Effects of Computer-Mediated Communication
and Face-to-Face Communication
on the Quantity and Quality of Discourse
Produced by English as a Second Language Students

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Abstract

The effects of two types of small-group communication, synchronous computer-mediated and face-to-face, on the quantity and quality of verbal output were compared. Quantity was defined as the number of turns taken per minute, the number of Analysis-of-Speech units (AS-units) produced per minute, and the number of words produced per minute. Quality was defined as the number of words produced per AS-unit. In addition, the interaction of gender and type of communication was explored for any differences that existed in the output produced. Questionnaires were also given to participants to determine attitudes toward computer-mediated and face-to-face communication. Thirty intermediate-level students from the Intensive English Language Program (IELP) at Brock University participated in the study, including 15 females and 15 males. Non-parametric tests, including the Wilcoxon matched-pairs test, Mann-Whitney U test, and Friedman test were used to test for significance at the $p < .05$ level. No significant differences were found in the effects of computer-mediated and face-to-face communication on the output produced during follow-up speaking sessions. However, the quantity and quality of interaction was significantly higher during face-to-face sessions than computer-mediated sessions. No significant differences were found in the output produced by males and females in these 2 conditions. While participants felt that the use of computer-mediated communication may aid in the development of certain language skills, they generally preferred face-to-face communication. These results differed from previous studies that found a greater quantity and quality of output in addition to a greater equality of interaction produced during computer-mediated sessions in comparison to face-to-face sessions (Kern, 1995; Warschauer, 1996).
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# TABLE OF CONTENTS

Abstract ................................................................................................................................. ii

Acknowledgments ................................................................................................................ iii

List of Tables ......................................................................................................................... vi

CHAPTER ONE: INTRODUCTION .................................................................................. 1
   Background of the Problem ............................................................................................... 3
   Statement of the Problem .................................................................................................. 5
   Purpose of the Study ......................................................................................................... 7
   Research Questions .......................................................................................................... 8
   Rationale ............................................................................................................................ 9
   Theoretical Framework ................................................................................................... 9
   Importance of the Study .................................................................................................... 11
   Scope and Delimitations of the Study ............................................................................. 12
   Outline of Remainder of the Document ......................................................................... 14

CHAPTER TWO: LITERATURE REVIEW ......................................................................... 15
   General Background ........................................................................................................ 15
   Theoretical Background .................................................................................................. 17
   Research Comparing the Quantity of Output Produced During
      Computer-Mediated and Face-to-Face Sessions ...................................................... 20
   Literature Relevant to Measures of Quantity Used in This Study ............................... 23
   Research Comparing the Quality of Output Produced During
      Computer-Mediated and Face-to-Face Sessions ...................................................... 28
   Literature Relevant to the Measure of Quality Used in This Study .............................. 31
   Research Exploring Gender Differences in Computer-Mediated
      and Face-to-Face Discussions ..................................................................................... 32
   Research Exploring Student Attitudes Toward Computer-Mediated
      Communication ............................................................................................................... 33
   Similarities between Computer-Mediated Communication and
      Spoken Discourse .......................................................................................................... 35
   The Transfer of Skills from Computer-Mediated Communication
      to Spoken Discourse ..................................................................................................... 37

CHAPTER THREE: RESEARCH METHODS AND PROCEDURES ......................... 39
   Description of the Intensive English Language Program ............................................. 39
   Research Procedures ...................................................................................................... 40
   Research Design ............................................................................................................. 45
   Independent and Dependent Variables ......................................................................... 47
   Participants ...................................................................................................................... 48
   Data Collection and Recording ...................................................................................... 55
LIST OF TABLES
Table 1: Schedule of Research Sessions ................................................................. 46
Table 2: Summary of Study Participants’ Nationality, Gender, and Age .... 50
Table 3: Participants’ Length of English Study in Home Countries and in Canada ........................................................................................................................................... 52
Table 4: Participants’ Length of Time Spent Living in Canada ...................... 53
Table 5: Prestudy Locations of and Reasons for Participants’ Internet Use ........................................................................................................................................... 54
Table 6: Summary of the Quantity of Interaction Produced in Electronic and Face-to-Face Reading Sessions .................................................................................................................. 81
Table 7: Summary of the Differences in Quantity of Interaction Produced by Good and Poor Typists in Electronic Sessions ................................................................. 82
Table 8: Summary of Quality of Interaction Produced in Electronic and Face-to-Face Reading Sessions .................................................................................................................. 84
Table 9: Summary of the Differences in Quality of Interaction Produced by Good and Poor Typists in Electronic Sessions ................................................................. 85
Table 10: Summary of the Quantity and Quality of Interaction Produced in Speaking Sessions That Follow Electronic and Face-to-Face Reading Sessions ........................................................................................................ 87
Table 11: Summary of the Quantity and Quality of Interaction Produced in All Spoken Sessions .................................................................................................................. 89
Table 12: Summary of the Differences Between Males and Females in the Quantity and Quality of Output Produced in All Sessions .... 91
Table 13: Pre- and Poststudy Results to the Question “Which Condition Do You Feel You Express Ideas More Easily in?” ................................................................. 94
Table 14: Pre- and Poststudy Results to the Question “What Skill Areas Do You Think Are Improved by Your Use of Computer-Mediated Communication? Circle As Many As Apply and Explain Why.” ........................................................................................................................................... 97
Table 15: Poststudy Locations of and Reasons for Participants’ Internet Use ........................................................................................................................................... 101
CHAPTER ONE: INTRODUCTION

Computer-Assisted Language Learning (CALL) is a field of interest that has been gaining popularity in many English as a Second Language (ESL) institutions. Schools are interested in implementing CALL materials because they offer the opportunity to bring a greater variety of language learning experiences into the classroom, and thereby appeal to a broader range of learning styles than traditional teacher-fronted classrooms. In addition, they offer a variety of meaningful contexts for communicative interaction to occur. Some of these contexts include the use of the Internet for research purposes, international email exchanges, and collaborative bulletin board projects where students post written assignments on electronic bulletin boards. In writing classes, word processors and email have added creative new possibilities in the use of the process approach to teaching writing. Multimedia programs have also enhanced possibilities for speaking and listening classes. In turn, research has begun to emerge, delving into the enormous possibilities found in CALL materials. These studies have generally either researched students’ attitudes and use of CALL materials (Beauvois & Eledge, 1996; Bump, 1990; Wang & Hurst, 1997) or evaluated whether new technologies actually aid in the improvement of language skills (Kern, 1995; Kern & Warschauer, 2000; Lee, 2002; Pelletieri, 2000; Sotillo, 2000; Sullivan & Pratt, 1996; Warschauer, 1996).

One example of CALL is the use of computer-mediated communication in the classroom. In this study, the use of synchronous computer-mediated communication in ESL classrooms is explored. Synchronous computer-mediated communication involves communicating electronically via either the Internet or software programs that are used on Local Area Networks. This communication is transmitted in “real-time,” or as it
happens (Murray, 2000). Using a software package such as WebCT, conversational participants enter a virtual room that contains a dialogue box as well as a box where messages are posted. Participants type their messages within the dialogue box and then click on the “send” button when they are ready to post their messages. Messages can be edited within this box; other conversational participants do not see the messages until they have been posted. Messages are displayed on the screen in the order in which they are sent. In addition, participants can scroll through the postings, reading and rereading messages. Because of these features of chat, discussions can seem somewhat disjointed, especially when they involve many conversational participants. In addition, participants cannot rely on paralinguistic features such as eye contact and body language, which can also lead to some difficulties in communication. These features of synchronous computer-mediated communication are discussed more fully in Chapters 3 and 4.

In this study, transcripts of small-group interaction using computer-mediated communication, a written medium, are compared to transcripts of face-to-face communication by small groups to determine which medium better prepares students for the production of oral output. In addition, the interaction of male and female participants in both settings is compared to understand whether a difference exists in the output produced by males and females in computer-mediated and face-to-face discussions. However, it is first necessary to review the current state of research relating to the use of computer-mediated communication in ESL classes. It is also necessary to consider the medium of computer-mediated communication itself in order to understand its potential to develop students’ spoken output. Results of the study can improve current
understanding of the uses of computer-mediated communication in ESL classrooms, and how these uses can help to improve the spoken English abilities of students.

**Background of the Problem**

The burgeoning field of CALL includes many different aspects and applications that can be applied to English language learning. Much research has been completed examining the use of networked computers in language classes. Many of these studies have compared the use of synchronous and asynchronous computer communication to traditional face-to-face classroom interaction (Beauvois, 1997; Bump, 1990; Garcia & Jacobs; Kern, 1995; Marjanovic, 1999; Sullivan & Pratt, 1996; Warschauer, 1996). These studies have examined many different aspects of computer-mediated communication. For example, comparisons have been completed concerning the quantity of communication that occurs in computer-mediated classrooms versus face-to-face classrooms (Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996). According to the Interaction Hypothesis, communicative interaction among students is necessary to provide comprehensible input by which students learn language (Pica, 1994). In addition, the Output Hypothesis states that communicative interaction pushes students to produce output necessary for in-depth processing of language (Swain, 1993). Research comparing computer-mediated and face-to-face discussions in ESL and other second language classrooms has revealed that students participate more equally in computer-mediated discussion (Warschauer, 1996), direct more comments to fellow students rather than the teacher (Chun, 1994), and generally participate more (Sullivan & Pratt, 1996) in a computer-mediated environment than in a face-to-face environment. Due to this increased level of practice and
participation, computer-mediated communication has been found to provide an ideal environment for second language acquisition in terms of quantity of output produced.

The suggestion has been made that as students interact more, negotiating meaning and producing output, second language acquisition will be facilitated both in terms of fluency and accuracy (Swain, 1995). In fact, researchers have found that interaction produced via electronic communication is more advanced than face-to-face interaction in terms of content quality and syntactic complexity (Beauvois, 1998) as well as lexical complexity (Warschauer, 1996). Content quality refers to how deeply and personally students discuss topics, while syntactic complexity is revealed by students’ choices of grammatical structures. Finally, lexical complexity is the difficulty and variety of vocabulary used by students. Thus, computer-mediated communication may aid in developing the complexity of students’ language abilities.

In addition, studies have compared male and female interaction in synchronous computer-mediated and face-to-face environments. Bump (1990) found that women felt freer to share ideas in male-female groups when communicating via computers than during face-to-face discussions. Similarly, Wang and Hurst (1997) noted that the comfort level of female participants increased when communicating electronically as compared to face-to-face. Studies have also found that the quantity of participation of males and females equalizes when participants interact electronically. In comparison, males generally dominate face-to-face discussions (Sullivan & Pratt, 1996; Warschauer, 1996). Warschauer (1996) has suggested that the nature of computer-mediated discussion may serve to equalize differences in the equality of participation of males and females. This may be due to a variety of factors, including anonymity, in addition to the fact that
participants do not need to compete to take a turn in conversation and cannot be cut off when sharing an opinion.

More recently, some studies have focused on the similarities between synchronous computer communication and face-to-face interaction, suggesting that computer-mediated communication may be able to act as an aid in improving students' spoken competence. For example, Beauvois (1998), commenting on the similarities between computer-mediated communication and spoken dialogue stated, “the slowing down of the communicative process seems to bridge the gap between oral and written communication for a number of students, allowing them to benefit more fully from the language learning process” (p. 213). Chun (1994), in studying these similarities, found that computer-mediated interactions closely resemble authentic spoken communication in terms of discourse management; quantity of discourse produced; and discourse functions used, such as greetings, topic initiations, and requests for information. In addition, Sotillo (2000) found that electronic communication resembles spoken dialogue in terms of its use of a great variety of discourse functions. As such, researchers have begun to question whether computer-mediated communication, a highly interactive form of communication, can benefit students' spoken language competence, as well as their written competence. This study seeks to investigate this issue by exploring whether differences exist in the benefits of electronic and face-to-face communication for spoken output.

**Statement of the Problem**

Studies that have indicated the effectiveness of the use of networked computers in improving students’ written competence have also contained the suggestion that the
enhanced interactive competence that is gained through the use of computer-mediated communication may transfer into an ESL student’s spoken language (Chun, 1994). Although this suggestion has been made, it is unclear whether this transfer from written to spoken discourse actually does occur. In addition, most studies that have been conducted on computer-mediated discourse, including Chun (1994), have compared electronic communication to large-group face-to-face discussions. While Warschauer (1996) compared small-group computer-mediated and face-to-face discussions, his study was limited to 1 day of research. In addition, his research did not focus on the effects of these two types of communication on follow-up spoken discussion. The effect of computer-mediated discussion as compared to face-to-face discussion on male and female interaction also needs to be studied in greater detail. While some studies have suggested that male-female participation is equalized during electronic discussions (Sullivan & Pratt, 1996; Warschauer, 1996), it is unclear how this might affect follow-up spoken discussions. Finally, although some studies have researched student attitudes toward electronic communication (Bump, 1990; Warschauer, 1996), it remains unclear what student attitudes are toward synchronous computer-mediated communication and its potential to enhance their speaking abilities (Beauvois, 1998; Chun, 1994). Therefore, while computer-mediated discussions have been found to stimulate greater quantity and quality of discourse than large-group face-to-face interaction, it is questionable whether the same results are found when comparing computer-mediated and face-to-face discussions in small-group settings. In addition, it is unknown what the differing effects of these two forms of communication are on verbal output. Also, the differences in male and female interaction in small-group electronic and face-to-face discussions are unclear.
Finally, it is unclear whether students find small-group electronic communication valuable in improving their speaking skills, especially as compared to small-group face-to-face communication.

**Purpose of the Study**

This experimental study explored and compared possible effects of face-to-face and synchronous computer-mediated communication on ESL students’ spoken discourse. Specifically, this study investigated whether electronic communication is more effective than face-to-face communication in improving the spoken output of ESL students as revealed in follow-up spoken exchanges. The study compared the quantity and quality of discourse produced in small-group computer-mediated discussions to small-group face-to-face discussions to determine which medium promotes greater development of verbal output in terms of quantity and quality of output produced during speaking sessions. In addition, the interaction that occurred in speaking classes that followed the computer-mediated and face-to-face sessions was analyzed in order to determine which setting leads to a higher quantity and quality of spoken discourse. The output produced by male and female participants was analyzed to determine differences that may exist in male and female output produced during computer-mediated and face-to-face discussions. Finally, attitudinal questionnaires were analyzed to improve understanding of student attitudes toward computer-mediated communication as compared with face-to-face communication.
Research Questions

This study explored the following research questions:

1. Is there a difference in the quantity of small-group interaction during electronic versus face-to-face discussions?

   This question was answered by analyzing:
   a. The number of turns taken by students during electronic and face-to-face discussions.
   b. The number of words produced during electronic and face-to-face discussions.
   c. The number of Analysis of Speech-units (AS-units) produced during electronic and face-to-face discussions.

2. Is there a difference in the quality of small-group interaction in electronic versus face-to-face discussions?

   This question was answered by analyzing the syntactic complexity of student utterances as revealed in the number of words produced per AS-unit.

3. Is there a difference in the quantity and quality of follow-up face-to-face interaction after electronic versus face-to-face discussions?

   This question was answered by analyzing the quantity and quality of follow-up face-to-face sessions in the same manner as detailed in research questions 1 and 2.

4. Do males and females produce verbal output differently in electronic versus face-to-face discussions?

5. What are students' perceptions of the differences between electronic and face-to-face discussions and of the value of synchronous computer-mediated discussions?
Rationale

This study was undertaken for several reasons. First, the study adds to understanding of the scope of computer-mediated communication, and how it stretches beyond the medium of writing to impact many facets of ESL students’ growing language base, including their speaking. To determine this, the study explores whether there is a relationship between using synchronous computer-mediated communication and follow-up speaking in terms of the quantity and quality of discourse produced. In addition, the study explores whether a statistically significant difference exists in the effects of electronic communication and face-to-face communication on spoken output. Therefore, the findings improve understanding of the benefits that computer-mediated communication can provide for ESL students in acquiring oral language abilities, and whether these benefits outweigh the benefits of face-to-face interaction. The study also clarifies differences that exist in the output produced by male and female participants during electronic and face-to-face communication and how these differences may affect male and female participation in follow-up speaking sessions. Finally, the study adds to understanding of student attitudes toward computer-mediated communication by exploring participant responses to questionnaires.

