I have tendency to make mistakes in run-on sentences. Right now after I write and before I post my writing online, I also do self-check and self-evaluation to see if I make mistakes in run-on sentences or any place not logic. Then I post it online, if I still make mistakes, my peers will help me detect my errors. (Larry, Interview Question 1)

Multiple Perspectives. Six participants expressed that they received many ideas and multiple perspectives from reading other people's writings and feedback in the Nicenet Forum. Compared to writing alone, online writing and discussion gave them multiple perspectives on revising and improving their writings. For example, participants felt their writing was enriched by a variety of new ideas about how to support their arguments with reasons, evidence, and examples. Moreover, a variety of different online

feedback and suggestions offered different options for editing grammar, sentence structure, or word choice. This kind of peer feedback and commenting broadened participants' experiences and learning about grammatical rules and American writing conventions. Three participants reported:

> When I write, I only think of one side, whether I agree or disagree with an issue. I usually can only think one or two reasons and examples to support my position. Online peers' feedback can help me point out my weak reasons and examples and offer multiple ideas to support my arguments. Some of online peers even counter argue with my position. It helps me think things from the other side and have more comprehensive understanding and multiple perspective of an issue. (Amy, Interview Question 2)

> Many online peers and tutors give me different suggestions on how to reorganizing my essay, revise my sentence structure (such as run-on sentence, or wordiness), correct my grammar, or choose appropriate word. Therefore, I have multiple ideas/perspectives on how to edit, revise and improve my writing. (Larry, Interview Question 2)

> Every individual has different training backgrounds and life experience so that every one cares different things and has different ideas. The more people give me feedback, the more I can get different and multiple perspectives. I feel I know other ways of thinking and I broaden my perspectives. In other words, it can bring more minds and more ideas. (Mark, Interview Question 2)

Critical Thinking Skills. Seven participating students expressed positive experiences about threads. They stated that a thread of many feedback items received from every draft they posted online assisted them to facilitate critical thinking skills. In addition, many suggestions/comments received from discussion topics/concerns on the discussion entries helped them to enhance critical thinking skills. Participants usually had to read critically the feedback, comments, and suggestions, evaluate the feedback carefully; and then make a decision about which suggestions to incorporate and which ones to ignore. Likewise, when participants were giving feedback to other people's posted drafts and topics they also needed to think critically in order to give constructive

feedback to help their peers improve their writing quality (e.g., ideas or grammar) and to offer suggestions for writing problem solving strategies. By giving and receiving feedback online, participants were challenged to think more critically and deeply about how to make their writing more readable and acceptable to their peers. Tom's comment expresses this notion.

> When I get a plenty of feedback and suggestions, I think more deeply and critically about my arguments and ideas and choose those ideas matching mine. Sometimes I also do internet information search and check some research regarding my topic to help me think critically and make decisions. (Tom, Interview Question 2)

Lower and medium writing ability participants expressed that through online feedback they were often helped by their higher writing ability online peers to revise their ideas. Because the lower and medium ability writing participants shared similar experience with their higher ability ELL writing peers, the suggestions had greater potential to enrich the content of their writing. In addition, lower and medium ability writing participants accepted comments from online English speaking tutors to reorganize their essays or edit grammar on their writings because they thought English-speaking tutors knew American writing conventions better. However, higher writing ability participants complained that they gave more feedback or suggestions to their ELL online peers than what they received. These participants thought they received more feedback and in-depth suggestions from their English-speaking tutors. The following are some of their comments:

> Whenever I write my feedback to my online peers, I think more critically and write more carefully because I want to give constructive suggestions and make my suggestions are readable and justified. Also I don't want to hurt my peers' feeling so that I need to be cautious about my wording and word choice. But I feel a little bit disappointed that I didn't get enough feedback or suggestions from my

> ELL peers compared to what I give them. I often receive more feedback from online English speaking tutors. (Larry, Interview Question 6)

Adapting to American Writing Conventions. Eight participating students indicated that CMC technology helped them adapt to American writing conventions including organization, logics, coherence, genre, and word choice. They thought that writing software (*Essay Punch* and *Paragraph Punch*) helped them organize their meaning and ideas into American writing conventions, including organizing the whole essay from the introduction, writing a topic sentence for each paragraph, supporting ideas, and writing the conclusion. In addition, the writing software also prompted them to choose proper transitional words between sentences or paragraphs to make their writing more coherent. Moreover, to help students become familiar with genres, the writing software provided them with opportunities to practice writing different genres, including narrative, argumentative, expository; although in this class students practiced more on argumentative essay writing. They felt the writing software was good for beginning and medium ELL writers but not for higher writing proficiency students because the writing software was more like drill and practice and not flexible and creative enough to offer individual feedback for improving ideas or arguments. While the writing software was not always flexible, online feedback, ELL writing websites on the link-sharing feature through Nicenet, or internet information check helped students improve word choice, word order, logic, sentence structure, and wordiness. For example, through the online communication with other ELLs, the participants felt they improved their ideas and incorporated more varied perspectives into their writing because they thought other ELLs had more diverse cultural backgrounds and had more similar experience with writing struggles from their first language to second-language English writing. Through getting

feedback from online English speaking tutors or by linking to ELL writing websites or labs, participants stated that they improved in making correct word choices, reducing wordiness and repetitions, logic of expression, and grammar, and sentence structure. Several participants--shared their experiences:

> Writing software offered through link sharing on Nicenet Forum helps me get familiar with American conventions to organize my meaning in a logic way that American readers can understand. Following the prompt and procedure of writing software, I am changing my first language thinking patterns to adapt to American writing conventions, such as their organization, logic, format, and argumentative genre. (Tom, Interview Question 2)

> Online English speaking tutors' feedback and comments often helps me get rid of wordy words, correct word order, or choose appropriate words in my sentences. Sometimes online English speaking tutors also suggest me reorganize my sentences and add up transitional words among sentences to make my writings read logically and coherently. I think I still think in my first language and then translate my first language into English; therefore, I often make many mistakes on word order, word choice, and repetitive words in my English writing without consciousness. (Garry, Interview Question 2)

Reducing Anxiety and Increasing Self-Confidence. All nine participants said that they reduced anxiety and increased self-confidence in online writing and discussion. They felt that the Nicenet discussion forum provided them with authentic environment to write. When they wrote, they felt that they wrote to communicate and share their ideas with their audience. They were not worried too much about making mistakes and they were not afraid that other online people knew and found their mistakes. It is an online environment and they did not see people face-to-face; therefore, they did not worry about losing face if they made mistakes in writing. One participant expressed:

> Every time when I give feedback, I learn to be more careful about my wording in writing and know why I give these suggestions. It helps me think more critically about why these suggestions are better. Then my peers may have their own ideas and arguments. They counter-argue in Nicenet discussion Forum. To me, it's like exchanging ideas and negotiating differences. (Mark, Interview Question 6)

Once they reduced their anxiety, they had a better connection between thinking and writing. As soon as they saw their thinking in written words, it helped them to continue writing. Writing became more like speaking to somebody and they began writing more fluently and smoothly in their online writing and discussion.

Participants also feel more confident about their English writing. Before the intervention, most participating had low confidence in their English composition. After having online writing and discussion experience, they became more confidence in their English writing. They came to see that they not only were helped by online English speaking tutors but also were able to help other ELLs. They came to realize everyone was an expert in certain areas but novice in other areas. Nicenet was able to provide an online learning community where everybody could collaborate and help each other edit, revise, and improve English writing. Three participating students' Mark, Larry, and Grace, stated:

> I am not worried about exposing my writing weakness and mistakes to my online peers because at the moment my readers correct my errors or give me suggestions on enrich my ideas or content, I improve my writing. Right now since I am not worried much about my grammar or sentence structure, I can start to write right away. I feel I have better connection between thinking and writing. Online writing provides me with an authentic environment to write. To me, writing is like speaking and I am talking to somebody online. As soon as I have my ideas, I can just write them down just like I am speaking those ideas out. I write more fluently and smoothly. (Mark, Interview Question 4)

> In online writing and discussion, I began to have more self-confidence in my English composition because I see not only me but all ELLs make writing mistakes. Also, when I write by myself, I usually make errors without self-awareness. But when we read others' writings, I became more objective and I am able to see other people's mistakes. Once I am able to identify mistakes or have more ideas to support my online peers' position, I am willing to give feedback to them and help them correct their mistakes or enrich their ideas. I find out I am more confident in my English writing and I can also help other ELLs correct their writing mistakes and improve their writing. (Larry, Interview Question 4)

> Now I feel more comfortable and easier to write. I am not afraid of making mistakes and I think it is okay to make mistakes in writing because other ESL online peers also make mistakes. The more we write, the more we are going to make mistakes. Moreover, I am not worried that other online people know and find my mistakes. In fact, I like people to give me feedback about my mistakes or offer me suggestions to improve my ideas or content. It can always help me edit, revise, and improve my writing. (Grace, Interview Question 6)

Disadvantage of CMC

Disadvantages of CMC included the lack of creativity and flexibility of the writing software, conflicting feedbacks, and need for a considerable amount of time on building an online learning community for emotional support and knowledge sharing/building.