Theoretical Framework

The Output and Interaction Hypotheses form the theoretical framework of this study. First, Swain’s (1993) Output Hypothesis stresses the importance of pushing students to produce output, since language production will increase students’ fluency while allowing them to test their hypotheses regarding the language. In addition,
production raises students’ consciousness about language, drawing attention to the gaps in their language knowledge. As learners interact with one another, they may notice the gap between what they want to say and what they are able to say. This gap leads them to pay closer attention to language so that they can find answers to their linguistic problems. Swain (1995) stresses the need for collaborative student-led discussions, since these discussions provide the ideal environment for the meaningful production of output.

Closely related to the Output Hypothesis is the Interaction Hypothesis, which states that interaction among students is very important in facilitating language acquisition (Pica, 1996). This interaction is framed in terms of what is called “negotiation of meaning.” As learners interact with one another, misunderstandings due to language occur, and learners must work together to negotiate intended meaning. This negotiation involves modifying and restructuring interaction, leading to modified output, which is more comprehensible to other learners. Interaction among learners also serves to draw more attention to linguistic form, while providing negative evidence to learners of what language use or forms are inappropriate (Pica, 1996).

According to Pica (1994), there are three necessary language-oriented conditions to make acquisition of any language successful. The first is positive input about the language that students are exposed to through collaborative interaction. The second is enhanced input about the language, also known as modified input, which is created when misunderstandings occur, and which is generally more comprehensible to learners than unmodified input. Modified input often makes linguistic features more salient, leading to more successful learning. Finally, both feedback and negative input are also necessary to help learners understand which aspects of their interlanguage are not acceptable in the
second language. According to the Interaction Hypothesis, provision of all of these conditions will make second language acquisition successful.

Both the Output Hypothesis and the Interaction Hypothesis are used as the theoretical framework of this study. Both hypotheses inform all aspects of the study, and are drawn upon in interpreting the study’s results.

**Importance of the Study**

This study contributes to the base of knowledge that is being formed about the use of synchronous computer-mediated communication in the ESL classroom. The study’s primary importance is that it widens the existing knowledge of the effects of computer-mediated communication by exploring beyond the skill of writing to examine the effect of synchronous computer-mediated communication on the spoken output of ESL students. In addition, this study contributes to the research base by focusing on small-group interaction in an area of research that has had comparisons of large-group interactions as its predominant focus. The results of this study can give further direction to future studies on the use of synchronous computer-mediated communication in the ESL classroom. In addition, results can provide insight into the effect gender plays on the quantity and quality of output produced in computer-mediated and face-to-face discussions. Finally, the study also provides further information about student attitudes toward computer-mediated communication.
Scope and Delimitations of the Study

The exclusive focus of this study is the effect of synchronous computer-mediated communication as compared to face-to-face communication on ESL students' spoken output. Since research linking electronic communication and speaking abilities is very limited, the literature review explores research relating to the use of networked computers in ESL classes, particularly research that focuses on the output produced by students during computer-mediated discussions. In addition, the literature review briefly explores studies that have examined the effects of computer-mediated communication on the quality and quantity of classroom interaction, especially in comparison to face-to-face interaction. The literature review also explores previous studies that have examined differences that exist in male and female interaction during electronic and face-to-face communication. The theoretical framework of the Interaction and Output hypotheses is also reviewed in terms of how these hypotheses underlie and support the use of computer-mediated communication in ESL classrooms. This review of the literature is used to establish the background of the field. However, specific focus is given to the effect of computer-mediated communication on students' spoken competence as defined by the quantity and quality of discourse produced, as well as students' perceptions of the effect of computer-mediated communication on their language abilities.

Other factors of interest have not been included in this study. For example, in addition to gender, the age of participants may impact how they communicate orally and electronically, especially since older participants may have had less exposure to synchronous computer-mediated forms of communication, such as chat. However, the sample in this study is rather homogeneous with respect to age, with an age range of less
than 20 years and with 80% of participants being 25 years of age or younger. Therefore, the effects of age were not analyzed in this study.

Culture was another factor that was not taken into consideration in this study although it may impact how and how much participants interact with one another. For example, one commonly noted continuum describing different cultures is the individualism-collectivism continuum (Levy, Wubbels, Brekelmans, & Morganfield, 1997). Within this continuum, it is believed that people who come from collectivist cultures emphasize community and group harmony, while in individualistic cultures, individual efforts and responses are commonly singled out for praise. It is unclear whether differences exist in the communication patterns of people from collectivist and individualistic cultures. In addition, in some Asian countries, such as Japan, silence is regarded as reflecting the inner self, which represents truthfulness whereas speech is associated with the face and mouth, which represent deceit (Jones, 1999). Students with these cultural beliefs may communicate very differently than students who come from cultures that encourage verbal interaction and dominance.

These theories are certainly of interest and may impact the quantity and quality of verbal output produced by students. However, since most previous studies on computer-mediated communication have focused on the effect of gender on output produced (Bump, 1990; Wang & Hurst, 1997; Warschauer, 1996), it was decided to repeat the focus on this factor for reasons of comparability. In addition, Stephens (1997) warns against the overgeneralization of cultural stereotypes and the description of cultures in a fashion that may have surface appeal but lack depth of insight. Also, Stephens states, “it is a complex matter to separate out what is due to ‘culture’ and what is due to historically
situated political circumstances” (p. 117). Therefore, the notion of cultural differences was considered beyond the scope of this study and thus was not included in the analysis of the results.

**Outline of Remainder of the Document**

The following chapters include a review of related literature, the methodology employed in the study, the findings of the study, and a summary of results found.

Chapter 2 contains a review of relevant literature, dealing specifically with the use of computer-mediated communication in the ESL classroom, especially in comparison with face-to-face communication. In addition, the theoretical basis of the study is explored in further detail, focusing on Interaction and Output hypotheses of language acquisition.

Chapter 3 reviews the research methods employed in the study including research design, selection of participants, data collection and recording, and analysis of the data.

Chapter 4 describes the results of the research. Results involve an analysis of the quantity and quality of output produced in each condition. In addition, a comparison is made of the quantity and quality of output produced by males and females. Finally, questionnaires given to study participants are analyzed and patterns are revealed.

Chapter 5 includes a summary of all analyzed data. In addition, conclusions are drawn from the findings, and the implications of the findings for practice and further research are outlined.
CHAPTER TWO: LITERATURE REVIEW

This chapter will review literature pertaining to the use of synchronous computer-mediated communication with ESL learners, especially relating to its impact on the quantity and quality of output produced by students in written and oral communication. First, the theoretical background of the study will be outlined. Following will be an overview of previous research that has analyzed the effects of electronic communication on ESL student discourse and compared it with face-to-face student discussion. Next, the similarities and differences between speech and writing will be explored, in order to establish similarities between computer-mediated communication and spoken discourse. Finally, studies that have suggested a link between computer-mediated communication and improved oral communication will be discussed to set the stage for the present study.

General Background

The computer is a powerful tool that has been used in language classrooms for a number of years. Throughout the years, the focus of computer use in ESL classrooms has changed. At one time in ESL classrooms, the computer was viewed as a provider of linguistic knowledge, and it was used primarily to drill language students on a variety of discrete grammatical points through the use of highly structured programs designed primarily to enhance grammatical accuracy (Kern & Warschauer, 2000).

Computer use is a much different entity in most language classes today. Instead of taking the place of the teacher, the computer is now seen as a tool, another medium by which students can creatively and reflectively communicate (Kern & Warschauer, 2000). Tools such as word processors are used to aid students in the production of essay drafts,
while Internet-based tools including email and chat are used for tasks ranging from discussion of a controversial reading to provision of feedback on a peer's written draft. As such, the use of computers in the curriculum has become less about rigid, individualized discrete-point drilling, and more about a fluid, student-led, communicative environment that provides a contextualized base of language production, thus promoting both fluency and accuracy.

Many studies have been completed that explore the nature of the synchronous computer-mediated environment of communication. Studies have explored the quantity of output produced by students during electronic discussions (Beauvois, 1998), as well as the quality, both in terms of syntactic (Chun, 1994; Kern, 1995; Pelletieri, 2000; Sotillo, 2000) and lexical complexity (Warschauer, 1996). In addition, studies have explored the differences in male and female participation during computer-mediated and face-to-face discussions, in addition to the interaction patterns of minority groups (Bump, 1990; Wang & Hurst, 1997). Some studies have also explored discourse functions used during electronic communication (Chun, 1994; Sotillo, 2000), as well as patterns of negotiation and conversational sequences (Garcia & Jacobs, 1999; Kitade, 2000; Negretti, 1999; Werry, 1996). These functions have often been compared and related to oral communication. Finally, some studies have analyzed student attitudes toward synchronous computer-mediated communication often in comparison with face-to-face communication (Beauvois & Eledge, 1996; Bump, 1990; Wang & Hurst, 1997). Most studies have either compared computer-mediated communication to whole class face-to-face discussions or they have studied computer-mediated communication as an entity in
itself. These studies are discussed in some detail in separate sections throughout the literature review.

**Theoretical Background**

The change in the function of computers in classrooms has paralleled a shift that has occurred in the theoretical basis of second language acquisition. Where language was once thought to be the acquisition of rules and habits through repetition, with a focus on discrete skills, language is now viewed as a dynamic and communicative system, to be learned through interaction with other speakers in authentic contexts (Kern & Warschauer, 2000). A shift has also occurred in what theorists view to be necessary environments for language acquisition. Current views regarding second language acquisition stress the importance of communicative interaction among language students. One theory in particular, the Interaction Hypothesis, frames this interaction in terms of what is called “negotiation of meaning.” According to the Interaction Hypothesis, as learners interact with one another, miscommunications occur, leading learners to negotiate the meaning of their utterances through modified output (Pica, 1994, 1996). Input is modified through the use of such devices as clarification requests, confirmation checks, repetitions, and reformulations (Long, 1996). This process is said to facilitate language acquisition since negotiations and modifications lead to more comprehensible input and draw attention to second language form. In addition, negotiations and modifications produce negative evidence regarding what constructions are impossible in the language (Ellis, 1999). Modifications also make input more salient, leading learners to notice this input more. Krashen (1985) first drew attention to the importance of comprehensible input with his Input Hypothesis. According to Krashen, the main factors
that are necessary for facilitating second language acquisition are comprehensible input and a low affective filter, which includes high levels of self-confidence and motivation, and low levels of anxiety, so that learners are able to process the input internally. The Interaction Hypothesis has taken Krashen’s ideas a step further by emphasizing the importance of negotiation in creating comprehensible input.

According to Pica (1994), negotiation is most effective when working with vocabulary and larger syntactic units. Larger syntactic units can include phrases, such as the prepositional phrase “in her office,” as in the sentence, “She worked on her research in her office.” In addition, they include clauses, such as the adverbial clause “while David played the guitar,” in the sentence, “Elizabeth sang while David played the guitar.” In contrast, negotiation over grammatical morphemes, such as the suffix “ing” in the word “watching” is rare. Echoing this notion, in a study of synchronous computer-mediated communication among dyads of language learners, Pelletieri (2000) found that while some negotiations occurred over grammatical morphemes, most negotiations dealt with vocabulary and the general content or meaning of the messages. However, negotiations were shown to increase comprehension and lead to structural changes in learners’ communications. It is expected that as learners interact with one another in a synchronous computer-mediated environment, they will be exposed to both positive and negative input about the grammatical features of the language, broadening their syntactical competence by revealing to them the variety of grammatical structures their peers use to communicate ideas. It is unclear whether the amount of discussion, and hence language input occurring will be greater in the small-group computer-mediated discussions or the small-group face-to-face discussions. However, students may notice the positive and negative input
more readily in the computer-mediated sessions since these discussions occur in a written form that can be read and reread. On the other hand, the absence of visual cues, such as gestures and facial expressions, may hinder understanding of messages delivered electronically.

Closely related to the Interaction Hypothesis is the Output Hypothesis, which also places great importance on interaction and negotiation, but with a focus on output produced. According to Swain (1993, 1995), output is valuable because it promotes fluency in language production, allows students to test hypotheses about the language, and helps students notice gaps in their linguistic knowledge. Learners process language more deeply through producing output than by receiving input, leading to language accuracy. They are forced to process language fully, and are not able to fake comprehension by relying on semantic and pragmatic knowledge. Swain (1993) feels students need to be pushed to create output at the edge of their linguistic abilities, and to reflect on it and modify it to enhance accuracy. This is best achieved through collaborative learning, since "jointly constructed performance outstrips individual competencies" (Swain, 2000, p. 111). In a study by Kowal and Swain (1994), it was found that while adolescent French learners worked collaboratively on language problems they noticed gaps in their linguistic knowledge, which triggered them to look for solutions. According to the Output Hypothesis, the setting in this study, either computer-mediated or face-to-face communication, that produces a higher quantity of output, should facilitate development of the syntactic complexity, or quality, of the participants' language. This is because as students interact, their output causes them to notice gaps in their grammatical knowledge and to test hypotheses they may have about
the syntax of the language, leading to a higher quality of output produced. In addition, a higher quantity of output leads to more opportunities for students to test their hypotheses about the language and to notice gaps in their grammatical competence. This hypothesis will be assessed by comparing the quantity and quality of discourse produced in face-to-face versus computer-mediated communication sessions as well as in the follow-up speaking sessions that occur after each face-to-face and computer-mediated communication session.

**Research Comparing the Quantity of Output Produced During Computer-Mediated and Face-to-Face Sessions**

According to the Interaction and Output Hypotheses, an ideal environment for second language acquisition must provide comprehensible input and encourage the production of output. Some studies have analyzed and compared the quantity of output produced during network-based interactions such as chat, or synchronous computer-mediated communication, and face-to-face discussions. This research has revealed that the quantity of output produced in chat discussions is often superior to that produced in face-to-face discussions, in terms of student versus teacher talk and directional focus of interaction (Warschauer, 1997). Directional focus refers to whether students direct their comments to the teacher or to fellow students. The following discussion highlights and critiques some of these findings.

Relating to student versus teacher talk, Kern (1995) noted that during two separate chat sessions, students produced 85% and 88% of the total number of sentences whereas during two face-to-face sessions, they produced only 37% and 60% of the total
idea units. In addition, Sullivan and Pratt (1996) found that students in a face-to-face class took only 35% of the turns, while in the computer-mediated class, they took 85% of the turns with the teacher taking the remaining turns. However, both of these studies compared whole-class computer-mediated discussion to whole-class oral discussion. It could be argued that whole-class oral discussion would generally entail less student participation since students are inhibited by the physical presence of the teacher in the classroom as they often look to the instructor to lead and manage the discussion. In addition, whole-class oral discussions generally involve only one person talking at a time, which also limits the number of turns available, possibly resulting in lower student participation.

Finally, in terms of directional focus, studies have found that students involved in chat sessions are less likely to communicate with the teacher, and more likely to communicate with each other. For example, Beauvois (1998) found that during online discussion, of a total of 186 student-generated messages, only 19 were directed to the instructor, whereas oral discussions were teacher-dominated, with student participation being limited to responding to teacher-initiated questions. In addition, Chun’s (1994) study revealed high student-student interaction, as 88% of all student-generated messages were directed to fellow students. However, Chun’s study only examined online discussion and therefore did not contain any comparisons with face-to-face discussion.

Studies have also been completed that compare the number of turns and words produced by students during online and face-to-face discussions. For example, one often-cited study by Kern (1995) examines the quantity of output produced in two sections of language classes that met both electronically and face-to-face. Kern found that in Section
1, students took 165 turns during online sessions versus 98 turns during face-to-face sessions. In addition, in Section 2, students took 200 turns during online discussions, but only 53 turns during face-to-face discussions. Similarly, the number of words produced during online sessions was much higher than face-to-face sessions. Students produced an average of 216 to 230 words during online sessions, but only 111 to 137 words during face-to-face discussions. Kern (1995) concludes, “Compared to oral discussions, [computer-mediated discussions were] found to offer more frequent opportunities for student expression and to lead to more language production” (p. 470).