Lack of Creativity and Flexibility of the Software. In the interview portion all participating students complained that writing software (such as *Essay Punch* and *Paragraph Punch*) was mechanical and more like drill and practice. Users had to follow its step-by-step procedure/prompt to write from prewriting, drafting, and editing. The software did not allow users anytime to go back to revise, add up more ideas, or go forward to write. Even though the writing software guided users through the writing process approach to write, it was not a real recursive process of writing. In other words, the writing software did not provide users with flexibility to brainstorm, write, edit, or revise. Many interviewees also said that compared to Microsoft Word, they spend much more time writing an English essay by using the writing software.

In addition, several participants indicated that writing software only offered limited writing topics for users to write and practice different genres from prewriting to publishing. It was good for beginning writers (lower writing proficiency writers) to cultivate using the writing process to write. Users could practice American organization

and thinking patterns. However, the writing software was not good for higher writing proficiency writers to improve their academic writing or higher-level writing skills.

Regarding the Nicenet Forum, all interviewees stated that some features of Nicenet were not user friendly. For instance, the text color was limited to only black and the font was fixed. Users could not highlight, change color, create a graph, or insert images. Simon indicated:

> The features of Nicenet are not user friendly. The color is only black. When I first post my writing online, the color is black. Then when people reply to my writing, the color is also black. Sometimes people give me specific comments or suggestions regarding certain word choice or grammar. They cannot highlight, change color, or give graph. I like to use different color from the original writing to give feedback because it's easier to tell the differences. As a result, I use Microsoft Word to compensate my needs (such as highlight, change color, make graph, insert picture) and then use email to send my feedback to my online peers. (Simon, Interview Question 3)

Participating students commented that Nicenet software was not as flexible and creative as Microsoft Word or Block to accept a variety of forms of writing and feedback. Four of the nine participating students complained:

> The screen of the writing software [*Essay Punch*] does not allow users to skip, go backward, or go forward. It is rigid, limited, and not flexible. It is not recursive and is not a real writing process. For example, the screen doesn't allow me to go back to my pre-writing screen to check my ideas again. To me, writing is recursive and not linear process. The program is not flexible enough to allow writers to go back or forward to write. It is not a real writing process. (Garry, Interview Question 3)

> The *Essay Punch* software guides writers to follow fixed procedures and it does not allow flexibility and creativity. I think using the writing software, writers can only write a good essay but not the best one. (Amy, Interview Question 3)

> The *Essay Punch* program guides writers to brainstorm two sides, but then force writers to argue for only one side. I have difficulty with this kind of design. For example, in the prewriting stage, it guides us to both sides, pro and con. Then in the drafting stage, it begins to force us to argue only one position, for or against. At that moment, I become confused and I feel I am forced to argue for one side.

> But in the beginning, I was open to think both sides and suddenly I am only allowed to argue for one side. (Larry, Interview Question 3)

> It takes a lot of time to write an essay by using the writing software. *Essay Punch* The writing topics in *Essay Punch* are limited and the writing software can not give suggestion on improving ideas, logics, and coherence. I still need online peers' feedback to offer more detail and in depth suggestions about how to improve ideas and meanings even though those feedback are not given or received immediately. (Faye, Interview Question 3)

Conflicting Feedback, Longer Time, and More Difficult Revision. Six participants expressed that they had experiences with receiving many conflicting responses from their online peers especially in the areas of grammar correction, vocabulary usage, and ideas for supporting or counter-arguing for positions. As a result, revision took more time and became difficult for them. In the interviews, students indicated that they had a mix of ELL writing ability online peers collaborating to do peer editing. Because each person gave suggestions and feedback based on his/her lenses students often received contradicting advice with regard to grammar errors, word choice, and ideas/examples. When students got conflicting feedback, they often felt confused and were forced to consult English speakers, the online English-speaking tutors, the Writing Center, or to do online information searches to check the accuracy of the feedback. The ELLs did not have confidence in their knowledge of grammar and vocabulary; therefore, when they encountered conflicting and contradictory feedback, they needed extra time to clarify the conflict/confusion before making a decision on their revision. Four participants responded:

> When I get conflicting feedback, I get confused. Because I don't have confidence in my English writing (especially in grammar and vocabulary), I often spent much time to check to clarify the accuracy of the feedback and make judgment to accept or reject feedback. (Garry, Interview Question 1)

> After posting my writing online, I often get contradictory feedback. I understand that every individual has different training backgrounds and life experience so that every one cares different things and has different ideas. The more people give me feedback, the more chance I will get different or conflicting perspectives. When I get conflicting suggestions and feedback, I do online information searches and checks to get some literature review and ideas regarding certain topic to help me make decisions. (Larry, Interview Question 2)

> Sometimes peer suggestions and comments conflict with one another, it would take time to look for resources to solve the conflicts. If the conflicts are grammar or vocabulary, I will take native speakers' advice because they know more about English rules and convention. However, if the conflicts are ideas, I will take ELL suggestions because they understand more about my thinking and meaning. (Mark, Interview Question 2)

> Revision became more difficult and longer for me because in the beginning I only focus on editing mechanic grammar errors, then I think more about my ideas, logic, and transition. The more I revise, the better quality I expect; therefore, it takes more time and becomes difficult to revise. (Amy, Interview Question 7)

Considerable Amount of Time on Building an Online Learning Community. A majority of participants stated that it took a considerable amount of time to build an online learning community for emotional support and knowledge sharing/building. Participants changed from the fear of exposing writing weakness/errors to a willingness to share their writing. Some interviewees expressed that in the beginning, they had low confidence in their English writing; therefore, they hesitated posting their writing drafts online. They were afraid that the more writing they posted online, the more writing errors they would expose to their online peers. In addition, all nine participants stated that at the beginning they did not think their ELL peers' English was good enough to offer meaningful feedback to help them improve their drafts so that they were not motivated to share their writing drafts online. During the process, the instructor provided online models of good and weak essays; initiated online discussion topics regarding the differences between good and weak essays; and strategies for improving writing

argumentative essays from weak to good; offered an online suggested list of expectations that writers could have for their online feedback; and used face-to-face sharing activities to build up trust and intimacy among online writing class members (e.g., my journey of English writing). According to the Nicenet database, after two weeks, participants became more willing to share their writing for improvement. A participant stated:

> When I first began the online writing, it was very hard for me to share my writing drafts with my online peers because I was afraid that if my peers saw a lot of my writing errors, they would look down upon me. But after seeing many other ELLs also make mistakes in writing, I gradually overcame my fear and became more confident. Then I was more willing to share many of my writing drafts online because my online peers would give me feedback about my writing and offer suggestions for improving my writing. (Mark, Refection Journal 3)

Participating students experienced changes from playing safe by giving shallow feedback to taking the risk to offer content related meaningful feedback. Many participants indicated that at the beginning, because they did not have trust in their online peers or felt pressured to preserve relationships, they tended to make more shallow, surface-level or praise type comments rather than to offer honest feedback to their online peers' writing and discussion. Moreover, some lower writing proficiency students stated they had limited vocabulary and poor grammar; therefore, they felt uncomfortable and the process too time-consuming for online feedback. They felt providing effective and meaningful feedback was a writing skill they needed to develop over time. Beginning the second week, the instructor posted a model for giving feedback online and initiated discussion topics about how to offer constructive feedback. Subsequently, participants gradually reported in their reflection journals a willingness to take a risk to offer honest and content-related feedback to help their peers improve their writing quality. For instance, one participating student reported:

> At the beginning I was worried very much about my wording on my feedback and was also afraid of criticizing online peers' writing might affect our friendship. As a result, I tended to praise more on my peers' writing and seldom to offer honest and content related suggestions to my online peers. But after receiving some good effective and meaningful feedback from other online ELL peers and online English speaking tutors, I began to learn from ways of giving critical response. I started to pick up some of the feedback as my models and examples for giving feedback. For example, I liked the SWOT [strengths, weaknesses, opportunities, and threats] type of feedback, then I started to imitate this kind of example to give feedback because I thought this type of feedback offered options and explanation for revising rather than gave direct corrections. It did take some time to learn how to give meaningful and helpful feedback, but I felt good about myself because I was no longer just a recipient but knowledge contributor. (Simon, Reflection Journal 4)

Participants went through changes from lack of confidence in sharing personal writing struggle and emotional processes to having the courage to share their work and support each other to grow in a learning community. A majority of interviewees stated that in the beginning, they did not have confidence in their writing and they seldom created online discussion topics related to their personal writing difficulties or their personal emotional struggling processes. Students shared that they feared letting their peers know too much of their personal struggles and emotion. Several students expressed that through reading several personal stories about other ELLs' writing struggling processes, they felt that they became to have more empathy on their online ELL peers' difficulties and emotion. They came to realize that all ELLs were in the same boat and they need to have the courage to share their struggles with the writing process to help other ELL students avoid making the same mistakes and to show their support and understanding to other ELL peers. Participants reported that they came to have a sense of belonging to the online learning community, and they used writing as a means to collaborate with and offer emotional support to each other to grow as a person and a writer in the online learning community. To illustrate, one participant shared:

> When I started my online writing, I didn't have the courage to share my personal writing difficulties and emotion with my peers because I had discomfort with sharing my inner emotion and difficulties with other people. But after a while, when I read a few personal struggling writing stories, I came to have more understanding and empathy on other ELLs' writing difficulties and emotion. I became to have more courage to share my personal writing experiences to make them feel that they were not alone. There was some other ELL student, like me, also going through similar writing difficulties and understanding how they felt. (Larry, Reflection journal 5)

Problem Solving Strategies and Effecting Writing Strategies.

According to students' reflection journal, most students initially indicated that imitating model writing, memorizing vocabulary, or memorizing grammar rules were the most effective ELL writing strategies. Through the use of online discussion on topic regarding effective writing strategies or problem solving strategies, a majority of participating students indicated online that they thought that these memorized strategies might help basic-level writing tasks, but might not be good enough for enhancing higher-level writing tasks, such as adapting to American writing conventions, having multiple perspectives, or writing to communicate with readers. Based on the Nicenet discussion database, during the third week, students had begun to brainstorm and share more cognitive higher-level writing strategies. Among these strategies was Amy's comment about having an awareness of one's writing ability.

> I think having awareness of one's own writing weakness is very important for improving ELL writing quality, because when a writer comes to have his or her patterns of writing errors, this person is more likely to detect their own writing errors and correct them. (Amy, Online discussion Feedback, July 7, 2007)

Tom talked about focusing on meaning/ideas.

> Because I want to have better connection between thinking and writing and to write fluently, it is better to focus on writing my meaning and ideas when we start to write. Then after writing first draft, we can start to edit our mechanical errors, such as grammar. (Tom, Online discussion feedback, July 10, 2007)

Other strategies mentioned by students during online discussions included utilizing the writing process to write from brainstorming to publishing, finding resources for improving writing, and cultivating some compensating skills/adaptive abilities from first language writing to American writing conventions. During the ideas sharing processes some online peers began to ask for reasons and explanations for certain writing strategies. Contributors were challenged to think and reflect deeply why they used certain writing strategies and why they thought the strategies were effective. By exchanging and sharing cognitive strategies, online writing students also began to exchange and use more metacognitvie strategies. The following are some examples of both cognitive strategies and metacognitive strategies exchanged on the threaded discussion topics.

Pedagogy of Integrating CMC into Writing

As noted in the participants' reflection journal, many students expressed that an online discussion forum facilitated them to become active participants in their own learning activities and processes. Most students had positive reaction to integrating CMC technology into writing class because they thought that the Nicenet discussion forum provided them with opportunities for negotiating and exchanging ideas about their own learning activities with their online teachers, tutors, and peers. They stated that the teacher was no longer the only person planning the learning activities for the whole online learning community. In fact, each ELL had different learning needs and styles; therefore, each person had the right to say something about his or her learning activities. Students collaborated with the teacher, tutors, and other peers to develop their learning activities and processes. For instance, in the online learning community, students were active in offering ideas and suggestions on learning and teaching activities for integrating

CMC technology into a writing class. According to the online discussion data, together students proposed: assessing students' writing needs and prior computer knowledge, step by step training activities for software application, clear guideline for giving feedback and collaboration, and models of good and weak essays. As a result, the instructor modified the teaching activities to incorporate students' collective suggestions and expectations.

Summary

The analyses of data from online database, formal interviews, and reflection journals suggests that there was a trend toward students' increased participation and positive perceptions in integrating CMC technology into ELL writing instruction. In terms of how CMC technology affected students' writing processes, students experienced both advantages and disadvantages in their writing processes. The advantages of CMC included cognitive/linguistic, psychological, and sociocultural aspects of writing. The cognitive/linguistic advantages include spelling and grammar check, reinforced writing process, patterns of writing errors awareness, enhancing multiple perspectives, and facilitating critical thinking skills. The sociocultural aspect of advantages were adapting to American writing conventions, including organization, logic, and argumentative genre. The psychological aspects of advantages were reducing anxiety and increasing self-confidence. The disadvantages of CMC included technological difficulties, cognitive/linguistic difficulties, and sociocutural difficulties. The technological difficulties included lack of creativity and flexibility of the writing software. The cognitive/linguistic difficulties included conflicting feedbacks, longer time, and more difficult revision. The sociocultural difficulties include the considerable amount of time

needed to build an online learning community to gain emotional support and needed experiences of knowledge sharing/building.

During the writing process, problem solving strategies and effective writing strategies were brainstormed and shared in the learning community. Metacognitive strategies and higher-level cognitive strategies were facilitated through online discussion and interaction. Moreover, unlike a traditional face-to-face writing class, the teacher was no longer the center of the teaching. The teacher could not individually plan for teaching goals and activities. Students became active participants to negotiate and contribute to their learning goals and learning activities.

CHAPTER 5: DISCUSSIONS

Overview

This chapter has five major sections. The first section presents the primary findings. The second section will focus on discussions of the study outcomes: ELLs' self-perception of their writing difficulties; the effect that CMC technology has on ELL students' self-perceptions of writing difficulties; the effect that CMC technology has on ELL students' self-perceptions of writing difficulties; effects of CMC technology has on writing performance; the comparison between the CMC technology writing group and the control group regarding self-perceptions of writing difficulties and writing performance; and the effect that CMC technology has on students' writing processes. The last sections of this chapter include a brief discussion of the implications for practice; the limitations of the study and suggestions for future research; and a final summary.

Summary of the Findings

The overarching purpose of this study was to examine the impact of CMC technology on ELLs' writing processes and writing performance through interacting, communicating, constructing knowledge, and collaborating with peers from different cultural and linguistic backgrounds. This study intended to reform teaching methods for ELL writing from a teacher-centered approach to a student-centered approach. In addition to the discussion forum (Nicenet), used to address students' individual learning needs, this study incorporated CMC technology tools that supported tutorial writing lessons (*Essay Punch*, *Paragraph Punch*), interactive multimedia grammar practices (Grammar Fitness), online bilingual dictionaries, and other online writing links (websites/labs) to improve students' writing skills. Offering unlimited time (class time) and place

(classroom), CMC technology incorporated both individualized learning processes and social interaction learning to facilitate ELL writing processes and writing outcomes.

Mixed methods were utilized in this study: quantitative methods, including writing difficulties/needs questionnaires, quantity of participation, pre-test quality (score) of writing samples, post-test quality (score) of writing samples, and qualitative research methods, including reflection journals and interviews.

The results of the questionnaire data showed that most ELLs perceived their highest writing difficulties (needs) in linguistic/cognitive deficiencies, next highest in psychological/emotional deficiency and the third in sociocultural aspects of writing difficulties. After CMC technology intervention designed to address students' self-perception of writing difficulties (needs), sociocultural aspects of writing difficulties were reduced the most, cognitive/linguistic aspects of writing difficulties were reduced the second highest, and psychological/emotional aspects of writing were reduced the least. In terms of students' writing performance, there was a trend towards an improved level of performance. Students showed improvement in their quantity of writing, organization, thesis statements, ideas, and use of multiple perspectives. However, a majority of students did not show much improvement in grammar usage (run-on sentences and articles) and word choice. Compared to the control group, technology group decreased self-perceptions of writing difficulties on sociocultural and, psychological/emotional aspects of writing between pretest and posttest, and increased in percent gains between pretest and posttest of writing performance. During the writing processes, there were advantages and disadvantages about using CMC technology for ELL writing instruction. A majority of students had a high level of positive perceptions

of CMC technology and participation, had a high level of discussion, reduced their writing anxiety, became more confident, and felt that they made progress in multiple perspectives, critical thinking, identifying writing errors, spelling, grammar, implementing writing processes, and adapting to American writing conventions. Participants described advantages most on cognitive/linguistic aspects of writing. On the other hand, the cognitive/linguistic disadvantages included conflicting feedback, longer time for revising, and harder revision. The technological difficulties included lack of creativity and flexibility in the writing software. The sociocultural difficulties were spending much more time on building an online learning community for emotional support and knowledge sharing/building. In the beginning of the study, students were reluctant to share with their ELL peers about their English writing because they were afraid that their peers might look down upon their writing abilities or they did not have confidence in their ELL peers' writing ability to be able to offer constructive or meaningful feedback and suggestions. However, gradually students began to establish a learning community where they not only helped each other to write but also offered emotional support to their peers by showing empathy and suggesting problem-solving strategies in their writing. Students became active participants in using writing to express ideas, negotiate differences, support other people's emotional needs, and solve problems. Metacognitive strategies and higher-order cognitive strategies were facilitated through online discussion and interaction.

Discussion of the Study Outcomes

ELLs' self-perception of writing difficulties

The major issue addressed in this study was the significance of identifying writing difficulties (needs) from students' perspectives (Reid, 2001). Previous studies had concentrated more on surveying faculty and analyzing documents to establish student learning needs. The 14 highest writing difficulties (needs) articulated by the participants of this study include the following:

* Choosing the right words for appropriate contexts.
* Adjusting to American thought patterns.
* Writing fluency.
* Anxiety.
* Idioms.
* Low self-confidence.
* Spelling correctly.
* Stating thesis statement.
* Summarizing texts into a conclusion.
* Using the right preposition for appropriate contexts.
* Writing well-organized essays including introduction, body, and conclusion.
* Generating ideas.
*Paragraph conclusion.
* Writing sentence fragments.

Overall, the 14 highest ranked writing difficulties covered all three dimensions: linguistic/cognitive, psychological/emotional, and socio-cultural aspects of writing. The

linguistic/cognitive dimension of writing difficulties included word choice, stopping many times to think, idioms, writing skills, thesis statements, organization, spelling, conclusion, paragraph development, preposition usage, and sentence structure. The psychological/emotional dimension of writing difficulties consisted of anxiety and low self-confidence. The sociocultural dimension of writing difficulties was represented by the adjustment to American thought patterns. Participating students saw their worst writing difficulties in linguistic/cognitive deficiencies, the second most challenging in psychological/emotional deficiencies, and the least significant difficulty in the sociocultural dimension.

Many of the highest ranking writing difficulties identified in this study correspond to previous findings about ELL students' writing difficulties, especially as relevant to the linguistic difficulties (Nelson, 1991; Silva, 2001) as well as rhetorical difficulties (Kaplan, 1972; Swales,1990; Leki, 1992; Connor,1996). ELL students have specific writing needs because the difficulties seem to emanate from the fact that the students are transiting from one writing culture into another. Consistent with previous studies, ELL students see most difficulties in terms of linguistic/cognitive deficiency (Nelson, 1991). For example, writing fluency was the third ranked writing difficulty. Because of lack of functional repertoire vocabulary, ELL students had to stop many times to think about which English word to write. Furthermore, ELL students tended to think ideas in their first language before composing into English words, sentences, and paragraphs. They often needed to stop many times to think about words, word choice, word order, sentence structure, and organization.

However, composing difficulties go beyond linguistic/cognitive difficulties to include culturally engendered rhetorical issues (Connor, 1996). When ELL students write, they are also faced with the problem of limited vocabulary. Since they know what to say in their first language, the first instinct is to go to the bilingual dictionary. However, using the bilingual dictionary does not quite solve the problem because they are again faced with having to choose between several meanings of the word. In this study, word choice was ranked as the greatest writing difficulty. Word choice requires writers to be able to select the word that best expresses the meaning intended in the communication situation. This selection takes into consideration not only the meaning of the word, but also the purpose of the communication and the audience. Given the purpose of the writing and the audience, language must be selected appropriately. This requires conventional and cultural knowledge that ELLs may not be able to acquire within a short period of time (Leki & Carson, 1997).

Another example of students' writing concerns relating to socio-cultural difficulty was adjusting to American thought patterns, which was ranked as the second greatest writing difficulty in this study. There are two possible explanations for this writing difficulty in adjusting to American thought patterns. First, ELLs are faced with transiting from one writing tradition to another one (Nelson, 1991). In other words, they transit from their first language writing tradition to an American writing tradition. Participants expressed frustration with having to follow a linear style that requires them to write a thesis, support it with main points that are stated in topic sentences and developed by separate paragraphs. They did not see the rationale for requiring that an essay contain an introduction, a body, and a conclusion, because they were not required to follow that

structure in their first language writing tradition. The participants said in their countries they just wrote what they had to say, and that the content was what mattered. There is a need for ELLs to learn a new discourse tradition. Second, learning to share the same rationale with American audiences is a culturally influenced writing need for ELLs (Connor, 1996). Participants had difficulties with writing thesis statements, following a specific organizational structure, and developing their main points. This requires developing a new mind-set about writing. In the past, these students have written in a certain way and have been understood according to their own set of cultural values. Now they must learn to write another way in order to be understood by American audiences. According to Swales (1990), these ELLs must unlearn their native writing patterns in order to write in the expected American organizational patterns, and rhetorical modes. This re-learning process is a complex and difficult task for many ELLs.

In addition, the findings of this study also suggest that ELLs perceive their second most serious writing difficulty is psychological/emotional deficiency. This is in accord with the findings of previous studies (Alias & Hussin 2002; Weasenforth & Meloni 2002), which suggested that ELLs have writing concerns in psychological/emotional deficiency. ELLs may experience writing anxiety because of their lack of self-confidence in English writing. The negative emotional difficulties can have harmful impact on the ELLs' writing processes and performances.

Overall, the findings of this study are consistent with the previous studies about ELLs' writing difficulties. Most ELLs thought they had the most writing difficulties in cognitive/linguistic deficiencies. However, this study also suggests that ELLs had second-level concerns/needs in psychological/emotional writing deficiencies, and third in

sociocultural writing difficulties. There were few previous studies focusing on ELLs' writing difficulties in psychological/emotional or socio-cultural areas. Even where some studies exist, there is no order or ranking between the two dimensions (psychological/emotional and socio-cultural) or three dimensions (cognitive/linguistic, psychological/emotional, and socio-cultural). In this study there are some possible explanations for having the highest perceived writing difficulties in cognitive/linguistic dimension, next highest in psychological/emotional area, and the least as in easiest in sociocultural aspects. First, most ELLs' essays are scored and given feedback based on linguistic/cognitive aspects of writing; therefore, ELLs are more likely to look at writing form a linguistic/cognitive lenses. Generally speaking, ELLs' experiences and perceptions of writing are more focused on performance and product writing.

Psychological/emotional or socio-cultural factors of writing may be ignored by or be invisible to most ELLs because these two areas do not show as scores on their compositions, tests, or assignments, nor are students given feedback on these two areas on writing tests/assignments. For example, among the 13 highest writing difficulties, ELLs thought most of their writing difficulties were in cognitive/linguistic dimensions. There were 10 cognitive/linguistic writing difficulties identified in the present study, including word choice, stopping many times to think, idioms, spelling, paragraph development, preposition usage, and sentence structure. Second, the questionnaire in this study was a self-reported type of survey. There were some items regarding psychological/emotional dimensions of writing and those items may prompt ELLs to start thinking about the emotional aspects of their writing, such as anxiety and confidence; therefore, they began to be aware they had the second most serious concerns in

psychological/emotional writing deficiencies. Third, a majority of ELLs were used to sharing their writings with English teachers (the third least writing difficulty) and native English speakers (the fourth least writing difficulty); therefore, they had least difficulties in sociocultural writing deficiencies.