However, it should be noted that these numbers have grave limitations. First, the oral sessions were generally 1-2 minutes shorter than electronic sessions, exaggerating the differences in the quantity of output produced during computer-mediated and face-to-face sessions. Second, oral discussions always followed chat discussions. This may explain the lessened interaction during face-to-face conversations as students may have exhausted their ideas once the online discussions were completed. Finally, instructors were involved in all discussions, which may have skewed participation greatly during face-to-face discussions where the instructor would be more obviously present due to his/her physical presence. In fact, the instructor of Section 2 led highly structured oral discussions, which “therefore placed considerable constraints on students’ comments, and may explain the lesser oral production in this group compared to the Section 1 oral discussion” (Kern, 1995, p. 471). These limitations, in addition to the absence of a formal statistical analysis, cause the results of this study to be questionable in their significance.

To conclude this section, many studies seem to suggest that computer-mediated communication promotes a greater quantity of language production than face-to-face
communication. These studies analyze the quantity of language produced by comparing number of turns produced (Kern, 1995; Sullivan & Pratt, 1996; Wang & Hurst, 1997), number of sentences produced, and number of words produced (Kern, 1995) in total. However, the studies included in this section, excluding Warschauer (1996), compared whole-class online discussions with whole-class face-to-face discussions. It is unclear how the quantity of output produced will change when comparing small-group online discussions with small-group face-to-face discussions, where teacher presence is less of a factor. It is also unclear whether and how computer-mediated and face-to-face discussions will differ in their effect on the quantity of discourse produced in follow-up speaking sessions. The present study compares the quantity of output produced during small-group online and face-to-face discussions according to the measures of turns, AS-units, and words produced per minute, similarly to previous studies.

**Literature Relevant to Measures of Quantity Used in This Study**

One measure used to compare the quantity of output produced during computer-mediated and face-to-face discourse in this research is the number of turns taken by participants per minute. Previous studies have also used this measure to analyze quantity of output produced, including Kern (1995), Sullivan and Pratt (1996), and Wang and Hurst (1997). These studies calculated the total number of turns taken by each participant during the different sessions. However, in this study, the length of sessions differed significantly. As such, it was decided that the number of turns taken per minute would be a more comparable calculation.
In addition, problems arose as to the calculation of turns during online and face-to-face sessions. In online sessions, these problems were due to participants repeatedly hitting the “send” button, even if they had not typed a message, while during face-to-face sessions, these problems were mainly due to overlap of utterances. Since previous studies contained no explanation of how turns were calculated, I developed a protocol for the calculation of both online and face-to-face turns. A description of this method is contained in chapter 3.

A second measure used to compare the quantity of output produced during computer-mediated and face-to-face discourse in this research is the number of AS-units produced by participants per minute. AS-unit stands for “analysis of speech unit.” When counting the number of words per AS-unit, it is a unit used to analyze the syntactic complexity of speech. An AS-unit is “a single speaker’s utterance consisting of an independent clause, or sub-CLAusal unit, together with any subordinate clause(s) associated with either” (Foster, Tonkyn, & Wigglesworth, 2000, p. 365). An independent clause is one that can stand on its own grammatically, minimally including a verb, such as the clause “turn right.” The first half of the definition of a subclausal unit includes “one or more phrases which can be elaborated to a full clause by means of recovery of ellipted elements from the context of the discourse or situation” (Foster et al., 2000, p. 365). Ellipsis is “a grammatical process... whereby elements of a sentence which are predictable from context can be omitted” (Quirk, Greenbaum, Leech, & Svartvik, 1985, p. 82). An example of ellipsis from this study follows:

032 FTF Session 2a
Hi: <<but, you guys speak very quickly, I think.>>
<<Spanish people can speak quickly>>
Se: <<English?>>

From the context of the entire conversation, the reader understands that Se means “Do you mean that Spanish people can speak English quickly?” However, as is common in speech, Se reduces this phrase to the ellipted “English?,” which is then considered one AS-unit. The second half of the definition of a subclausal unit includes “a minor utterance” (Foster et al., 2000, p. 366). The list of minor utterances is taken from Quirk et al.’s (1985) list of irregular sentences and non-sentences. It includes exclamatory phrases such as “Fire!” as well as formulas, such as “thanks” and emotive phrases known as interjections, including “mm, uh huh, hey.” Finally, a subordinate clause is a clause that cannot stand on its own; it must be connected to an independent clause in order to be considered grammatically correct. Subordinate clauses are typically introduced by subordinating conjunctions, such as “although, since, because.” In the sentence “I like Picasso’s paintings because they are crazy,” “I like Picasso’s paintings” is the independent clause and “because they are crazy” is the subordinate clause. This sentence would be considered one AS-unit.

In linguistic studies that analyze the syntactic complexity of speech, t-units are usually used as the measure of complexity. T-units were developed by Kellogg Hunt and are defined as “one main clause plus whatever subordinate clauses happen to be attached to or embedded within it” (Hunt, 1966, p. 735). However, t-units were originally created to measure the development of syntactic complexity in children’s written work. Unfortunately, oral data is not as clear-cut as it contains many instances of hesitation, false starts, repetition, and ellipsis. In order to make the t-unit measure work for oral data, researchers have needed to modify the definition considerably, resulting in a lack of
comparability across research studies (Foster et al., 2000). As such, AS-units appeared to be a more valid measure of syntactic complexity for the present study.

The main reason why AS-units were chosen as the measure of syntactic complexity for this study is that AS-units can account for utterances characteristic of speech. For example, false starts are included in the AS-unit, as in the following example:

032B FTF Session 1
Sa: <<uh why uh I du- I would like to discuss why er- herbology is effective in helping uh to eliminate uh what the Chinese call evils.>>

The inclusion of false starts in AS-units increases the number of words produced per AS-unit, an effect that should be taken into account when analyzing the data. In addition, AS-units account for topicalization, which occurs when an utterance follows the topic-comment structure. The following example illustrates topicalization.

032 FTF Session 2a
Hi: <<and and pronunciation, my hostmother says Mexican people can pronounce very well.>>
<<but Japanese, and Korean and Chinese, we have a lot of accent>>

In the second AS-unit, “Japanese, and Korean and Chinese” is the topic and the remainder of the AS-unit is the comment. The word “we” is the pronominalized repetition of the topic. Both the topic and comment are included in one AS-unit. AS-units can also account for repetition. Repetition of words is included in one AS-unit as in the following example.

032B FTF Session 2a
Ta: <<how about MinKyu.>>
<<do do you do you have email address?>>

While the above explanation was lengthy and technical, I felt it was necessary in order to explain the complexity involved in coding oral data for syntactic complexity. Many research articles that code in this manner fail to explain their coding system
adequately, or list overly simplistic examples that mislead the reader (Foster et al., 2000). This explanation was intended to reveal the truly complex nature of this form of coding. Chapter 3 includes a detailed discussion of specific AS-unit coding challenges encountered in the coding stage of this study and how these methodological challenges were handled.

A final measure of the quantity of output produced by participants during online and face-to-face conversations is the number of words produced per minute. Although not well-defined in the research, this measure has been used in previous studies (Kern, 1995). For the purposes of this study, a word is defined as “a speech sound or series of speech sounds that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use” (Merriam-Webster online dictionary, 2003). The Merriam-Webster definition does not include compound words, which are created by “putting together existing words to form a new lexical unit” (Celce-Murcia & Larsen-Freeman, 1999). However, in this study, compound words such as “raincoat” and “girlfriend” were counted as only one word.

This measure provides more information about how much students actually say or write within each conversational turn they take, revealing the depth of interaction that occurs in each condition. For example, a student could have contributed to the discussion with many turns, but each turn could have consisted of only a minimal response, such as “mhm.” Calculating the number of words per minute allows the researcher to gain a better understanding of how much discussion actually occurred. On the other hand, a student could have produced many words, but they mostly consist of repetitions or hedges, such as “um.” Therefore, the researcher must study the transcripts carefully to
fully understand the quantity and quality of interaction taking place. In addition, the researcher can compare the mean number of words produced per minute during the two treatment conditions as well as during the two follow-up conditions to see where the most interaction occurred, and to see which treatment condition encouraged spoken interaction the most.

Since typing speed has been found to influence the amount of output produced by participants of online discussions (Bump, 1990; Wang & Hurst, 1997), the results of pre- and poststudy typing tests were also analyzed so that participants could be split into two groups: high and low-level typists. Typing speed not only affects how much output is produced; it also can negatively affect participants’ attitudes toward online communication if their typing speed is slow (Wang & Hurst, 1997). As such, this information is important in understanding differences in the amount of output produced and attitude toward online discussions.

Research Comparing the Quality of Output Produced During Computer-Mediated and Face-to-Face Sessions

In terms of facilitating syntactic complexity, computer-mediated communication could provide an ideal environment according to the Interaction Hypothesis and the Output Hypothesis due to the fact that it is text based and allows for more planning time than oral communication (Kitade, 2000; Warschauer, 1998). For example, since all interaction is typewritten, learners can scroll back and reread any input they did not initially understand, thus promoting comprehension of input. In addition, noticing new linguistic information is promoted due to the fact that it is written. Words commonly used
in oral interaction can be overlooked, but when learners see them on screen, they often “notice” them for the first time (Warschauer, 1997). As such, learners may be able to process new syntactic information more readily during computer-mediated communication than oral communication, thus promoting development of their second language grammar (Swain, 1995).

However, research has revealed mixed results in terms of how well syntactic complexity is promoted by synchronous computer-mediated communication. For example, Warschauer (1996) used a coordination index to measure syntactic complexity. This index was calculated by dividing the number of independent clause coordinations, such as “I like skiing, but I don’t like snowboarding” by the total number of combined clauses, which included independent coordinations together with dependent subordinations, such as “I don’t like snowboarding because it is too dangerous.” A discussion with a lower coordination index was thus considered more syntactically complex since it included more subordination than coordination. Using this index, Warschauer found that electronic communication was significantly more complex than oral communication. In fact, 47.5% of combined clauses in the face-to-face mode were based on coordination, rather than more complex subordination, compared to only 18.5% of electronically-produced clauses. In another study, Beauvois (1998) found that chat promoted a high level of formal quality, defined as the use of compound, complex sentences, such as “I enjoy skiing, but I don’t enjoy snowboarding because I feel it is too dangerous.” In comparison, face-to-face discussions consisted primarily of “list conversations,” such as “I have one brother and two sisters.” As such, research by both Warschauer (1996) and Beauvois (1998) supports the notion that synchronous computer-
mediated communication provides an ideal environment for the development of syntactic complexity.

In contrast, the results of studies completed by Kern (1995) and Sotillo (2000) conflict with those of Warschauer (1996) and Beauvois (1998). In his study, Kern found that subordinate constructions were used more readily than coordinate constructions in both the computer-mediated and face-to-face discussions. However, a higher proportion of simple sentences were used during chat, as well as a higher number of interjections, such as "wow." On the other hand, more relative pronouns, comparative, and superlative structures were used during oral discussions, features that according to Kern (1995) are all indicative of more complex language. Kern (1995) suggests that simpler language may have been found during chat sessions due to students' perceived need to communicate their ideas and receive responses quickly. In conclusion, Kern states, “Questions about the ‘effectiveness’ of [chat] use must therefore be framed in terms of particular goals. Formal accuracy, stylistic improvement, global coherence,... are goals not well served by [chat]” (1995, p. 470). Sotillo (2000) found similar results in a study comparing synchronous and asynchronous computer-mediated communication. For example, although chat interaction contained a higher ratio of error-free t-units to total t-units, it was also found to contain less complex sentences. Sentences were short and simple, rather than compound or complex, and generally lacked the use of subordination. In addition, more fragments, such as one-word utterances, were found during electronic communication. Sotillo (2000) notes, “Though synchronous communication is text-dependent, it would seem that fluency or effective ongoing discourse, but not syntactic complexity or accuracy, is facilitated via this mode of CMC” (p. 105). As such, it is
hoped that the results of this study will help to clarify the role of computer-mediated communication, as compared with oral communication, in developing the syntactic complexity of ESL students.

Literature Relevant to the Measure of Quality Used in This Study

The studies referred to in the previous section incorporate many different methods for determining the syntactic complexity of discourse. Warschauer (1996) used a coordination index, dividing the number of independent clause coordinations by the total number of combined clauses. Beauvois (1998) measured the "formal quality" of utterances by counting the number of complex, compound sentences they contained. Kern (1995) analyzed the number of subordinate structures produced in comparison to the number of coordinate structures produced. Finally, Sotillo (2000) used t-units as a measure of complexity in order to determine the amount of subordination included in participants' utterances. While differing in their methods, all of these studies used subordination as a measure of complexity. Similarly, this present study used the number of words produced per AS-unit as a measure of syntactic complexity. This measure was chosen because it is a unit designed specifically for analyzing the complexity of oral data whereas the t-unit was originally created to analyze the complexity of written data. In addition, literature by Foster, Tonkyn, and Wigglesworth (2000) details how to code and count AS-units. Research by Warschauer (1996), Beauvois (1998), and Kern (1995) does not include detailed explanations or examples of coding systems used. A higher number of words per AS-unit suggests a greater complexity in speech, since more words per AS-unit suggests the use of more subordination, which indicates complexity in speech.
However, a high number of words per AS-unit may also be due to a large number of repeated words and hedges. As such, the data must be analyzed carefully for repetitions and hedges in order to understand what the numbers truly represent.

**Research Exploring Gender Differences in Computer-Mediated and Face-to-Face Discussions**

Many studies have revealed that computer-mediated discussions display greater gender equality in participation than face-to-face discussions. For example, Wang and Hurst (1997) found that females took as many turns as males during online discussion, whereas the ratio of male to female turns during oral discussion was 11.5 to 6.6. In addition, Warschauer (1996) found that three out of four groups of students displayed much greater equality in participation during computer-mediated discussion than face-to-face interaction. Bump (1990) suggests that this increase in equality is due to the fact that communication is completed through computer networks, with students often choosing pseudonyms, leading to the gender of discussion participants being unknown. Thus, contributions are noted for their actual content, and not for the popularity level of the person offering them. As such, this anonymity may free quiet or inhibited students to participate more equally than they would during face-to-face discussions. In addition, Kern (1995) suggests that since online interaction is written, it encourages the participation of students who normally hesitate to contribute to oral conversation. As such, they are more willing to take risks, leading to greater amounts of output being produced. This suggestion is supported by the research of Wang and Hurst (1997) in which women noted that their comfort level increased when discussing topics
electronically. In addition, in Bump’s (1990) study, women expressed that they feel freer to express their opinions during computer-mediated discussion than during face-to-face discussions. Most of these studies involved large-group interaction. Thus, differences may exist in the male and female interaction patterns of small-group computer-mediated and face-to-face discussions.

**Research Exploring Student Attitudes Toward Computer-Mediated Communication**

In general, student attitudes toward synchronous computer-mediated communication have been positive. For example, through responses to questionnaires, Bump (1990) found that students felt electronic communication was more liberating than face-to-face communication, in that they felt less fear in sharing their opinions in a written manner. Many students also felt the use of pseudonyms allowed them to express their feelings more honestly. In addition, students felt the written medium allowed them to collect and process their thoughts before sharing them, leading to improved thinking and creativity in discussion. Students in a study by Marjanovic (1999) felt that electronic communication gave voice to students on the basis of the actual content of the messages, rather than the personality of the message-sender. Kern (1995) discovered similar results. In his study, students expressed that they enjoyed having the chance to interact with other students directly, rather than through the instructor. In addition, they also enjoyed the time and freedom they had to compose their written messages. Some students noted that this freedom gave them more confidence in participating in the discussion and voicing their opinions. Warschauer (1996) found that students generally preferred chat to spoken
interaction in his study. Students stated that they felt they could express themselves freely, comfortably, and creatively. Also, students felt their thinking abilities were enhanced through communicating electronically, and they noted that they felt no stress when chatting. Finally, Beauvois and Eledge (1996) studied the relationship between personality type, as determined by the Myers-Briggs Type Indicator, and attitude toward computer-mediated communication. Attitude was divided into three different categories, including perceived linguistic, affective, and interpersonal benefits, and was measured using a Likert-type questionnaire. Each statement on the questionnaire was rated by students on a scale of 1 to 5, with 1 representing "strongly disagree" and 5 representing "strongly agree." According to the results, both introverted and extroverted students had generally favourable attitudes toward chat. Perceived affective benefits was the highest scoring category, with an average of 4.31. This category related to the level of control and enjoyment students perceived, versus the level of stress. In addition, the category of perceived linguistic benefits received an average score of 4.05. Within this category, the item receiving the highest score related to participating more during electronic discussions than oral discussions. Thus, it can be seen that many students have favourable opinions about using computer-mediated communication in the classroom.