In fact, many of the difficulties could overlap and interconnect between dimensions. For instance, word choice and idioms could be seen as linguistic/cognitive aspects of writing difficulties, but choosing appropriate words and idioms that best expressed the meaning intended in a written context could also go beyond linguistic/cognitive difficulties to include cultural dimensions of knowledge. Generally speaking, rhetorical styles or modes usually overlap between linguistic/cognitive and sociocultural aspects of writing. In other words, besides the linguistic/cognitive dimension of writing difficulties, the rhetorical writing difficulties seemed to have their origin in cultural and traditional differences. For example, writing fluency and spelling could be looked at as linguistic/cognitive areas of writing deficiencies, but students' self-perception of linguistic/cognitive writing ability could also affect students' psychological/emotional aspects of writing. Then, these psychological/emotional dimensions of writing could also affect the students' linguistic/cognitive aspects of writing. Actually every dimension of writing is connected with each other and could affect each other. In an ELL writing situation, if students have self-perceptions of low linguistic/cognitive writing ability in writing fluency and spelling, this kind of perception of having linguistic writing difficulties in fluency and spelling may also have influence on students' confidence in writing fluency and spelling. Next, this kind of confidence may cause the students to feel relaxed or anxious about writing or spelling. Eventually, the

psychological/emotional aspect of writing could reflect back to students' linguistic/cognitive aspect of writing.

In general, ELL have learning needs that are ELL-specific. The writing difficulties expressed by participants in this study show that ELLs have cognitive/linguistic difficulties, sociocultural differences, and psychological/emotional concerns. To meet ELLs' writing needs, instruction strategies in ELL composition classes would need to differ from those in mainstream English composition classes. ELL composition teaching activities should include not only linguistic/cognitive aspects of writing but also psychological/emotional and sociocultural aspects writing.

Effects of CMC Technology on Self-Perceptions of Writing Difficulties

A major issue addressed in this study was how the use of CMC technology could affect ELL students' self-perceptions of writing difficulties. Experimental data obtained in this study showed that the CMC writing group reduced almost all of their perceptions of writing difficulties from pre-test to post-test. Based on the details, the CMC writing group was found to decrease their perceptions of writing difficulties in the sociocultural dimension second in cognitive/linguistic dimension and third in the psychological/emotional dimension between the pre-test and post-test. The finding is encouraging because CMC online writing group students are able to show decreases of their self-perceptions of writing difficulties in all three dimensions during this brief period of summer session. This finding is supported by previous studies, which provided evidence that online collaborative writing has potential socio-cultural (Kern, 1995; Sotillo, 2000; Beuchor & Bullen, 2005; Chung et al, 2005), cognitive (Cohen & Riel,

1989;Lindblom-Ylanne & Pihlajamaki, 2003; Tusi, 2004), and psychological (Alias & Hussin 2002; Weasenforth & Meloni 2002; Greenfield, 2003) advantages.

However, it is particularly interesting that socio-cultural writing difficulties show the greatest decreases in the present study. From the data base, the CMC group students show much participation and interaction from pre-test to post-test. In other words, CMC technology has much more impact on ELLs' socio-cultural aspects of learning and writing. Sociocultural theory offers an explanation for this finding. According to sociocultural theory (Vygotsky, 1978), learning is embedded within social events and occurs when learners interact with people (students and teachers) and artifacts (such as computer tools). In the present study, CMC technology provided students with an internet connected platform (tool) to interact, communicate, negotiate, and construct with other ELLs and native English speaking tutors. From the questionnaire data, following the CMC technology intervention students felt that they had less difficulties sharing writing with ELLs, who also may lack competency in grammar, vocabulary, or American writing conventions. There are two possible explanations. First, from the data of interviews and reflection journals, students indicated that they liked to share their writings with other online ELL peers because they felt other ELLs might have more similar international cultural experiences or writing experiences with them. Other ELLs can understand their ideas/positions better and help them enrich their content with multiple perspectives and examples. Second, from the interviews, participants expressed that other ELL students may also struggle with many writing problems like theirs. ELL peers have more understanding and empathy about ELL writing difficulties. As a result, ELLs can offer more effective and practical writing problem solving strategies in their feedback.

In terms of psychological/emotional writing difficulties, following the CMC intervention students reduced much of their anxiety level. The finding is consistent with the previous studies (Alias & Hussin 2002; Weasenforth & Meloni 2002), which reveal that CMC technology can reduce anxiety level. In the present study, from the data of interviews and reflection journals, students indicated that they reduced their anxiety and were not worried as much about their grammar, sentence structure, or word choice because online writing was like talking to friends. In addition, through reading other ELLs' posted writings, they found out that other ELLs also made writing mistakes; therefore, they were not afraid of exploring their writing errors or weakness with online peers. Overall, CMC technology writing provides ELLs with a psychologically and emotionally safe learning environment where students can reduce much of their anxiety to write.

In terms of cognitive/linguistic writing difficulties, the findings of this study reveal that students reduce most of their difficulties in spelling, organizing ideas, and generating ideas. The findings are in accord with previous research (Cohen & Riel, 1989; Lindblom-Ylanne & Pihlajamaki, 2003; Tusi, 2004), which indicates that CMC technology has advantages in improving spelling, generating and elaborating ideas, and organizing better essays. Compared to students' self-perceptions of writing and their actual writing performance, CMC technology writing students' self-perception of cognitive/linguistic writing difficulties matched their writing performance. For example, in post-test writing, students showed improvement on organization, ideas, spelling, and use of multiple perspectives.

In summary, CMC technology provides students with not only a medium (tool) in which to write but also a socio-culturally nurturing and psychologically safe learning environment where they can facilitate ELL cognitive/linguistic writing. After being exposed to CMC technology, ELLs can learn in an environment that supports the Zones of Proximal Development through the use of capable people, tools, and artifacts (Vygotsky, 1986).

Effects of CMC Technology on Writing Performance

Based on the results attributed to research question three, when ELLs are taught using CMC technology, there are statistically significant differences found when examining the students' writing performance between pre-test and post-test. There were 51 percentage gains over time and students had improvement on quantity of writing, organization, thesis statements, ideas, spelling, and use of multiple perspectives. The findings are consistent with previous studies (Cohen & Riel, 1989; Lindblom-Ylanne & Pihlajamaki, 2003; Tusi, 2004), which suggest that CMC technology has an impact on fluency, organization, clear ideas, spelling, and multiple ideas. However, CMC online writing students did not show much improvement in grammar (run-on sentences and articles) and word choice. The results partially confirm previous findings by Kern (1995), who reported that networked writing environments had disadvantages for grammatical accuracy because of the fast pace of discussions (writings) taking place. There are several explanations for the effects of CMC technology on students' writing performance in the present study. First, from the interview data, students indicated that the individual online tutoring writing lessons and practices (such as *Paragraph Punch*, *Essay Punch*, and other linking writing labs) individually guided them to write an essay. Students said they were

guided step by step to use a process writing approach to write and they had plenty of learning and practice in generating ideas, organization, supporting ideas, and spelling check; therefore, they improved their writing abilities in these areas. Second, in the interviews students said that reading peers' online writing and feedback gave them multiple perspectives on revising and improving their own writings. Third, data from the interviews revealed that students felt online writing was like talking to friends; therefore, they were not worried much about grammar, and they had better connection between thinking and writing. In other words, as soon as they saw their thinking in written words, it helped them to keep writing. They became able to write more fluently. Fourth, data from the post-test questionnaire showed that online writing students still felt that they had the most writing difficulty in word choice. Student also became aware they had more difficulty with run-on sentences and articles. Several students indicated that they had much difficulty in choosing the correct articles because they did not have experience using and selecting articles in their first language. In addition, they felt that word choice is culturally embedded and they had not been in America long enough to be able to choose appropriate words in a written context. In terms of making mistakes in writing run-on sentences, students expressed that they often thought in their first language, then wrote those ideas into English; therefore, they had problems in their sentence structure and making writing errors in run-on sentences.

Comparing CMC Technology Writing and Control Group

According to the results attributed to research question two and four, there are statically significant differences in the students' self-perception of writing difficulties for ELL students when they engage in CMC online writing compared to ELLs who do not

participate in CMC technology writing. There is no statistically significant difference found when examining students' writing performance between CMC writing and control group post-test. However, with a computed p value of .06, the results do approach significance. In addition, the CMC group made larger percent gains between the pre-test and post-test writing performance. The increases in writing performance by the CMC group are more than twice the amount of the control group. In other words, CMC online writing group outperformed the control group on increasing writing performance, reducing self-perceptions of socio-cultural writing difficulties, and decreasing self-perceptions of psychological/emotional writing difficulties. The results of this study support previous claims that CMC online writing has socio-cultural (Kern, 1995; Sotillo, 2000; Beuchor & Bullen, 2005; Chung et al, 2005) and psychological (Alias & Hussin 2002; Weasenforth & Meloni 2002; Greenfield, 2003) benefits. However, it is very interesting that there are significant differences in self-perceptions of socio-cultural writing difficulties, as well as self-perceptions of psychological/emotional writing difficulties. After six weeks of CMC technology intervention, the CMC technology writing group had significantly lower self-perception of socio-cultural and psychological dimensions of writing difficulties than the control group. However, the CMC group did not decrease their concerns about cognitive/linguistic writing difficulties. There are two possible explanations. First, triangulation with the data of interviews, indicated the possibility that by receiving and giving feedback from online ELLs and English speaking tutors, or using online writing tutoring lessons/writing labs, CMC technology writing students developed more awareness of their cognitive/linguistic writing errors than they were before the intervention. Although they did decrease somewhat in their concerns

about cognitive/linguistic writing difficulties the difference between the two groups was not significant. Second, the acquisition of second language writing skill, which includes unlearning first language writing patterns in order to compose using expected American writing patterns, requires many hours of practice and refinement (Swales, 1990). The six-week, short intervention period (12 sessions) may not have allowed sufficient time for significant differences to occur in skill or self-perceptions of skill in cognitive-linguistic writing between the CMC writing group and the control group.

According to the interview data, the higher-writing-proficiency students complained that they did not get enough feedback and help from their online ELL peers. However, the lower-writing-proficiency students expressed that they got many suggestions and comments from their online ELL peers and tutors. These finding were also supported by the statistical data. Even though there was small sample size in three different writing level groups within the two groups, when three different writing level groups within the CMC writing group and the control groups are compared, students starting with lower writing proficiencies (writing score<2.5) in the online writing group turned out to reduce the most on their self-perception of writing difficulties (group score M=2.73; group reduced score M=.99; percent changes between pretest and posttest=-27%) and improve the most on their writing performance (group score M=3.90; group improvement score M=2.40; percent gains between pretest and posttest=160%). The findings are very interesting and exciting. It supports the Zone of Proximal Development (Vygotsky, 1986) model, in which Vygotsky claims that individual can better learn through the help of more capable peers (students), adults (teachers and experts), and artifacts (computer tools). The findings indicate that CMC technology appears to be more

effective in helping less able students than more able students because less able students can get more opportunities for help and learning from more capable peers (medium and high ability students), tutors, teacher, and computer tools through scaffolding and modeling in the CMC learning environment.

Generally speaking, these findings support the socio-cultural theory, Zone of Proximal Development (ZPD), and research on the benefits of CMC technology. The CMC technology has the advantage of fostering a socio-culturally interactive and psychologically/emotionally safe learning environment to improve ELL cognitive/linguistic writing. The CMC technology is most effective in supporting sociocultural interaction process among online peers, tutors, or teacher.

Effect CMC Technology on Writing Processes

The result from the analyses of data from online database, formal interviews, and reflection journals showed that there was a trend toward students' increased participation and positive perceptions in integrating CMC technology into ELL writing instruction. Data from the interviews indicated that CMC technology has both advantages and disadvantages in affecting students' writing processes. The most frequently mentioned advantages were cognitive/linguistic aspects of writing, including making progress in spelling and grammar, reinforcing writing process, having awareness of patterns of writing errors, enhancing multiple perspectives, and facilitating critical thinking skills. The sociocultural advantages were adapting to American writing conventions (such as organization, logic, and argumentative genre); and the psychological advantages were reducing anxiety and increasing self-confidence. This study confirms earlier finding regarding the benefits of CMC technology in cognitive/linguistic (Cohen & Riel,

1989;Lindblom-Ylanne & Pihlajamaki, 2003; Tusi, 2004), sociocultural (Kern, 1995; Sotillo, 2000; Beuchor & Bullen, 2005; Chung et al, 2005), and psychological/emotional (Alias & Hussin 2002; Weasenforth & Meloni 2002; Greenfield, 2003) aspects of learning.

In addition, the data from interviews also shows that CMC technology is effective in facilitating the habit of writing using a process in all stages. This finding concurs with the results demonstrated by Williamson and Pence (1989), in which online forums assist in prewriting activities (generating ideas, outlining, and sharing resources); during writing activities (discussion, generating more ideas); and post-writing activities (editing, revising, reflection, and publication).

On the other hand, the cognitive/linguistic disadvantages included conflicting feedback, longer time for revising, and more difficult revision. The technological difficulties included lack of creativity and flexibility of the writing software; and the sociocultural difficulties were spending a lot of time on building an online learning community for emotional support and knowledge sharing/building. Compared to the advantages of CMC technology learning, these disadvantages about CMC technology are consistent with the findings of several previous studies regarding the disadvantage of CMC technology in technological dimension of learning (Alexander, 1999) and sociocultural (Anderson & Kanuka 1997; Cifuentes& Shih 2001), which argued that CMC technology had drawbacks on conflict and time wasting. However, those previous arguments are not specifically related to writing or ELL writing. The findings of the present study demonstrate that these difficulties are especially pertinent to ELL writing.

During the writing processes, problem-solving strategies, effective writing strategies, metacognitive strategies, higher-order cognitive strategies, active participation through online discussion and interaction were facilitated. The findings are supported by the Social Constructivism theory (Bakhtin, 1981). According to the Social Constructivism theory, learners construct their knowledge through collaborative learning activities with other students, teachers, and experts in the learning community. In an authentic learning community, learners develop their metacognitive abilities, higher order thinking skills; become active participants; and negotiate and generate solutions through shared understanding. In this study, students were from different diverse language and cultural background. They used online writing to express ideas, negotiate differences, support other people's emotional needs, and solve problems in order to work together across language and cultural boundaries. Gradually students constructed and reconstructed knowledge through interaction, discussion, and dialogue in an online learning community. As a result, CMC was conducive to creating a knowledge-building ELL writing environment.

In addition, based on the data from interviews, a considerable amount of time was spent on building an online learning community for emotional support and knowledge sharing/building. The finding is consistent with the Collaborative Learning Theory (Johnson & Johnson). According to Johnson and Johnson (1987), sharing is a fundamental feature of successful collaboration. When learners share more insights, personal experiences, and perspectives, they are motivated to learn with groups because they feel that the encouraging words they get from their peers are motivational rewards. However, in the present study, students experienced fears of exposing weakness, giving

shallow feedback, and lack of confidence in the process of collaborating with their ELL peers in the beginning of online writing. According to the data from interviews and reflection journals, the Nicenet discussion forum provided students with tools to support collaborative learning, such as topic discussion, writing sharing, feedback giving. From students' experiences, the software can only support but not replace group collaborative processes. Teachers still need to design teaching activities to facilitate online collaborative learning processes. Online students provided several suggestions and feedback. First, ELLs prefer guided (structured) activities and small groups (a size of three working in a group) because this can make collaboration easier and more straightforward at the beginning of the online writing. Students also like to work in a group of three rather than two because when there are different opinions, there is always a third person to arbitrate. According to Wegerif (1998), to establish a sense of community in collaborative online learning, students need to be provided with maximum structure and support at the beginning of the course. As students learn to work together, then they can be given more student-centered activities toward the end of the course. Second, students need some time and ice-breaking activities to get to know their peers in order to build up trust and comfort. For example, based on reflection journals, students indicated a self-introduction (a story about me), a personal sharing experience (my writing journey in the United States), and team projects (group voting for top essay) can provide students with opportunities to build up the relationship.

Implications for Practice

The findings of this study demonstrate that CMC technology can be effective in improving ELL students' writing processes and writing performance. CMC technology may be more powerful in providing learners with socio-cultural interaction and psychological/emotional comfort to enhance students' cognitive/linguistic writing abilities. This study showed that writing teachers should be aware of both the advantages and disadvantages for the use of CMC technology as a pedagogical tool for the process writing approach for ELLs.