On the other hand, some studies have also revealed negative student reactions toward electronic communication. For example, Kern (1995) found that many students were frustrated with the quick pace at which messages built up on the screen, a problem that is more likely to occur in whole-class discussions. In Wang and Hurst’s (1997) study, students voiced similar complaints about the pace of the messages. In addition, they felt the absence of facial expressions and tone of voice signals diminished the richness of the
communication. However, the most frequent complaint related to the necessity of relying on the keyboard for communication. Bump (1990) found similar results. In fact, 46% of his respondents claimed the main disadvantage of chat is its reliance on the keyboard. Students felt they could not express their thoughts quickly enough, especially as compared to speaking. In addition, they found it annoying when correcting their typing errors since this process further slowed down the process of communication. Finally, they expressed that the discussion often lacked coherence due to the delay in response as students were typing their messages. As a result, while many students enjoy computer-mediated communication, research has revealed important student-perceived disadvantages in this mode of communication.

**Similarities Between Computer-Mediated Communication and Spoken Discourse**

The purpose of this study is to discover whether synchronous computer-mediated communication affects the spoken interaction of ESL students, in terms of quantity and quality of discourse produced. Many of the studies listed in this review do not explore the possible effect of synchronous computer-mediated communication on spoken conversation, especially as compared with face-to-face communication. In order to ask this question, it must first be determined whether computer-mediated communication, a text-based medium, displays any similarities to spoken communication. Generally, spoken and written communication differ in terms of many factors including time constraints, physical features, length of utterance, turn-taking, levels of formality, syntactic and lexical complexity, and discourse functions used. However, for each of these features, the differences between speaking and writing are generally continuous, not
dichotomous, relying on factors including medium, task, audience, and language proficiency (Biesenbach-Lucas & Weasenforth, 2001). For example, informal use of language is usually associated with speaking rather than writing. However, informal language is commonly found in written computer-mediated communication such as email or chat. Thus, the differences between speaking and writing are relative, not fixed (Baron, 1998). However, there are certain characteristics displayed in the use of computer-mediated communication that are usually associated with spoken discourse. For example, Werry (1996) found computer-mediated communication to contain many interwoven topics and digressions, usually associated with the quick pace of speech. In addition, spelling, capitalization, and punctuation are often used creatively to simulate the paralinguistic features of speech (Negretti, 1999; Werry, 1996). For example, writers may use capitalization to represent shouting, or a series of periods to reveal that they are thinking about what they should say next. In addition, punctuation is often used to create emoticons that simulate a variety of facial expressions, such as a smile. Baron (1998) found computer-mediated communication to simulate speech in terms of style and lexicon, while its format and syntax were found to contain a mix of spoken and written features. Finally, Chun (1994) found that the functions performed during computer-mediated communication simulate those performed in oral communication. Similarly, Sotillo (2000) found a great variety of discourse functions being used in chat sessions, including greetings, imperatives, and requests for information and clarification. As such, she concluded that synchronous computer-mediated communication closely resembles face-to-face communication in terms of interactional features, and is more diverse in variety of discourse than the traditional Initiation, Response, and Follow-up exchange of
the teacher-fronted classroom (Sotillo, 2000). These similarities between computer-mediated communication and speech signify that using computer-mediated communication may have positive benefits on students' spoken language abilities.

The Transfer of Skills from Computer-Mediated Communication to Spoken Discourse

The similarities between face-to-face and synchronous computer-mediated communication naturally lead to the question of whether the use of chat for classroom discussions can actually lead to an improvement in speaking abilities. In a broad study comparing face-to-face and computer-mediated communication language classrooms, Beauvois (1997) found that the oral test scores of the computer-mediated communication group were significantly better than those of the face-to-face group. These scores reflected the accuracy of pronunciation, grammar, and vocabulary produced by students during oral tests. While this finding is interesting, it does not provide information on how different aspects of speaking are improved. In addition, it is unclear whether interacting in computer-mediated discussions caused the improvement in speaking abilities, or whether other factors were involved. In another study, Chun (1994) found that the medium of synchronous computer-mediated communication provides language learners with the opportunity to manage discourse themselves, and to use a large variety of discourse functions in different communicative contexts. Students participated by creating questions and answers, giving statements and imperatives, and by managing the discourse through requests for clarification, feedback, and the use of social formulas. Chun (1994) concluded her research by suggesting that since chat resembles face-to-face
communication, it may serve as a bridge in the transfer of communicative skills from writing to speaking.

Although this transfer of skills from a written to a spoken medium has been suggested, it is unclear whether the use of synchronous computer-mediated communication actually does prepare language students for producing spoken output. This study has been designed to answer this question by looking specifically at the quantity and quality of discourse produced during both computer-mediated and face-to-face discussions as well as during follow-up speaking sessions to understand which environment better prepares students for producing these features of verbal output.
CHAPTER THREE: RESEARCH METHODS AND PROCEDURES

This chapter describes the research methods used in this study. The topic under investigation is the quantity and quality of discourse produced in both computer-mediated and face-to-face small-group discussions of articles in ESL reading classes, as well as student attitudes toward communication in both of these conditions. In addition, the effect of both of these conditions on students' spoken abilities, revealed by the quantity and quality of discourse produced in follow-up speaking discussions of related articles is investigated. Finally, any gender differences in interaction will be explored. This chapter outlines the selection of participants, design of the research, and analysis of the resulting data. Consideration is also given to certain research methods, including the use of transcription in the data collection process and the use of AS-units in the data coding process.

Description of the Intensive English Language Program

The study was conducted over an 8-week period during regular classes held in the Intensive English Language Program (IELP) at Brock University in the fall of 2001. The IELP is a 14-week noncredit program designed to prepare students for academic studies in English. Students receive 5 hours of instruction each day from Mondays to Thursdays. Each day consists of five 50-minute classes of speaking, listening, reading, writing, and grammar instruction. A different instructor generally teaches each class. In the IELP, students are placed in one of six levels, ranging from Preparatory to Level 5, based on their results on the Michigan test, a standardized English language placement test. Subsequent adjustments in level are based on diagnostic tests and classroom teachers'
observations. Preparatory is the lowest level of study whereas Level 5 is the most advanced. Class sizes generally are kept small, ranging from 10-20 students per class. Therefore, many levels consist of more than one class, or section. If this happens in Level 1, for example, the first class is called Level 1, the second, Level 1A, and the third, Level 1B. It is very rare that more than three sections of a level exist. Students of the IELP come from a variety of countries. The most frequently represented countries include South Korea, Japan, China, and Mexico. While some students study in the IELP for only one term, others remain until they complete all levels in the IELP. Students come to the IELP with a variety of goals, but most often they want to improve their English proficiency either to enhance their job prospects in their native country or to prepare for studies in an English-language institution. Instructors in the IELP aim to teach classes using a communicative approach, encouraging student participation through the use of practices such as small-group discussions, student-led debates, pair and group peer review of writing assignments, and student presentations. In addition, teaching materials and techniques encourage the use of authentic communication amongst students through student creation of dialogues and stories, and the discussion of controversial topics rather than teacher-led drill work or rote memorization of vocabulary and grammatical structures.

Research Procedures

This study took place during the reading and speaking classes of two sections of intermediate-level IELP students. In the first week of the study, both participant groups were given preliminary explanations about the study and its purpose. The explanation of
the study was communicated during the reading classes since I taught these. Students were given the letter of information, found in Appendix A, and were asked to sign the consent form if they were interested in participating in the study. The consent form is found in Appendix B. After consent forms were handed out, one student was chosen to be responsible for collecting the forms and delivering them to the IELP administrative assistant. Consent forms were then held until I submitted final grades for the semester. Data were not collected until after students had given their consent. In addition, questionnaires and typing test results were also held by the administrative assistant until after I submitted the final grades for the semester. This period also included completion of the prestudy demographic and attitudinal questionnaire about students’ use of computers and their language learning, found in Appendix C. Finally, students were also asked to complete the 3-minute prestudy keyboarding assessment. The administration of this test is discussed in the “Data Collection and Recording” section.

In the second week of the study, students received a 50-minute orientation to computer-mediated communication in a computer laboratory. Students were familiar with the computer laboratory since their writing classes met in the laboratory twice a week. Therefore, students were already comfortable with logging on to the computers and using word processors. I led the orientation, which occurred during their reading class. During this orientation, participants were introduced to WebCT, and to the concept of chat. WebCT is a computer program that has a chat component. Once in the chat area, students can choose from four different rooms to enter. Students can chat with other students in the same chat room. To chat, students type in a dialog box towards the bottom of the screen. Once students are ready to send their messages, they click the send button, and
their message is posted. Other chat room participants cannot read messages until the messages have been sent. In addition, chat room participants can scroll through all of the messages that have been posted. These features give students time to edit their own contributions and process what other students have posted. During the orientation, students were given the opportunity to experiment with using chat in small groups. It is expected that a 50-minute orientation was sufficient, since many IELP students regularly use email and chat programs such as MSN Messenger to communicate with family and friends. Writing instructors in the IELP regularly complain about the difficulty of keeping students off chat programs such as MSN Messenger when their classes meet in the computer laboratory. In addition, on the prestudy questionnaire, 9 students noted that they felt “very comfortable” using computers while the other 21 checked off “comfortable.” Also, 21 of the 30 students noted that they had used chat previous to the study. As such, it is expected that the orientation session was sufficient preparation for the study.

Once the orientation session was completed, data collection occurred for a 6-week period, during regular reading and speaking classes, once a week. Since I was the reading instructor, as well as the researcher, I worked collaboratively with the speaking instructors for the two classes to coordinate lesson plans. Once a week, for 6 weeks, both classes, on the same day, read an article in their reading class, and then discussed it in small groups. Classes alternated in their involvement in electronic and face-to-face reading sessions as explained fully in the “Research Design” section. Participants in the electronic session discussed the reading in small groups via synchronous computer-mediated communication using WebCT, while the face-to-face group participants
interacted orally with their small groups through face-to-face communication. Since the
two IELP classes that were a part of the study consisted of 15 students each, each class
session was generally divided into 4-5 small groups that included 3-4 members in each
group. Students were not given any questions for discussion, but were encouraged to lead
and generate discussion about the article themselves, without help from the instructor.
Each electronic and face-to-face session involved 5 minutes of teacher-led prereading
discussion, 15 minutes of time for individuals to read the article, 15 minutes of small-
group discussion, 10 minutes of reading a second and much shorter related article, and 5
minutes of large-group debriefing. Students in the IELP are generally accustomed to
being given approximately 15 minutes to read articles of the length and level of difficulty
involved in their reading classes. Electronic sessions occurred in a computer laboratory,
while face-to-face sessions occurred in regularly scheduled classrooms.

All computer-mediated and face-to-face small-group interactions were recorded
and transcribed for analysis. Pseudonyms were used throughout the transcription process.
All utterances produced in the electronic medium were automatically recorded and
posted. At the end of each computer-mediated session, chat transcripts were saved and
printed. In the face-to-face condition, all small groups received their own audiotape
recorders and were responsible for recording their discussions. I circulated the room
helping groups with audiotape recorder complications. At the end of each session, I
collected all audiotapes for transcription and analysis. The process of transcription will be
discussed in the section on "Data Collection and Recording."

On the following day, students discussed the second related article in their
speaking class for 15 minutes, this time in different small groups. Small-group
interactions occurring in these classes were recorded and transcribed in the same fashion as all face-to-face group sessions. The remainder of the speaking class was devoted to regular classroom activities.

Readings used in the study were taken from the class textbook, *For Your Information 3* (Blanchard & Root, 1997). Therefore, they were selections that would normally be read by intermediate-level students in the IELP. The purpose of the readings was simply to provide a topic for discussion. Students were free to discuss any questions they had about the readings, as well as any issues they felt warranted discussion. This is one discussion technique commonly practiced in IELP reading classes. The purpose of the second, shorter article was to provide additional information about the same topic as the first article. This was assigned to students so that they would have additional information to discuss during the speaking sessions. I felt that if a second article were not provided, students would feel they had exhausted all of their ideas about the original article, and would not have any content to discuss during the speaking sessions.

During the final week of the study, in addition to participating in face-to-face and electronic reading classes and post-face-to-face and post-electronic speaking classes, students completed a poststudy attitudinal questionnaire. The main purpose of this questionnaire was to explore student attitudes toward face-to-face and electronic communication as well as student opinions of possible language benefits of electronic communication. Students completed the questionnaire during one of their regularly scheduled reading classes. This questionnaire can be found in Appendix D.

I was the teacher of both groups' reading classes. As such, I conducted all face-to-face and electronic sessions in the reading class. This may have affected the study, as my
students may have felt pressured to participate in the study. However, students were reassured that their decision regarding whether or not to participate would in no way affect their class grades, as discussed in the “Limitations” section. Two other teachers worked collaboratively with me, teaching the speaking classes. These teachers audiotaped the small-group discussions that occurred as a follow-up to both face-to-face and electronic reading classes each week.

Research Design

Data collection of small-group discussions began in week 3 of the study. A quasi-experimental design was employed, involving two groups of intermediate-level ESL students. Both groups received equal exposure to the two learning environments, face-to-face and computer-mediated, during their reading classes in an alternating fashion. Small-group student discussions were recorded during these face-to-face and computer-mediated sessions in order to understand whether differences existed in the quantity and quality of interaction produced during face-to-face and computer-mediated discussions. Following these reading classes, both groups of students participated in their speaking classes. All speaking classes involved only spoken, face-to-face interaction. Small-group student discussions that occurred during these speaking classes were also recorded in order to understand whether previous exposure to face-to-face and computer-mediated sessions affected the quantity and quality of verbal output produced. The research design is illustrated in Table 1.
Table 1

*Schedule of Research Sessions*

<table>
<thead>
<tr>
<th></th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td><strong>Reading Class</strong></td>
<td><strong>Speaking Class</strong></td>
<td><strong>Reading Class</strong></td>
</tr>
<tr>
<td></td>
<td>Computer-mediated</td>
<td>Face-to-face</td>
<td>Post-face-mediated</td>
</tr>
<tr>
<td>Group 2</td>
<td>Face-to-face</td>
<td>Post-face-mediated</td>
<td>Computer-mediated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Week 6</th>
<th>Week 7</th>
<th>Week 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td><strong>Reading Class</strong></td>
<td><strong>Speaking Class</strong></td>
<td><strong>Reading Class</strong></td>
</tr>
<tr>
<td></td>
<td>Face-to-face</td>
<td>Post-face-mediated</td>
<td>Computer-mediated</td>
</tr>
<tr>
<td>Group 2</td>
<td>Computer-mediated</td>
<td>Post-face-mediated</td>
<td>Face-to-face</td>
</tr>
</tbody>
</table>
Since classes in the Intensive English Language Program (IELP) at Brock University are generally small, ranging from approximately 10 to 20 students per class, two classes were involved in the study in order to increase the sample size of the study. By alternating the two types of treatment, I, as researcher, could control for performance differences that were attributable to different group compositions and group dynamics. In addition, the alternating design aided in control of variables such as topic effects and time of class effects, since participation in small-group discussions can be affected by these variables.

**Independent and Dependent Variables**

The main purpose of this study was to determine what differences can be observed in the effects of small-group computer-mediated and small-group face-to-face communication on ESL students’ spoken competence. For the purposes of this study, spoken competence was operationalized as the quantity and quality of spoken output produced. Quantity included the number of turns taken, the number of AS-units produced, and the number of words produced while speaking. Quality in this study was similar to Beauvois’ (1998) definition of formal quality, which related to the grammatical complexity of sentences produced and was defined as the number of compound, complex sentences students used, as opposed to simple sentence constructions. The measure of complexity in this study was the number of words contained per AS-unit.

In order to examine possible effects of electronic and face-to-face communication on spoken competence, it was first necessary to establish any differences that may exist in the interaction that occurs in small-group computer-mediated and small-group face-to-
face communication. As such, the use of either computer-mediated or face-to-face discussion of a text in reading class was the independent variable of this study.

Dependent variables included the amount of communication that occurred in each condition, as well as the quality of the communication. In order to study the effects of these two conditions on students’ spoken competence, speaking classes following both conditions were studied for the quantity and quality of discussion that ensued. Therefore, the quantity and quality of output produced during speaking sessions were two more dependent variables. Another research question involved studying the interaction of gender with type of session to understand the effect of gender on the quantity and quality of output produced. In this case, the independent variables were gender and type of session. The four types of session included face-to-face reading classes, electronic reading classes, speaking sessions that follow face-to-face reading classes, and speaking sessions that follow electronic reading classes. The dependent variables again were quantity and quality of output produced. A final question of the research involved asking students in which condition they feel they can communicate more effectively, and whether they feel that using computer-mediated communication helps them to improve their spoken communication. The measure used to assess this dependent variable was an open-ended attitudinal questionnaire, given to students at the end of the study.

**Participants**

Participants included English language students enrolled in Level 3, an intermediate level of study, in the IELP at Brock University. Scores on the Michigan test determine initial placement in levels of study in the IELP. Students who receive a mark in
the 60-70 range generally are placed in Level 3. The Michigan test score total is 100 points.

Two sections of level three were chosen for the study, Level 3 and Level 3B. The study occurred during their reading classes, 032 and 032B, and their speaking classes, 031 and 031B; the number 3 refers to the level whereas the numbers 2 and 1 refer to the skill area. In the IELP class codes, the second number always refers to the level of study whereas the third number always refers to the skill area. In terms of skill areas, 0 refers to writing, 1 to speaking, 2 to reading, 3 to grammar, and 4 to listening. The letter B signifies the third section of Level 3. Both classes participated in the face-to-face and computer-mediated conditions in an alternating fashion. Originally, one class contained 16 students, but one student chose not to participate in the study. This student was required to participate in all class activities; however, data were not collected for this student. This student missed many IELP classes including the class sessions used in this study. The second class also contained 16 students, but one student was dropped from the analysis because of a lack of participation. This student only participated in 2 of the 12 sessions and also was not present for the poststudy questionnaire. Therefore, the data from 30 participants were used for analysis in this study. The distribution of nationality, gender, and age is displayed in Table 2.

Further knowledge about study participants was gained through the information given in the demographic questionnaire. This information is summarized in the following paragraphs and in Tables 3-5.
Table 2

*Summary of Study Participants’ Nationality, Gender, and Age*

<table>
<thead>
<tr>
<th>Country of Origin</th>
<th>Section 032/031</th>
<th>Section 032B/031B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Japan</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>China</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Mexico</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>South Korea</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Section 032/031</th>
<th>Section 032B/031B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>9</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Section 032/031</th>
<th>Section 032B/031B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>23</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>24</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>26</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>31</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>33</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
In terms of previous language study, there was confusion regarding the fourth item on the questionnaire. Some students thought the question "Have you studied any other languages?" included the study of English while other students thought it excluded the study of English. Therefore, the fourth question is not included here in the description of the demographic information. However, 28 of 30 participants noted on the prestudy questionnaire that previous to their travels to Canada they had studied English in their home countries with length of study ranging from 2 months to 12 years. In addition, the 30 study participants had been studying English in Canada for a range of 1 month to 2 years while the period of time they had been living in Canada ranged from 1 month to 4 years. This information is depicted in Tables 3 and 4.

In terms of Internet habits, 21 study participants claimed that they used the Internet every day while the other 9 participants stated that they used it a few times a week, revealing an overall comfort with Internet use. Locations of Internet use and reasons for Internet use are summarized in Table 5. Finally, 22 of the 30 students stated that they had used chat before. Eighteen students noted that they used chat to communicate with friends. Four students used it to meet people, 2 for having fun, and 1 to improve English skills.

The information contained in the demographic questionnaire was used simply to provide background information about the participants. Through this information, the researcher could understand participants in terms of their previous language study and computer experiences.
Table 3

Participants’ Length of English Study in Home Countries and in Canada

<table>
<thead>
<tr>
<th>Time Spent Studying English in Home Countries</th>
<th>Number of Participants</th>
<th>Time Spent Studying English in Canada</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 years</td>
<td>1</td>
<td>2 years</td>
<td>1</td>
</tr>
<tr>
<td>11 years, 10 months</td>
<td>1</td>
<td>1 year, 10 months</td>
<td>1</td>
</tr>
<tr>
<td>10 years</td>
<td>3</td>
<td>1 year, 6 months</td>
<td>1</td>
</tr>
<tr>
<td>9 years</td>
<td>2</td>
<td>1 year, 4 months</td>
<td>1</td>
</tr>
<tr>
<td>8 years, 6 months</td>
<td>3</td>
<td>10 months</td>
<td>1</td>
</tr>
<tr>
<td>8 years</td>
<td>3</td>
<td>9 months</td>
<td>1</td>
</tr>
<tr>
<td>7 years, 6 months</td>
<td>2</td>
<td>7 months</td>
<td>1</td>
</tr>
<tr>
<td>7 years, 1 month</td>
<td>1</td>
<td>6 months</td>
<td>4</td>
</tr>
<tr>
<td>7 years</td>
<td>1</td>
<td>5.5 months</td>
<td>1</td>
</tr>
<tr>
<td>6 years</td>
<td>4</td>
<td>5 months</td>
<td>1</td>
</tr>
<tr>
<td>4 years, 2 months</td>
<td>1</td>
<td>4 months</td>
<td>4</td>
</tr>
<tr>
<td>3 years</td>
<td>1</td>
<td>3 months</td>
<td>5</td>
</tr>
<tr>
<td>2 years</td>
<td>3</td>
<td>1.5 months</td>
<td>6</td>
</tr>
<tr>
<td>6 months</td>
<td>1</td>
<td>1 month</td>
<td>2</td>
</tr>
<tr>
<td>2 months</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>28</strong></td>
<td><strong>TOTAL</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>
Table 4

Participants' Length of Time Spent Living in Canada

<table>
<thead>
<tr>
<th>Time Spent Living in Canada</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 years</td>
<td>1</td>
</tr>
<tr>
<td>2 years</td>
<td>1</td>
</tr>
<tr>
<td>1 year, 10 months</td>
<td>1</td>
</tr>
<tr>
<td>1 year, 6 months</td>
<td>1</td>
</tr>
<tr>
<td>1 year</td>
<td>1</td>
</tr>
<tr>
<td>10 months</td>
<td>1</td>
</tr>
<tr>
<td>9 months</td>
<td>1</td>
</tr>
<tr>
<td>7 months</td>
<td>1</td>
</tr>
<tr>
<td>6.5 months</td>
<td>1</td>
</tr>
<tr>
<td>6 months</td>
<td>4</td>
</tr>
<tr>
<td>5 months</td>
<td>2</td>
</tr>
<tr>
<td>4 months</td>
<td>3</td>
</tr>
<tr>
<td>3 months</td>
<td>4</td>
</tr>
<tr>
<td>1.5 months</td>
<td>6</td>
</tr>
<tr>
<td>1 month</td>
<td>2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>
Table 5

Prestudy Locations of and Reasons for Participants’ Internet Use

<table>
<thead>
<tr>
<th>Location of Internet Use</th>
<th>Number of Participants</th>
<th>Reasons for Internet Use</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>28</td>
<td>Email</td>
<td>29</td>
</tr>
<tr>
<td>Home</td>
<td>19</td>
<td>News</td>
<td>15</td>
</tr>
<tr>
<td>Public library</td>
<td>5</td>
<td>Searching for information</td>
<td>11</td>
</tr>
<tr>
<td>Friends’ homes</td>
<td>2</td>
<td>Chatting</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Studying computers</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Watching movies</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Downloading music</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>54</strong></td>
<td><strong>TOTAL</strong></td>
<td><strong>68</strong></td>
</tr>
</tbody>
</table>
Data Collection and Recording

Students completed pre- and poststudy questionnaires in order to provide demographic information, as well as to assess student attitudes toward using computers in language learning and levels of computer comfort and use. The demographic information was used primarily as supporting information in the study to help me understand the population that was participating in the study. The questions of primary interest to me related to students' opinions about face-to-face and electronic communication and students' perceptions about the ability of computer-mediated and face-to-face communication to help improve their spoken competence. These questionnaires may be found in Appendix C and D.

Typing speed was measured for all participants at the beginning of the study through the use of an essay found in Appendix E. I went with the students to a computer lab. First, I instructed students to open their email accounts and enter my email address in the recipient line. Then, students were given an essay with 2,188 characters, including spaces, and were asked to copy as much of that essay into the email body as they could in 3 minutes. Participants began typing when I said, "go," and stopped typing when I said, "stop." Then, they were instructed to send their emails to me immediately. The dates and times of the sent messages confirm that students sent the messages immediately. From these tests, I was able to establish typing speeds for each participant by calculating the number of characters typed per minute. This information is important since typing speed would naturally affect the amount of output students could produce during the computer-mediated sessions (Wang & Hurst, 1997). Typing speed may also have affected how students perceived the computer-mediated sessions. Having typing speed information
allowed me to compare the computer-mediated output generated by good and poor typists, through a median split as discussed in the “Data Analysis” section.

Transcription

In order to analyze the dependent measures of this study, student discussions needed to be recorded and transcribed. This process was not problematic for the computer-mediated discussions, since discussions were automatically saved by the program and were later printed in their entirety for analysis. However, all spoken sessions were tape-recorded and transcribed by me. Although when superficially considered transcription appears to be a simple process, it is actually a complex process that deserves consideration from a methodological standpoint. The next few paragraphs serve to examine this issue.

Transcription was an important and problematic area of this study. Often, the process of transcribing data is viewed as problem-free by researchers, so they do not explain their use of conventions. However, transcription is not an objective process. Since the participants’ spoken words are filtered through the transcriber, the process can be very subjective in nature (Lapadat & Lindsay, 1999). For example, if transcribers do not fully understand what has been said, they will transcribe what most logically makes sense to them (Poland, 1995).

In its essence, the transcript represents a hybrid between written and spoken language. The words written on the page can never truly communicate the heart of the conversation, where words were directed to specific listeners in a particular emotional context (Kvale, 1996). Therefore, every transcript involves the act of selecting how much detail will be recorded and how this detail will be coded (Lapadat & Lindsay, 1999), and
researchers must select the type of transcription that best suits their purposes (Kvale, 1996).

In order to maximize the quality of transcription, researchers need to become more reflective about the processes they use, while acknowledging that transcription is merely a representation of an actual spoken event (Lapadat & Lindsay, 1999). Poland (1995) states, “one could envisage a methods section of a research paper containing a description of the steps taken to ensure audiotape quality, the directions provided to transcribers, and an assessment of the trustworthiness of the transcription” (p. 298).

The following sections detail some of these methodological decisions and problems encountered throughout the process.

**The recording process.** All face-to-face group sessions, whether in reading classes, or in the follow-up speaking classes, were recorded on audiotape. Each group received its own audiotape, recorder, and microphone. All tapes were new and of good quality, but the recorders and microphones varied in quality. In addition, many of the factors Poland (1995) lists limited the quality of the recordings. These factors include background noise, such as the sounds of other groups interfering, or the opening and closing of doors, shy or quiet speakers, difficult-to-understand accents, and the microphone being placed too far away from the speakers. In total, 2 of the 63 spoken sessions were completely unintelligible. In addition, another 3 could only be partly transcribed due to these problems.

Most of these problems did not factor into computer-mediated sessions. Participants were given a training session involving the use of synchronous communication using WebCT. This session seemed to alleviate any technological
problems as researcher observations revealed that students were able to use the program easily. Shy or reluctant participants simply did not surface during computer-mediated sessions. After each session, group discussions were saved and printed.

Originally, in the letter of information, students were informed that they would be able to choose a code name for themselves that would be used to code all questionnaires, assessments, and transcriptions. However, at the time the letter of information was written, the researcher was not aware that WebCT, as configured when used in Brock University, does not allow for code names. Thus, when students chatted, their full names appeared on the transcript. As such, anonymity, which is usually considered as one of the benefits of electronic communication, was not present. All participants verbally agreed that the researcher could create a two-letter code to represent each participant. This code was used on all questionnaires, assessments, and transcriptions.

The process of transcription. I was the only transcriber for this study. As such, there was no need to train other transcribers. While I, as transcriber, was an experienced ESL teacher, having only one transcriber may have affected how well the transcription matched the oral discussion, especially for difficult-to-understand sections. In addition, some of the transcription may have been compromised due to transcriber fatigue. However, I made every effort to ensure accuracy by taking regular breaks during transcription and checking over transcribed material. The amount of transcription involved, 63 spoken sessions, each approximately 15 minutes in length, made it impractical to employ more than one transcriber in terms of both time and money.

Since the transcription was to be used for quantitative analysis, including the number of turns, number of words, and number of AS-units produced, I decided to
transcribe all utterances verbatim, or word for word, including repetitions and minimal responses such as “mhm.” The nonverbal aspects of the conversations were not considered in this study. Actual symbols used in the process of transcription are included in Appendix F. These symbols were taken from literature by Schiffrin (1987) and Silverman (1993), and were adapted for the purposes of this study. Ideally, symbols used in previous research comparing face-to-face and electronic communication (Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996) would have been used; however, the transcription practices or symbols used were not explained in these studies. Therefore, discourse analysis literature was consulted in order to find an appropriate system of transcription symbols. The symbols detailed by Schiffrin (1987) and Silverman (1993) accommodate the different problems encountered during transcription such as overlapping utterances and unclear utterances.

Possible errors. The errors found in the transcription fall into the category Poland (1995) describes as accidental errors. For example, some speech may not have been transcribed due to an overlap of speakers, or interfering background noise, such as laughter. In addition, some words or phrases were unintelligible, or may have been mistaken for other words or phrases. In the case of unintelligibility, the symbol “xx” was used to denote what the transcriber thought was one unintelligible word. In addition, words that were unclear to the transcriber were placed in parentheses and followed by a question mark. A sample of a transcribed session can be found in Appendix G.

Quantity of Output Produced

Once all sessions were recorded and transcribed, the number of turns taken per minute was calculated for each participant for each of the four different types of sessions.
These four sessions included face-to-face reading classes, computer-mediated reading classes, speaking classes following face-to-face reading classes, and speaking classes following computer-mediated reading classes. Sessions were not controlled for length of time so that students would not feel pressured by a set time limit. Therefore, the raw number of turns taken per session was not comparable. By calculating number of turns taken per minute, the researcher could compare the data according to this standard length of time. This allowed the researcher to compare how often participants contributed to the discussion in each session. In addition, the researcher could make comparisons across sessions to observe whether students contributed more often in electronic or face-to-face sessions, and in spoken sessions following electronic ones, or spoken sessions following face-to-face discussions.

In the electronic sessions, each time a participant hit the "send" button, it was counted as a turn. Sometimes, if other members of the group were not responding, participants would hit "send" repeatedly, without typing a message as if to make the statement that they were waiting for a response. Each time a participant hit "send," their code name appeared on the transcript. In the following example, Ri took 7 turns.

032B Chat Session 3B
Ri: yo-----****
Ri:
Ri:
Ri: I'm waiting for you ****
Ri:
Ri: What are you doing???
Ri:

At other times, participants would break their thought into a number of turns. Although these instances were counted as one thought, or AS-unit, they were counted as separate turns. In the following example, Ba takes 4 turns and produces 3 AS-units, as his
second and third turns constitute one AS-unit. In addition, Se takes 2 turns and produces 2 AS-units, one that overlaps his first and second turns. A sample electronic session can be found in Appendix H.