The advantages for the use of CMC technology are as follows:

* Positive interaction and increased participation
* Reducing writing anxiety and increasing confidence
* Enhancing multiple perspectives
* Facilitating critical thinking skills
* Identifying writing errors
* Increasing spelling and some simple grammatical errors
* Reinforcing the writing process
* Improving writing performance
* Adapting American writing convention
* Audience awareness
* Authentic audience
* Authentic purpose for writing

The disadvantages for the use of CMC technology are:

* Conflicting feedback

* Time-consuming for revision and difficult revision
* Technological difficulties, such as lack of creating and flexibility of the writing software

These advantages and disadvantages are related to the students' experiences and perceptions of the use of CMC technology for the writing process and for writing performance. During the writing process, CMC technology is a tool to facilitate, scaffold, and model writing. Writing teachers still need to constantly evaluate students' learning and modify their teaching activities to enhance student's learning and writing processes.

Limitations of the Study and Future Research

This study had a number of limitations. First, the study did not provide measures (effects) of maintenance over a long period of time. This study was conducted within six weeks in a summer session. Although positive and negative effects of CMC technology with ELLs' writing processes and writing performance have been noted, further research should measure the long-term effects of CMC technology for ELL writing. Second, only CMC technology writing students were interviewed to know how sociocultural (interactional) factors influenced their writing processes. Control group students were not interviewed to investigate how face-to-face interaction affected their writing processes. Further research should interview both the treatment group and the control group to explore the differences of socio-cultural effect on students' writing processes between face-to-face learning and online learning. Third, the sample was drawn from a very restricted population. The population was small relative to the high number of students for whom English is a second language currently enrolled in colleges

and universities in the United States. This further makes it difficult to generalize the findings to a large population of ELLs in the United States.

Further research could be conducted to highlight the writing learning needs of students' for whom English is a second language. A factor analysis should be conducted on the survey used in this study to determine the extent to which the dimensions described by the items on the survey match factors (dimensions) identified via factor analysis. In addition, qualitatively, using focus groups, the research population could include more institutions to establish the consistency of the needs expressed by ELLs.

Summary and Conclusion

Findings from this study indicate that connecting the curriculum adapted to ELLs' learning difficulties (needs) with CMC technology can facilitate ELLs' writing processes and writing performance. The study suggests that computer-mediated technology might be a solution to ELLs' writing difficulties because a knowledge-building community can help cultivate students' thinking abilities and understandings of principles of good writing. However, in the process of integrating Computer-Mediated Communication technology into ELL composition classes, instructors should constantly evaluate to see if Computer-Mediated Communication technology helps to address their students' learning needs and to achieve their students' learning goals. No matter how attractive any technology is, learning will not take place when technology is not based on educational goals and pedagogy.

In addition, most writing software is heavily influenced by cognitive-based design. Software design would be enhanced by a more theoretically diverse perspective so that writing teachers can choose from a wide variety of software tools and tailor the

implementation of these tools to their ELLs' learning needs and learning styles. Technology has the power to influence our thinking, our feelings about writing, and our interactions with people. The technology has potential to affect the ways we approach writing, including the processes we use, and, when, where, and how we use them. As we increasingly use technology for writing, we need to think about the following questions: To what degree do writing software programs affect an individual's thinking about writing, feelings about writing, and interactions (communicating) with people, tools, and writing? What knowledge about technology and learning should teachers take into their practice, so that they can be ready and able to contribute successfully to the integration of technology into writing?

Teachers and researchers are at the stage of using technology effectively and pedagogically in the classroom. The challenge for all teachers and researchers concerned with ELL writing is to gain more comprehensive insights about how to integrate new technology into their writing instruction that might be effectively and beneficially used for English language learners.

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Appendix A

According to the authors of the book, *Teaching ESL Composition*, "Writing is a lifetime skill (that) serves four crucial, enduring purposes for the learner: communication, critical thinking and problem solving, self-actualization, and *control of personal environment*" (Hughey). In writing to persuade, you are writing to control personal environment.

What does personal environment mean? For a student, personal environment may mean conditions in the family or school or neighborhood or city. Personal environment may even extend beyond these areas to include conditions in the state, country, or world community. The point is that by writing to persuade, writers have the opportunity to extend their ideas to influence others and thereby affect change.

A key point to remember is that when writing to persuade, your audience may not agree with you. Writing to persuade is, therefore, more demanding and more ambitious than many other types of writing. Your goal may be to change your readers' minds or move them to action. Your goal may be to sell a program, defend an idea, or refute an opponent. In all these instances, you should consider writing to persuade as an important method for shaping your environment toward ***your*** vision of reality, whatever it is.

Organization of Essays to Persuade

One type of essay to persuade refers to questions of ***fact***. If you believe, for example, that drivers who consistently drive faster than the speed limit are harming Mexico, it would be a good idea to get evidence to support *how* they are harming Mexico. Suppose you could show that speeding causes increased mortality rates on Mexico's highways,

increased gasoline consumption and, therefore, increased pollution. Suppose you believe as I do that speeding also contributes to more speed bumps, thereby augmenting problems two and three above. These are questions of fact which you could arrange *topically*. As you present your ideas, each main point presents a *reason* why someone should agree with you. More, each main point presents a reason for *action*--you are writing an essay to persuade drivers to respect speed limit laws. Such an essay could be organized as follows:

I.	Introduction
	A. Speeding causes higher mortality rates. B. Speeding causes increased gasoline consumption. C. Speeding causes increased pollution. D. Speeding causes a higher number of speed bumps aggravating B and C.
II.	Conclusion

Other questions of ***fact*** can be arranged *spatially*. Suppose, for example, that you believe that world citizens should do more to help preserve endangered species. By organizing your essay spatially, it might be possible to discuss leopards, cheetahs, and elephants in Africa, Bengal tigers and snow leopards in Asia, jaguars and swamp deer in South America, and bald eagles and timber wolves in North America. The organization of your essay might look as follows:

I.	Introduction
	A. Africa 1. Leopards 2. Cheetahs 3. Elephants B. Asia 1. Bengal tigers 2. Snow leopards C. South America 1. Jaguars 2. Swamp deer D. North America 1. Bald eagles 2. Timber wolves
II.	Conclusion

Another type of essay to persuade refers to questions of questions of **policy**. Personal questions of policy arise in nearly everything we do. We choose what to do for our summer vacation, whether to buy a new VCR, or which telephone service we should use.

When you write about a question of policy, it usually requires the use of the word "should." How should I make the most effective use of my education? What should be

done about the inept postal service in Mexico? Why should health care service providers provide free birth control to those who want it?

Of the essays to persuade that have to do with questions of policy, some are (1) to gain acceptance or passive agreement; others are (2) to move the reader to immediate action. There is a big difference between the two, and as a writer, you should know specifically what you are trying to persuade your reader to do. Are you writing to get the reader to accept your point of view, or are you trying to move the reader to action.

Types of Arguments in Essays to Persuade

The two main types of arguments in essays to persuade are *rational* and *emotional*. If you are writing an essay against hunting, for example, an emotional appeal might begin as follows: "Every year hundreds of bloodthirsty killers go out and ruthlessly slaughter thousands of innocent, helpless animals...." Obviously, many of the words in that sentence are emotionally charged. A rational appeal against hunting, on the other hand, might begin as follows: "Every year sportsmen buy their hunting licenses and legally kill the state allotted limit of animals; however, evidence shows that this practice must be stopped because the annual "harvest" always exceeds the ability of nature to replenish the dwindling animal supply...."

Rational arguments are better when writing to persuade, especially when writing for an English academic audience. In the rational example above, for example, it would be possible to support your position with the number of licenses issued, the numbers of animals killed every year for the last five years, the estimated decline in animal

populations, etc. Emotional arguments work best when writing for an audience that already agrees with your position; however, they are rarely successful in persuading someone who does not already agree. It is best to use emotional arguments for an academic audience very sparingly.

Finally, there are several important points to remember when writing an essay to persuade:

1. State your organization. If you have been reading these web pages, you have seen it repeatedly. "Tell your audience what you are going to tell them; then tell them; then tell them what you told them." Err on the side of clarity. If your audience cannot understand what you write, or if your readers cannot follow your ideas, you will, of course, not persuade anyone.

2. Use a straight line of development. You have also heard and applied this rule by now in this advanced composition class. If you have any doubts as to how to apply it to an essay to persuade, refer again to the organizational chart referred to previously. A straight line of development is what the U.S. academic audience understands and expects.

3. Anticipate possible objections. Remember that you may not be able to persuade everyone to accept your ideas. There may be individuals or groups *opposed* to what you have to say. Thus, you should anticipate their objections and deal directly with the reasons for their disagreement. Anticipate their criticism and deal directly with it.