032 Chat Session 2C
Ba: <<some time the feeling is not good ..when we talk use the computer.>>
Se: <<yes,>>
<<but if you dont have money, to buy a phone card, you need to use the computer>
Ba: <<ak..>
Ba: <where are you ..>>
Ba: <<what are you doing.>>
Se: <because its cheaper>>

In face-to-face sessions, there were some instances of turn continuations. For example, if a participant spoke, was overlapped by another participant, but continued to speak, it was considered a turn continuation, hence one turn. Overlap is denoted by the [...] symbols. The left bracket denotes the point at which overlap begins, and the right bracket reveals the point at which overlap ends.

032B Speaking Session 5
Fl: do you know [people can can]=
Ta: [when when]
Fl: =make a wish when they shoot that kind of star?

In this case, Ta tries to interrupt, overlapping Fl's speech. However, Fl continues speaking. As such, in this case both Fl and Ta have taken one turn.

In some instances, participants made contiguous utterances, meaning that they spoke quickly, with no pause between speakers. Contiguous utterances were marked with =. They were considered separate turns except when one speaker was clearly leading the discussion, with other participants merely providing minimal responses to convey that they were paying attention. In these cases, the leading speaker was considered to be taking only one turn.
032 FTF Session 1C
Le: art market is so expensive when the people that make it is dying, pass away because uh eh, in their their time nobody knows a lot of about=
Bi: =ya=
Le: =someone=
Bi: =ya=
Le: =but when the people die every=
Bi: =ya=
Le: =everybody know about

In this example, Le is clearly leading the discussion. Bi interacts by giving Le
minimal responses in order to show Le he is paying attention. As such, Bi is considered
to have taken three turns, while Le has only taken one turn.

Another measure of quantity coded was the number of AS-units students
produced per minute. In the data, each AS-unit is bracketed as follows:

032 FTF Session 1B
Fu: «<<was he genius?>>

If an AS-unit extended over one turn, single brackets were used to denote continuation as
in the following example:

032 FTF Session 2A
Se: «<<for you, you are from other country.>>
<<we are Spanish=>
Hi: «<<mhm=>>
Se: «<speakers>>

Se’s statement “we are Spanish speakers” constitutes one AS-unit even though it is
interrupted by Hi’s “mhm.” Therefore, the single brackets show continuation of the AS-
unit.

While Foster et al. (2000) claim the AS-unit is superior to the t-unit as a
measurement of the complexity of spoken discourse, problems were still encountered.
For example, in some cases where “because” was used, it was difficult to know whether
it was subordination, and thus part of another AS-unit, or an answer to a “why” question
thereby being a separate AS-unit. Kitade (2000) notes this problem as the result of the fact that multiple topic threads are being discussed in chat at the same time. As such, adjacency pairs, or question-answer sequences, are not always adjoining. The following electronic example illustrates this problem.

032 Chat Session 2A
Ba: <<i didn't use when i was back home>>
   <<but now i need it>
Hi: <<Why you don't need e-mail in you country?: Ba>>
Ba: <because i want to talk to my family and friends>>
An: <<remember all the extreme is bad>>
Hi: <<Yes, I think so,>>
   <<it is cheaper than TEL,>>
Ba: <<because i communicated with them face to face>>

Ba’s second utterance could be interpreted as an answer to Hi’s question. However, based on the context, it is probably a subordinate clause of his first utterance. As such, it is marked with a single bracket to show AS-unit continuation of the first utterance. Ba’s final contribution then logically follows as the answer to Hi’s question.

Another common problem with AS-units involved the coding of the word “yes.” In certain cases, it was difficult to determine whether “yes” was being used as an ellipted utterance or as a filler, as in the following example.

032 Chat Session 1C
Bi: <<but ...not every body ..is often serious...>>
Se: <<yes,>>
   <<my parents are doctor ,>>
   <<and i know that the time its esential in teh medicine>>

In this electronic example, it is unclear whether Se’s “yes” is an ellipted agreement with Bi’s statement, as in “yes, I agree,” or whether it is simply a filler or a form of encouragement. However, since this example was from electronic data, it was assumed
that Se would be less likely to use a filler. As such, it was treated as an ellipted statement and coded as a separate AS-unit.

Finally, coordination of independent clauses with a coordinating conjunction, such as "and, so, but, or, for, nor, yet" was at times confusing during the coding stage. For consistency, it was determined that coordinated independent clauses with the same subject would constitute one AS-unit while those with different subjects would be coded as two separate AS-units.

032B Speaking Session 3
Mm: <<you you you!>>
<<but now because I don't need to get a to have cell phone now because I'm not xx a little busy>>
<<so sometimes I thought "oh, I need">>
<<but not necessary>>

In this example, "but not necessary" is coded as a separate AS-unit because the inferred subject is "it (is)" which is different from the previous coordinated clause’s subject "I."

032B FTF Session 2B
Su: <<and I don't agree his opinion because he said, when we using this Internet he want to separate the person because they don't see somebody>>
<<for example they they work together but they use the Internet to talk about>>

In this example, Su’s second AS-unit contains two independent clauses joined with the coordinating conjunction “but.” In this case, the two clauses are coded as one AS-unit because they share the same subject, “they.”

As a final measure of quantity, the number of words produced per minute was calculated for each participant for each of the four types of sessions. As stated in chapter 2, the definition of word used in this study is “a speech sound or series of speech sounds that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use” (Merriam-Webster online dictionary, 2003). As also stated
in chapter 2, in addition to the Merriam-Webster definition, compound words such as “raincoat” and “girlfriend” are also being counted as one word in this study. This includes: repetitions of words; false starts, where a participant may begin to say one idea and then change to another; hedges, including expressions such as “um, uh;” and minimal responses, such as “uh huh, ya.” It was found that a much larger number of repetitions, false starts, hedges, and minimal responses occurred in the spoken data, as opposed to the electronic data. This may be because the electronic medium allowed participants more time to process their ideas before uttering them, while in the spoken sessions, participants may have felt more pressure to fill in the silences before they became awkward. The inclusion of repetitions, false starts, hedges, and minimal responses may therefore have artificially inflated the number of words produced during spoken sessions. The alternative to counting all of these utterances was to make decisions on whether each repetition, false start, hedge, and minimal response constituted a “word” or not. This option was thought to be rather arbitrary and would remove some of the consistency involved in coding the data. For example, it was often unclear whether a repetition of a word was an unnecessary stutter, or whether it was repeated for emphasis or in response to a look of misunderstanding from a conversation participant. In addition, minimal responses such as “uh huh” were often not distinguishable from words that were used for the same function, such as “yes.”

**Quality of Output Produced**

As a measure of syntactic complexity, the number of words produced per AS-unit was calculated for each participant in each type of session. A higher number of words per AS-unit indicates more complex speech since it generally suggests the use of more
subordination, which is indicative of complex speech. The calculation of words per AS-unit allowed for a comparison of the syntactic complexity of electronic and face-to-face sessions. It also enabled a comparison of follow-up speaking sessions to determine which treatment, either electronic or face-to-face, more greatly improves students' spoken output in terms of quality.

Data Analysis

Questionnaires were analyzed descriptively in order to determine the general demographic characteristics of both participating classes as well as relevant computer experience. Therefore, answers to questions about characteristics such as age, country of origin, first language, computer experience, and computer comfort levels were tallied to achieve an understanding of the study participants. This demographic information was used as supporting information in the study. In addition, answers to open-ended questions appearing on the questionnaires were analyzed to find any patterns or themes that existed in the student responses. For example, one question on the poststudy attitudinal questionnaire asked students what language skills they felt were improved through their use of computer-mediated communication and why. Answers to this question were analyzed for themes and patterns related to students' perceptions of the possible benefits of computer-mediated communication.

A median split was used to divide participants into one of two keyboarding groups, good or poor, based on their typing skills. Two female students were not present for the keyboarding assessment, so they were not included in these calculations. First, the median keyboarding score was determined as 114.5 characters per minute. Then, the 14
students whose typing scores fell above the median were identified as the “good” typing group. The 14 students with typing scores below the median score were identified as the “poor” typing group. No participants scored exactly at the median. Since there was an even number of participants who completed the keyboarding assessment, 28, exactly half were identified as the “good” keyboarding group and half as the “poor” keyboarding group. In addition, 7 males and 7 females were identified as “good” typists whereas 8 males and 6 females were identified as “poor” typists. Therefore, gender did not seem to relate to keyboarding skills. Mann-Whitney U tests were then completed to see whether the good and poor typists differed significantly in the quantity and quality of output they produced during electronic sessions as revealed by the mean number of turns per minute, number of AS-units per minute, number of words per minute, and number of words per AS-unit. The Mann-Whitney U test is the nonparametric equivalent of the t-test. It is used to compare the means of two different independent samples and to determine whether the difference in means is significant (George & Mallery, 2003). In this case, the two independent samples compared were the “good” and “poor” typing groups.

Nonparametric statistical tests were used in this study since the data were not normally distributed. Lack of normalcy was determined by examining the statistics for skewness and kurtosis. Skewness refers to scores piling up at one end or another of a scale while kurtosis refers to scores either piling up at the middle of the distribution or spreading out to the sides (Creswell, 2002). A normal distribution has skewness and kurtosis values of 0.0. However, values between +2 and −2 are considered acceptable. In this study the skewness and kurtosis values were outside the +2 to −2 range. Therefore,
the data were considered not normally distributed and nonparametric tests were used. This finding was not surprising since the sample size of the study was small.

For each participant, data produced and recorded during the 6 weeks of data collection were tabulated as revealed in Appendix I. In the study, each participant was involved in three electronic sessions, three face-to-face sessions, three post-electronic speaking sessions, and three post-face-to-face speaking sessions. For each dependent variable, such as number of turns taken, it was necessary to have only one score, not three, for each of the four types of sessions. Therefore, the number of turns taken during electronic sessions was totalled in addition to the total number of minutes spent in conversation during electronic sessions. These two variables were then used to create a derived score for the participant, turns taken per minute during electronic sessions. This process was repeated for each of the variables for all types of sessions. It was necessary to have only one score in order to complete paired-samples analyses for the different research questions. Then, descriptive statistics were performed to see trends in the results. Finally, a variety of inferential tests were completed to determine whether differences in means were significant.

For research questions 1 and 2, relating to the quantity and quality of output produced in face-to-face versus computer-mediated discussions, a series of Wilcoxon matched-pairs tests were run to determine whether these two types of discussions produced significantly different output. Wilcoxon tests were also run for research question 3 to determine whether speaking sessions that follow face-to-face discussions differ significantly from speaking sessions that follow electronic discussions in the quantity and quality of output produced. Wilcoxon tests were used instead of Mann-
Whitney U tests since these research questions addressed paired samples rather than independent samples. In other words, the groups of individuals experienced “both conditions of the variables of interest” (George & Mallery, 2003, p. 134). All individuals participated in face-to-face and computer-mediated discussions; all participants were involved in speaking sessions that followed face-to-face discussions and speaking sessions that followed computer-mediated discussions. In addition, Friedman tests were run in order to determine whether there were any significant differences in the quantity and quality of output produced in all three speaking sessions, including face-to-face reading sessions, post-electronic speaking sessions, and post-face-to-face speaking sessions. In this case, Friedman tests were used since more than two related samples were being tested for significant differences. For research question 4, Mann-Whitney U tests were used to understand whether any significant differences exist in the quantity and quality of output produced by females and males. Mann-Whitney U tests were used since females and males comprise two independent samples. Nonparametric tests were used in all instances since the data were not normally distributed.

The files of three participants were found to have missing data. Two participants were missing data for post electronic speaking sessions, and two participants were missing data for post-face-to-face speaking sessions, due to skipping these sessions. This led to 6.90% of post-electronic speaking session data to be lost in addition to 6.90% of post-face-to-face speaking session data. These missing values were replaced with the series mean in order to keep the data set intact. According to George and Mallery (2003) up to 15% of missing data can be replaced by the series mean without affecting the results significantly. These cases represent less than 15% of the total data.
Limitations

Some limitations are inherent in the design of this study. For example, since I assumed a double role as researcher and teacher, the possibility exists that face-to-face and computer-mediated sessions may have been handled differently. For example, I may have had more enthusiasm for the electronic classroom sessions, and thus taught those classes with more energy, thereby affecting students’ motivation levels, and perhaps ultimately, their quantity and quality of output. However, I made every effort to handle face-to-face and computer-mediated sessions equally in order to guard against researcher bias. In addition, students may have felt pressured to participate in the study since I was also their teacher. For example, the one student who chose not to participate in the study also skipped many classes. While the student skipped all classes, and not just the ones involved in the study, his discomfort from choosing not to participate in the study may have been one cause of his skipping behaviour. Another student signed the consent form but then skipped many classes, causing her data set to be incomplete and eventually dropped from analysis. This student may have felt pressure to sign the consent form while not wanting to be part of the study. However, I clearly informed the students that participation would not affect course marks either positively or negatively. This was ensured by the fact that I did not know who chose to participate in the study until after I submitted the final grades for the class.

At the same time, my assuming a double role as researcher and teacher may also have been a strength in that I had a high level of interest vested in the study. As such, this may have led to a higher level of energy and organization being placed into the classes. Also, in terms of transcription, my experience as an ESL teacher may have resulted in
high levels of transcription accuracy since I was familiar with the voice quality and pronunciation of the students.

On the other hand, there are some limitations related to the speaking teachers who were not the researcher. While I led the face-to-face and electronic reading classes, the post-face-to-face and post-electronic speaking classes were taught by two different teachers. These teachers may have become frustrated with research taking up their class time. Thus, some of the speaking sessions were cut short, resulting in a loss of both the quantity and quality of the data. This situation occurred with one of the speaking teachers toward the end of the data collection period for unknown reasons.

Next, the development of the attitudinal questionnaire is a limitation. The questions included in the questionnaire are not based on the literature and are not standardized questions. However, the questions are based on my experience as a teacher and interest in different aspects of students' backgrounds, experiences, and opinions. In addition, previous studies on face-to-face and electronic communication were consulted to discover what questions these studies explored, both in terms of demographics and attitudes (Beauvois, 1998; Chun, 1994; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996).

In addition, the activity of reading the articles may have had some limitations. Each week, one article was chosen from the reading class text for students to read and discuss during the face-to-face and electronic reading classes, for a total of six different articles, one for each week of data collection. In addition, a second, shorter article related in topic to the first article was selected each week for students to read in preparation for discussion in follow-up speaking classes. Slower readers might have felt rushed, and may
not have had enough time to understand the vocabulary and meaning of the articles fully. Also, although the articles were taken from the same reading text, the articles differ in length and complexity, which could have led to varying comprehension levels in the students. Also, some articles may have dealt with concepts from different cultural perspectives than those of the students', leading to difficulties in how students could relate to, and hence discuss the topics. However, all of the articles were taken from the class text, an ESL text that is regularly used for intermediate level classes in the IELP (Blanchard & Root, 1997). Therefore, the activities used and possible difficulties encountered in the research did not differ from normal classroom practices in the IELP.

Another possible limitation in the study involves the methods used to record data. The interactions that occurred in the face-to-face reading and follow-up speaking sessions were recorded on audiotape. There is a possibility that participants in these sessions were inhibited by the presence of the audio recorder, causing them to limit their contributions to the discussion. Students should have been less inhibited by the use of the audio equipment as they became more accustomed to the procedures of the study. Although the computer-mediated sessions did not involve audiotapes, students may still have been inhibited in their discussions since they were aware that their interactions were being recorded by the computer. However, these factors were mitigated by the participants' knowledge that transcription and coding data would remain anonymous.
Ethics

A summary of the research proposal, including the letter of information and informed consent form was given to Brock University’s Research Ethics Board in October, 2001. This study was approved by the Research Ethics Board on October 18, 2001. A copy of the ethics approval can be found in Appendix J. One student did not sign a consent form for the study. While this student was required to participate in all sessions when present, data were not released for this student. In addition, every effort was made to avoid potentially negative effects on students and to follow high ethical standards.
CHAPTER FOUR: FINDINGS

This chapter summarizes the findings of this study. First, an overview of observed differences between face-to-face and electronic communication is presented. Then, results are presented in sections that correspond to the five research questions. The questions to be answered include the following:

1. Is there a difference in the quantity of small-group interaction during electronic versus face-to-face discussions?

2. Is there a difference in the quality of small-group interaction in electronic versus face-to-face discussions?

3. Is there a difference in the quantity and quality of follow-up face-to-face interaction after electronic versus face-to-face discussions?