Appendix B:

Self-Perception of Writing Difficulties Survey

Personal Information

Name:_____

Age:

Gender:___ (M: Male, F: Female)

Country of Birth:

Native Language:

How long have you been writing in English:

During the school year, how many hours per week do you use a computer: _____

During the school year, how many hours per week do you use the internet: _____

Perception about English Writing

This questionnaire is designed to help us get a better understanding of the kinds of difficulties you experience during your English writing process. Please indicate how strongly you agree or disagree with each of the statements listed below by circling the number that corresponds to your opinion.

1	2	3	4	5	6
Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

1. I like to write English essays…… .1 2 3 4 5 6
2. It is easy for me to get started writing an English essay… 1 2 3 4 5 6
3. It is easy for me to keep my English writing going and

write smoothly…… 1 2 3 4 5 6

4. I write short and simple English sentences…… .1 2 3 4 5 6

5. It is easy for me to write my ideas into English paragraphs……... 1 2 3 4 5 6

6. I have difficulty writing closing sentences for my paragraphs…… 1 2 3 4 5 6

7. I have difficulty using articles (such as “a”, “the”, “an”)…… 1 2 3 4 5 6

8. I have difficulty using prepositions (such as “on,” “in,” “at”)..... 1 2 3 4 5 6

9. I have difficulty using verb tenses within a paragraph (such as “say”, “said”, “will say”)……... 1 2 3 4 5 6

10. I have difficulty with word order in English sentences (such as “How are you?”, “How you are?”)…… 1 2 3 4 5 6

11. I have difficulty with word choice (such as choosing “quarrel” or “debate”)…….1 2 3 4 5 6

1	2	3	4	5	6
Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

12. I have difficulty using punctuation (such as . , ?)……...1 2 3 4 5 6

13. I use few idioms (such as “Butterflies in my stomach” or “ Hit the road”) . …… ... 1 2 3 4 5 6

14. I have difficulty spelling correctly……...1 2 3 4 5 6

15. I have difficulty generating ideas for writing …….……1 2 3 4 5 6

16. I have difficulty adjusting my way of writing in my native language writing to American thought patterns……. 1 2 3 4 5 6

20. I am aware of what sentence fragments are,

but I still use them (for example,
My school offers many majors in engineering. Such as
electrical, chemical, and industrial engineering.)……..1 2 3 4 5 6

21. I am aware of what sentence fragments are,
and I don't use them…….1 2 3 4 5 6

22. I know what run-on sentences are,
but I still use them (for example,
The boy showed us his tickets someone gave them to him)….1 2 3 4 5 6

23. I know what run-on sentences are,
and I don't use them……… ..1 2 3 4 5 6

24. I find it difficult to go from one paragraph to another with
smooth, well-connected transitions (such as "As a result",
"In addition", or "In fact")…….1 2 3 4 5 6

1	2	3	4	5	6
Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

25. I feel that I have trouble writing logically
and systematically in English…… 1 2 3 4 5 6

26. I have difficulty writing a thesis statement……1 2 3 4 5 6

27. I have trouble focusing ideas (arguments)
that are related to the points that I
am trying to make…… 1 2 3 4 5 6

28. I have difficulty organizing ideas…… 1 2 3 4 5 6

29. I have difficulty summarizing my larger
argument into a conclusion…….. 1 2 3 4 5 6

30. When writing an English essay, I have trouble
writing an introduction, some paragraphs to make my points,
and a conclusion……1 2 3 4 5 6

31. Sometimes I start writing something, then in the end
I write something else……1 2 3 4 5 6

32. When I write in English, I stop many times to think about what to write……. 1 2 3 4 5 6

33. I have anxiety about writing in English…….1 2 3 4 5 6

34. I am confident in my writing in my native language writing (such as Chinese, Korean, or Arabic)…… 1 2 3 4 5 6

35. I have confidence in English writing……. 1 2 3 4 5 6

1	2	3	4	5	6
Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree

36. I don't have enough time to finish my English writing exams or assignments in a limited time period…….1 2 3 4 5 6

37. I feel comfortable revising my writing in English…… 1 2 3 4 5 6

38. I like to use computer technology (such as e-mail, online discussion or internet) in my writing class……. 1 2 3 4 5 6

39. I am a skillful English writer……. 1 2 3 4 5 6

40. I feel comfortable with sharing my English writing with other ELL students…….1 2 3 4 5 6

41. I like to share my English writing with my English teachers….1 2 3 4 5 6

42. I feel comfortable with sharing my English writing with native English speakers……. 1 2 3 4 5 6

43. I like to give feedback and suggestions to other people's English writing…….. 1 2 3 4 5 6

44. I feel my writing assignments are interesting and meaningful……. 1 2 3 4 5 6

45. I am motivated to learn English writing in the future……1 2 3 4 5 6

Now I would like to ask three questions to understand your situation more precisely. Please write a few sentences in response to the following questions. Please give as many details as you can.

1. Overall, what do you find most difficult about composing in English? Why do you think this part is difficult for you?

2. What do you usually do to solve the problems you have in/with your writing?

3. Explain how writing in English makes you feel.

Appendix C

Interview Questions

Thank you for allowing me to interview you. The purpose of this interview is to understand how you perceive technology use in the writing process, collaborative learning, and writing performance. With your permission, the interview will be tape-recorded and the tape will be destroyed after the study is completed. The information you provide will be used in the study, however your name will not be mentioned.

This interview will last about one hour. Eight questions follow regarding your perceptions about technology use in writing.

1. In general, how do you like technology use in writing?
2. Is technology effective in terms of improving your writing? If yes, in what way? If no, why?
3. What difficulties have you experienced with using computer-mediated communication technology in the writing process?
4. When you have problems with online writing, what do you usually do to solve the problems?
5. How do you like the feature of individual tutoring practices tailored to meet your personal learning needs?
6. Have you felt that communicating with others by e-mail and the Internet has helped you improve your writing or improved your attitude toward writing? How?
7. Have you found that using technology in writing changes your attitude toward writing? If yes, in what way? If no, why?
8. What would you like your teacher to do when he/she integrates technology into writing?

Appendix D

Analytic Toolkit for NICENET

Date of report:

Time Period:

User name	**# of creating individual notes**	**# of commenting on others' notes**	**# of reflecting on other's notes**	**# of giving feedback to others' notes**	**# of first writing drafts**	**# of revisions**
001						
002						
003						
004						
MEAN						
SD						
MEDIAN						

Appendix E

TOEFL Independent Writing Rubrics (Scoring Standards)

Score	Task Description
5	**An essay at this level largely accomplishes all of the following** ● effectively addresses the topic and task ● is well organized and well developed, using clearly appropriate explanations, and/or details ● displays unity, progression, and coherence ● displays consistent, facility in the use of language, demonstrating syntactic variety, appropriate word choice, and idiomaticity, though it may have minor lexical or grammatical errors
4	**An essay at this level largely accomplished all of the following:** ● addresses the topic and task well, though some points may not be fully elaborated ● is generally well organized and well developed, using appropriate and sufficient explanations, exemplifications, and/or details ● displays unity, progression, and coherence, though it may contain occasional redundancy, digression, or unclear connections ● displays facility in the use of language, demonstrating syntactic variety and range of vocabulary, though it will probably have occasional noticeable minor errors in structure, word form, or use of idiomatic language that do not interfere with meaning
3	**An essay at this level is marked by one or more of the following:** ● addresses the topic and task using somewhat developed explanations, exemplifications, and/or details ● displays unity, progression, and coherence, though connection of ideas may be occasionally obscured ● may demonstrate inconsistent facility in sentence formation and word choice that may result in lack of clarity and occasionally obscure meaning ● may display accurate limited range of syntactic structures and vocabulary
2	**An essay at this level may reveal one or more of the following weakness:** ● limited development in response to the topic and task ● inadequate organization or connection of ideas ● inappropriate or insufficient exemplifications, explanations, or details

	to support or illustrate generalizations in response to the task ● a noticeable inappropriate choice of words or word forms ● an accumulation of errors in sentence structure and/or usage
1	**An essay at this level is seriously flawed by one or more of the following weaknesses:** ● serious disorganization or underdevelopment ● little or no detail, or irrelevant specifics, or questionable responsiveness to the task ● serious and frequent errors in sentence structure or usage
0	**An essay at this level** merely copies words from the topic, rejects the topic, or is otherwise not connected to the topic, is written in a foreign language, consists of keystroke characters, or is blank

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