4. Do males and females produce verbal output differently in electronic versus face-to-face discussions?

5. What are students’ perceptions of the differences between electronic and face-to-face discussions and of the value of synchronous computer-mediated discussions?

Tables 9-20 present the findings of research questions 1-5.

Characteristics of Face-to-Face Sessions

Face-to-face sessions generally followed the format typical of informal conversations. Conversations usually began with one student asking a general question, such as “What do you think about the article?” Alternatively, some groups began by negotiating what aspect of the topic they should discuss. During the discussion, students rarely quoted or referred to the article. Instead, they took the general topic of the reading
as a starting point. If the article did not appeal to them, they tended to widen the scope of their conversation. For example, during discussion of an article about Picasso, many students asked the much broader question, "If you had the money, would you buy a painting by a famous artist?" This broadening of the topic was acceptable and expected, since the readings were merely meant to be a starting point for discussion. Even though students widened the scope of the topic during discussion, the great majority of face-to-face sessions remained on-topic. Sometimes one participant took over the conversation, acting as an interviewer, and deciding when to begin and end different threads of discussion. However, even with these occurrences of conversational dominance, all members of each conversational group participated in the face-to-face discussions. In addition, participants often worked collaboratively to help each other find words to express their ideas, or to work out the pronunciation of difficult words as in the following example.

032B FTF Session 1B
Ch: <<acupuncture.>>
<<but some how to say this..um...press?>>
Mi: <<press?>>
Sj: <<press?>>
Ch: <<ya>>
Sj: <<pressure?>>
Ch: <<pressure..um>>...
Sj: <<xx xx xx>> ((very quietly)).....
Ch: <<message>>
Mi: <<message>>
Ch: <<message, message>>
Sj: <<uh, massage>>
Ch: <<ya, massage.>>
<<yes. mess- massage is good.>> ((laughs))
Sj: <<ya, very good>>
Finally, face-to-face discussions also generally included closings to the conversations, where one or more participants would signal the end of the discussion with a word or phrase such as "good-bye," "thank you," "that's all," or "time to finish."

**Characteristics of Electronic Sessions**

Electronic sessions differed from face-to-face sessions on a number of levels. First, when opening the discussion, students tended to establish contact by saying hello before beginning discussion of the topic at hand. Once contact was made, conversations began in much the same way as face-to-face discussions. Actual discussions were more disjointed and difficult to follow than face-to-face discussions. Sometimes electronic discussions appeared to be a series of monologues with no contribution from peers occurring. At other times, students spread out their related thoughts over a number of turns. This contributed to the disjointedness of the conversation since other students interrupted these thoughts with their own contributions. This phenomenon is illustrated in the following example, where Le continues his thoughts over a number of turns.

032 Chat Session 2
Le: <<Im agree and disagrrre at the same time>
Do: <<yes!!>>
Le: <because some time is more useful to send an email>>
Le: <<even>
Le: <some time is better because>
Do: <<everything has goodthings and bad things>>
Fu: <<e-mail brings us some problem sometimes.>>
Le: <you have by wroten the arranments that you do>
Do: <<what kind of problems fu?>>
Le: <because some times you can say that yes for some problems>>
<<but when you must to do that you say not.>>

This example reveals how the turn structure of electronic communication differs from that of face-to-face conversations. Other interesting differences also occurred in the
interaction of electronic discussions. For example, students sometimes specified in their entries to whom they were directing their comments or questions, as in this example.

032 Chat Session 1A
Hi: <<Chinese medicine is not popular in Mexico?: Ma>>

In this case, Hi is directing her question specifically to Ma. In addition, impatience was often expressed when participants did not respond quickly enough.

032 Chat Session 2
Le: <<What do you think about the article ?>>
Fu: <<well, what is talking about in article?>>
Do: <<I am pretty to agree this authour>>
Fu: <<How Do?>>
Le: <<Do, we are waiting for your answer >>
Le: <<hurry hurry>>

Electronic discussions contained many instances of off-topic comments and joking. In the following example, taken from one electronic discussion, Le asks about Ba’s future plans after the IELP course finishes, a thread of discussion not related to the assigned topic, black holes. In addition, Ba tells one discussion participant that she is cute and he plays with the keyboard, perhaps indicating his boredom with the topic or task.

032 Chat Session 3B
Le: <<What are you going to study Ba ?>>
Ma: <<yes how yo can talk?>>
Ba: <<u r cute too>>
Ba: !!!!!!!!!!!!!!!!!!!!!!!!!!!!
Le: <whwn you finishe this curse ?>>
Ba: HAAAAAAAAAAAAAAAAAHGAAAAAAAAAAAAAAAAA
Ba: JAJASAJA
Ba: jkngbjtruitohgldrhihdhr;ilghldirg

Emoticons, or keyboard characters used to express emotions, were used, but only by Asian students. Four Korean students, one Japanese student, and one Chinese student used emoticons. Only one male student included emoticons in discussions. The following examples are taken from different electronic discussions. When asked what the emoticons
represented, students explained that they were used to represent a smile. The following examples come from a number of different electronic sessions.

Ma: ^^
Fl: ^.^
Su: -.-;;
Yo: :)
Jo: -_-+
Sj: *^>*

In addition, laughter was expressed in written form presumably as a way to compensate for the lack of visual cues. Many students expressed laughter by writing “hahahaha” while some Latin students expressed laughter by writing “jajajaja.”

Unfortunately, one instance of flaming, or hostile language, also occurred. In the following example, Af tells Ta to go back to China when Ta does not respond to Af’s encouragement to improve his English by memorizing vocabulary.

032B Chat Session 2B
Ta: <<yes>>
<<but i hate mameriing voucabulary>>
Af: <<I have done this for two months>>
<<and I think my vocabulary has improved a little.>>
Ta: <<oh ye?>>
Af: <<o.k TAO so, go back to china!!!!!!!!!!!!!!!!!!>>
Ta: <<i will try>>
Ta: <<no>>
Af: <<O.k try it>>
<<and you will see>>
Ta: <<why you ask me to go back>>
Af: <<because you said you don't like "mamerling" vocabulary....>>

No instances of flaming were found in face-to-face discussions. Finally, students often self-corrected their electronic mistakes by repeating a word they misspelled, or apologizing for being incorrect by writing “oops, mistake, sorry.” When closing the
discussion, students usually ended in a similar fashion to a telephone or face-to-face conversation, writing “good-bye” or “see you.”

**Experimental Results**

*Research Question 1. Is there a difference in the quantity of small-group interaction during electronic versus face-to-face discussions?*

The dependent measures used to determine the quantity of output produced in electronic and face-to-face sessions were calculated. These included the number of turns taken per minute, the number of AS-units produced per minute, and the number of words produced per minute. The quantity of output produced in electronic and face-to-face sessions was compared and tested for significance with Wilcoxon matched-pairs tests. Electronic and face-to-face sessions differed significantly on all three measures of quantity. The mean number of turns taken per minute during electronic sessions was 1.40, while the mean score for face-to-face sessions was 3.45. Wilcoxon tests showed that for turns taken per minute, the scores of face-to-face session participants were significantly higher than the scores of electronic session participants, $p<.001$. Face-to-face session participants also scored significantly higher $p<.001$, than electronic session participants on the measure of AS-units produced per minute, with mean scores of $M=4.85$ and $M=1.29$, respectively. Finally, the mean number of words produced per minute by face-to-face session participants $M=28.67$, was significantly higher ($p<.001$) than the mean number of words produced per minute by electronic session participants $M=6.67$.

Following the standard of most social science studies, a $p$ value of less than .05 indicates that the results are statistically significant. A $p$ value of less then .05 means that there is a
less than 1 in 20 probability that a certain result occurred by chance (George & Mallery, 2003). The results for research question 1 are depicted in Table 6.

In order to determine how much keyboarding ability affected the quantity of output produced during electronic sessions, a median split was used to compare the quantity measures of good and poor typists. The 15 typists with keyboarding test scores higher than 114.5 characters per minute were identified as “good typists” while the 15 typists with scores lower than 114.5 characters per minute were identified as “poor typists.” Mann-Whitney U tests were performed to determine whether good and poor typists differed significantly on measures of quantity in the electronic sessions. The findings are presented in Table 7. For mean number of turns per minute, good typists scored a mean of $M=1.55$ while the mean for poor typists was $M=1.35$. However, these scores were not statistically significant in their differences, since the $p$ value is .168. Mean scores for AS-units produced per minute also varied for good typists ($M=1.50$) and poor typists ($M=1.18$). However, these differences were also found to lack statistical significance ($p=.098$). Finally, good typists scored significantly higher than poor typists on the measure of mean words produced per minute, with mean scores of $M=8.40$ and $M=5.38$, respectively, $p=.013$. While some differences were found in the quantity of output produced by good and poor typists, it is evident that typing ability alone cannot account for the differences existing in the quantity of output produced during face-to-face and electronic reading sessions. The difference is so great that even the best typists cannot keep up with face-to-face interactions.
Table 6

Summary of the Quantity of Interaction Produced in Electronic and Face-to-Face Reading Sessions

<table>
<thead>
<tr>
<th>Measure of Quantity</th>
<th>Electronic $M$ (SD)</th>
<th>Face-to-Face $M$ (SD)</th>
<th>$z$ score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns/Minute</td>
<td>1.40 (0.91)</td>
<td>3.45 (1.51)</td>
<td>-4.27**</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>1.29 (0.58)</td>
<td>4.85 (2.13)</td>
<td>-4.78**</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>6.67 (3.22)</td>
<td>28.67 (13.82)</td>
<td>-4.78**</td>
</tr>
</tbody>
</table>

Note. The $z$ scores are derived from Wilcoxon matched-pairs tests. Tests were two-tailed. * $p < .05$; ** $p < .001$.
Table 7

Summary of the Differences in Quantity of Interaction Produced by Good and Poor Typists in Electronic Sessions

<table>
<thead>
<tr>
<th>Measure of Quantity</th>
<th>Good Typists M (SD)</th>
<th>Poor Typists M (SD)</th>
<th>z score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns/Minute</td>
<td>1.55 (0.93)</td>
<td>1.35 (0.94)</td>
<td>-1.38</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>1.50 (0.65)</td>
<td>1.18 (0.44)</td>
<td>-1.65</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>8.40 (3.34)</td>
<td>5.38 (2.13)</td>
<td>-2.48*</td>
</tr>
</tbody>
</table>

Note. The z scores are derived from Mann-Whitney U tests. Tests were two-tailed.
* p < .05; ** p < .001.
Research Question 2. Is there a difference in the quality of small-group interaction in electronic versus face-to-face discussions?

In order to compare the syntactic complexity, or quality, of output produced during electronic and face-to-face sessions, the mean number of words produced per AS-unit was calculated for each participant in each type of session. Wilcoxon matched-pairs tests were used to test for significance. It was found that participants of face-to-face sessions scored higher \((M=6.06)\) than participants of electronic sessions \((M=5.11)\) on this measure of syntactic complexity. The results were found to be significant, with a \(p\) value of .018. These results are summarized in Table 8.

The mean scores of good and poor typists were also compared on this measure to determine whether typing ability hindered the syntactic complexity of students' output during electronic sessions. According to the Mann-Whitney U test, good typists were found to perform significantly better \((p=.027)\) than poor typists on this measure, with mean scores of \(M=5.64\) and \(M=4.62\), respectively. The results of this comparison are presented in Table 9.

Research Question 3. Is there a difference in the quantity and quality of follow-up face-to-face interaction after electronic versus face-to-face discussions?

Once the comparisons of quantity and quality of electronic and face-to-face reading sessions were completed, these same dependent measures were used to see whether any significant differences existed between speaking sessions that followed electronic sessions and speaking sessions that followed face-to-face sessions. This information was used to determine whether electronic or face-to-face sessions serve as better preparation for the development of students' verbal output in terms of the quantity
Table 8

**Summary of the Quality of Interaction Produced in Electronic and Face-to-Face Reading Sessions**

<table>
<thead>
<tr>
<th>Measure of Quality</th>
<th>Electronic M (SD)</th>
<th>Face-to-Face M (SD)</th>
<th>z score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words/AS-Unit</td>
<td>5.11 (1.36)</td>
<td>6.06 (2.43)</td>
<td>-2.38*</td>
</tr>
</tbody>
</table>

*Note. The z score is derived from a Wilcoxon matched-pairs test. The test was two-tailed. *p < .05; **p < .001.*
### Table 9

**Summary of the Differences in Quality of Interaction Produced by Good and Poor Typists in Electronic Sessions**

<table>
<thead>
<tr>
<th>Measure of Quality</th>
<th>Good Typists</th>
<th>Poor Typists</th>
<th>z score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Words/AS-Unit</td>
<td>5.64 (1.19)</td>
<td>4.62 (0.98)</td>
<td>-2.21*</td>
</tr>
</tbody>
</table>

*Note. The z score is derived from a Mann-Whitney U test. The test was two-tailed. * \( p < .05; ** \( p < .001.\)
and quality of output produced during speaking sessions. Wilcoxon matched-pairs tests were used to determine levels of significance. In terms of mean turns taken per minute, participants of post-face-to-face sessions scored a mean of $M=3.27$ while the mean of participants of post-electronic sessions was $M=2.92$. However, with a $p$ value of .102, these differences were not found to be statistically significant. For the measure of mean AS-units produced per minute, participants of post-face-to-face sessions and post-electronic sessions scored means of $M=4.64$ and $M=4.33$, respectively. However, a $p$ value of .289 determined that these differences were not statistically significant. Finally, participants of post-face-to-face sessions scored a mean of $M=25.42$ for the measure of mean words produced per minute. On the other hand, participants of post-electronic sessions scored a mean of $M=25.19$. These differences also lacked statistical significance ($p=.943$). As a measure of quality, a comparison was made of the mean number of words produced per AS-unit in post-electronic and post-face-to-face sessions. In this case, the mean for post-electronic sessions was $M=5.86$ while the mean for post-face-to-face sessions was $M=5.34$. However, with a $p$ value of .094, these differences were not found to be statistically significant. Thus, there appear to be no statistically significant differences in the effects of electronic and face-to-face sessions on spoken output. These results are presented in Table 10.

After comparisons of the post-electronic and post-face-to-face speaking sessions were completed, a comparison of all three spoken sessions was completed using the Friedman test for significance. This allowed the researcher to understand whether participants performed better during post-face-to-face sessions as a result of a practice effect of speaking. Interestingly, on all measures of quantity and quality, no statistically
Table 10

Summary of the Quantity and Quality of Interaction Produced in Speaking Sessions That Follow Electronic and Face-to-Face Reading Sessions

<table>
<thead>
<tr>
<th>Measures of Quantity and Quality</th>
<th>Post-Electronic Speaking Session $M$ (SD)</th>
<th>Post-Face-to-Face Speaking Session $M$ (SD)</th>
<th>z score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns/Minute</td>
<td>2.92 (1.21)</td>
<td>3.27 (1.65)</td>
<td>-1.64</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>4.33 (2.06)</td>
<td>4.64 (2.48)</td>
<td>-1.06</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>25.19 (14.37)</td>
<td>25.42 (14.63)</td>
<td>-0.72</td>
</tr>
<tr>
<td>Words/AS-Unit</td>
<td>5.86 (1.54)</td>
<td>5.34 (1.71)</td>
<td>-1.68</td>
</tr>
</tbody>
</table>

*Note. The z scores are derived from Wilcoxon matched-pairs tests. Tests were two-tailed. * $p < .05$; ** $p < .001$. 
significant differences were found in the mean scores produced during face-to-face reading sessions, post-electronic speaking sessions, and post-face-to-face speaking sessions. Thus, it appears that the hypothesis of a practice effect can be discounted since no statistical differences exist in the quantity and quality of output produced by students in the three types of oral sessions. These results are depicted in Table 11.

**Research Question 4. Do males and females produce verbal output differently in electronic versus face-to-face discussions?**

Using the Mann-Whitney U-test, no significant differences were found in the verbal output produced by males and females in the reading and speaking sessions. Despite this fact, results are summarized here and in Table 12. In terms of quantity of output produced, females produced means of 1.49 and 3.42 turns per minute during electronic reading sessions and face-to-face reading sessions, respectively. On the other hand, males produced means of 1.30 and 3.48 turns per minute during electronic and face-to-face sessions, respectively. Differences between female and male means were found to lack statistical significance. In terms of the speaking sessions, females produced means of $M=2.92$ and $M=3.34$ for post-electronic and post-face-to-face speaking sessions while males produced means of $M=2.92$ and $M=3.20$ for post-electronic and post-face-to-face speaking sessions. These means were not found to have statistically significant differences. For the measure AS-units produced per minute, females produced a mean of $M=1.35$ during electronic reading sessions while males produced a mean of $M=1.24$ AS-units per minute during these same sessions. During face-to-face reading sessions, females produced a mean of $M=4.84$ AS-units per minute while males scored a mean of $M=4.86$ AS-units per minute. In following speaking sessions, the mean number of AS-
Table 11

*Summary of the Quantity and Quality of Interaction Produced in All Spoken Sessions*

<table>
<thead>
<tr>
<th>Measures of Quantity and Quality</th>
<th>Face-to-Face Reading Session M (SD)</th>
<th>Post-Electronic Speaking Session M (SD)</th>
<th>Post-Face-to-Face Speaking Session M (SD)</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turns/Minute</td>
<td>3.45 (1.51)</td>
<td>2.92 (1.21)</td>
<td>3.27 (1.65)</td>
<td>.670</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>4.85 (2.13)</td>
<td>4.33 (2.06)</td>
<td>4.64 (2.48)</td>
<td>.393</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>28.67 (13.82)</td>
<td>25.19 (14.37)</td>
<td>25.42 (14.63)</td>
<td>.082</td>
</tr>
<tr>
<td>Words/AS-Unit</td>
<td>6.06 (2.43)</td>
<td>5.86 (1.54)</td>
<td>5.34 (1.71)</td>
<td>.202</td>
</tr>
</tbody>
</table>

*Note.* The chi-squares are derived from Friedman tests. All degrees of freedom = 2.

* *p < .05; ** p < .001.
units produced per minute by females during post-electronic sessions was $M=4.24$, while for males it was $M=4.43$. Finally, in speaking sessions following face-to-face reading sessions, females produced a mean of $M=4.43$ AS-units per minute. Meanwhile, males produced a mean of $M=4.85$ AS-units per minute. No statistically significant differences were found in the number of AS-units females and males produced. In terms of words produced per minute, females produced a mean of $M=6.75$ during electronic reading sessions while the mean for males was $M=6.59$ during these same sessions. For face-to-face reading sessions, females produced a mean of $M=26.61$ words per minute while males produced a mean of $M=30.74$ words per minute. During post-electronic speaking sessions, females produced a mean of $M=24.42$ words per minute. Meanwhile, males scored a mean of $M=25.97$ words per minute. During post-face-to-face speaking sessions, females scored a mean of $M=22.33$ words per minute, while males produced a mean of $M=28.51$ words per minute. No statistical differences were found in these results.

Finally, for the measure of quality, words produced per AS-unit, the females produced a mean of $M=5.02$ during electronic reading sessions, while the males produced a mean of $M=5.19$ during these same sessions. During face-to-face reading sessions, females scored a mean of $M=5.59$ words per AS-unit, and males scored a mean of $M=6.54$ words per AS-unit. Females produced a mean of $M=5.77$ words per AS-unit during post-electronic speaking sessions, while males produced a mean of $M=5.95$ words per AS-unit. During post-face-to-face speaking sessions, females scored a mean of $M=5.23$ words per AS-unit, and males produced a mean of $M=5.44$ words per AS-unit. None of these scores were statistically significant in their differences. The results are also summarized in Table 12.
Table 12

Summary of the Differences Between Males and Females in the Quantity and Quality of Output Produced in All Sessions

<table>
<thead>
<tr>
<th>Reading Sessions</th>
<th>Electronic</th>
<th></th>
<th></th>
<th>Face-to-Face</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>M (SD)</td>
<td>Males</td>
<td>M (SD)</td>
<td>z score</td>
<td>Females</td>
</tr>
<tr>
<td>Turns/Minute</td>
<td>1.49 (1.19)</td>
<td>1.30 (0.54)</td>
<td>-0.68</td>
<td>3.42 (1.49)</td>
<td>3.48 (1.58)</td>
<td>-0.35</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>1.35 (0.76)</td>
<td>1.24 (0.32)</td>
<td>-0.04</td>
<td>4.84 (2.23)</td>
<td>4.86 (2.11)</td>
<td>-0.35</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>6.75 (3.61)</td>
<td>6.59 (2.89)</td>
<td>-0.23</td>
<td>26.61 (13.28)</td>
<td>30.74 (14.49)</td>
<td>-0.81</td>
</tr>
<tr>
<td>Words/AS-Unit</td>
<td>5.02 (1.53)</td>
<td>5.19 (1.22)</td>
<td>-0.23</td>
<td>5.59 (1.88)</td>
<td>6.54 (2.87)</td>
<td>-1.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Speaking Sessions</th>
<th>Post-Electronic</th>
<th></th>
<th></th>
<th>Post-Face-to-Face</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Females</td>
<td>M (SD)</td>
<td>Males</td>
<td>M (SD)</td>
<td>z score</td>
<td>Females</td>
</tr>
<tr>
<td>Turns/Minute</td>
<td>2.92 (1.14)</td>
<td>2.92 (1.32)</td>
<td>-0.23</td>
<td>3.34 (1.62)</td>
<td>3.20 (1.74)</td>
<td>-0.08</td>
</tr>
<tr>
<td>AS-Units/Minute</td>
<td>4.24 (1.79)</td>
<td>4.43 (2.36)</td>
<td>-0.08</td>
<td>4.43 (2.11)</td>
<td>4.85 (2.86)</td>
<td>-0.29</td>
</tr>
<tr>
<td>Words/Minute</td>
<td>24.42 (13.46)</td>
<td>25.97 (15.65)</td>
<td>-0.27</td>
<td>22.33 (10.28)</td>
<td>28.51 (17.81)</td>
<td>-1.00</td>
</tr>
<tr>
<td>Words/AS-Unit</td>
<td>5.77 (1.68)</td>
<td>5.95 (1.43)</td>
<td>-0.02</td>
<td>5.23 (1.32)</td>
<td>5.44 (2.07)</td>
<td>-0.25</td>
</tr>
</tbody>
</table>

Note. The z scores are derived from Mann-Whitney U tests. Tests were two-tailed. * p < .05; ** p < .001.
Research Question 5. What are students' perceptions of the differences between electronic and face-to-face discussions and of the value of synchronous computer-mediated discussions?

The final research question explores student opinions on the differences between computer-mediated and face-to-face discussions as well as student perceptions of the value of electronic communication for the development of different skill areas of English. Pre- and poststudy questionnaires were used to answer these questions. All participants completed the prestudy questionnaire while one participant was not present for the poststudy questionnaire. Two questions in particular focused on these issues. These results are summarized in Tables 13 and 14.

a) Is it easier for you to communicate with your friends through chat, or through spoken conversation?

In the poststudy questionnaire, the same question was worded in the following manner: Which condition do you feel you express ideas more easily in? Circle one and explain.

Face-to-Face  Computer-Mediated Communication (chat)

According to the prestudy questionnaire, the 4 students who preferred chat, or electronic communication, claimed it gives them time to think about their message, is cheaper for long-distance communication, and is less intimidating for shy people. One student, Fl from class 032B/031B wrote, “I would have a bit more time to think about the answer.” Of the 4 participants who preferred chat, 2 were Chinese students who claimed they felt “very comfortable” using computers. The other 2 included a 33-year-old Spanish male, and a shy and quiet Japanese female. The 13 students who preferred face-to-face interaction commented that it is faster. They also claimed that it is easier, since it is
simpler to speak than to write, and it is easier to understand conversation participants’
true feelings by their facial expressions. One student, Ma from class 032/031 wrote,
“Spoken conversation [is easier] because for me it is important to see the expressions of
the people that I’m talking.” Of the 13 participants who preferred face-to-face
communication to electronic communication, 2 were Chinese, 6 Korean, 1 Japanese, and
4 were Spanish. Many of these students stated they also use chat regularly to
communicate with friends, but given the choice, prefer spoken conversation for the
reasons listed above. Students answering “don’t know” had not used chat previously.
Finally, 4 participants answered this question unclearly, so their answers were discarded.
These results are summarized in Table 13.

After the study was complete, 21 students still preferred face-to-face
conversation. Students who preferred face-to-face conversation highlighted the fact that
the use of eye contact and body language helps to improve communication. Twelve
students enjoyed the visual component of face-to-face conversation because they felt it
helps them understand the true feelings of their conversation partners. Eight other
students noted that the use of body language helps to lessen conversational
misunderstandings, whereas in electronic communication, if one doesn’t know the correct
words, one cannot express thoughts accurately. For example, one student in class
032B/031B commented, “Because I think the body language can helps a lot and
sometimes when you are typing and you don’t find the right word about what you want to
say, it is hard to express the perfect idea.” Students also commented on the length of time
needed for electronic communication. Two students felt that electronic communication is
too slow because of the necessity of typing all thoughts, while 4 others felt it is too slow
Table 13

*Pre- and Poststudy Results to the Question “Which Condition Do You Feel You Express Ideas More Easily in?”*

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of Prestudy Responses</th>
<th>Percentage of Prestudy Responses</th>
<th>Number of Poststudy Responses</th>
<th>Percentage of Poststudy Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chat</td>
<td>4</td>
<td>13.33</td>
<td>6</td>
<td>21.43</td>
</tr>
<tr>
<td>Face-to-Face</td>
<td>13</td>
<td>43.34</td>
<td>21</td>
<td>71.43</td>
</tr>
<tr>
<td>No Preference</td>
<td>3</td>
<td>10.00</td>
<td>2</td>
<td>7.14</td>
</tr>
<tr>
<td>Don’t Know</td>
<td>6</td>
<td>20.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>Spoilt</td>
<td>4</td>
<td>13.33</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>100.00</strong></td>
<td><strong>29</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>
because they worry too much about their grammar and spend too much time editing their responses. For example, one student in 032/031 stated, “Because of the grammar in chat I have to be careful with it and write slow.” In addition, one student expressed that electronic communication is confusing when more than two people are in the same chat room. Finally, 2 students noted that face-to-face communication is more persuasive and more direct than electronic communication. Four students who preferred chat stated that electronic communication takes away pressure since they don’t have to worry about being interrupted and they have time to think about the topic. For example, one student in class 032B/031B wrote, “It is easier to talk with using computer because I have time to think about the topic that the teacher gave me. It is hard to talk looking each other because I just talk without thoughts.” In addition, one student said it is easier to express true feelings through electronic communication because of the sense of anonymity. This student claimed, “I think using chat to talk can help people ‘speak out’ their real think. In chat I will not get any trouble if I speak out my real feeling.” Unfortunately, I failed to ask participants to write their names on the poststudy questionnaire. As such, demographic comparisons cannot be made for poststudy questionnaire responses. In addition, prestudy and poststudy results cannot be matched to see which students changed their opinions. Results explained above are summarized in Table 13.

One student from the 032/031 class by the code name Fu wrote a lengthy and interesting explanation in the poststudy questionnaire. He felt that both electronic and face-to-face communication make introverted students nervous. In terms of electronic discussions, he stated, “Even you said to us ‘You can talk everything about articles.’ But my chat seemed to be off the point. I couldn’t keep up with chat. I felt long time as if it
took one hour in spite of just 15 minutes.” Then, writing about face-to-face conversations he stated, “I always think other classmates’ speaking skills are superior to that me. Because of this reason, I didn’t speak a lot. Speaking with English made me nervous more and more.” These statements reveal that students’ personalities, a factor this study did not explore, also affect their perceptions of electronic and face-to-face communication.

b) What skill areas do you think are improved by your use of computer-mediated communication? Circle as many as apply and explain why.

Participants presented a wide variety of reasons when asked what skill areas are improved through computer-mediated communication. In general, their prestudy predictions appear to be more optimistic in terms of their views on the language benefits of using electronic communication than their poststudy responses. However, it appears that participants felt electronic communication has the potential to enhance a number of ESL skill areas. These results are summarized in Table 14.

Many students felt that writing skills improve through chat communication. In the prestudy questionnaire, 25 students checked off this skill area, while in the poststudy questionnaire, 23 students checked off this skill area. Students gave similar comments in the pre- and poststudy questionnaires. For example, students claimed that electronic communication forces them to write their opinions quickly to maintain fluency in the conversation, reducing the problem of writer’s block. Students also felt that chat makes them consider their audience, causing them to think carefully about how to write to best communicate their ideas and persuade their audience. Finally, students felt electronic communication allows them to practice the vocabulary and grammar they have learned,
Table 14

Pre- and Poststudy Results to the Question “What Skill Areas Do You Think Are Improved by Your Use of Computer-Mediated Communication? Circle As Many As Apply and Explain Why.”

<table>
<thead>
<tr>
<th>Skill Area</th>
<th>Prestudy Responses out of 30</th>
<th>Percentage of Prestudy Responses</th>
<th>Poststudy Responses out of 29</th>
<th>Percentage of Poststudy Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grammar</td>
<td>17</td>
<td>20.24</td>
<td>14</td>
<td>19.72</td>
</tr>
<tr>
<td>Speaking</td>
<td>17</td>
<td>20.24</td>
<td>11</td>
<td>15.49</td>
</tr>
<tr>
<td>Listening</td>
<td>4</td>
<td>4.76</td>
<td>2</td>
<td>2.82</td>
</tr>
<tr>
<td>Reading</td>
<td>21</td>
<td>25.00</td>
<td>21</td>
<td>29.58</td>
</tr>
<tr>
<td>Writing</td>
<td>25</td>
<td>29.76</td>
<td>23</td>
<td>32.39</td>
</tr>
</tbody>
</table>
resulting in improved writing. One student noted, “Because, I could see another students’
writing style and skills. Some students’ writing style was new for me.” Many students
also felt reading improves through having to read peer responses quickly. Twenty-one
students checked off this skill area in the pre- and poststudy questionnaires. Eight
students commented in the poststudy questionnaire that they felt their reading speed had
improved. One student stated, “Because when I was in computer-mediated
communication I learned how to use the parts of speech in reading because I had to read
so fast and clearly.” Fewer students had confidence in the ability of electronic
communication to improve grammar skills. In the prestudy questionnaire, 17 students
chose this skill area while 14 students chose this skill area in the poststudy questionnaire.
Students who chose grammar stated that they felt they could learn more about English
grammar from their classmates by reading their responses and seeing how they used the
language. In addition, students made mention of being able to check their responses for
grammar, and being able to notice their mistakes more easily when seeing them in a
written form. Very few students checked off the skill area of listening. In fact, listening
was only chosen by students who checked off all of the skill areas. These participants
claimed that any practice of English enhances English ability in a general manner.

Since the skill area of speaking is of special interest to me in this study, it is being
highlighted separately from the other skill areas. In the prestudy questionnaire, students
seemed quite optimistic about the ability of electronic communication to enhance
speaking skills. In fact, in the prestudy questionnaire, the same number of students
checked off grammar as did speaking, 17. One student noted, “Computer chatting is
speaking. Only one difference is that we write on computer.” There were no patterns
found in participant responses except for one. In the presurvey questionnaire, all 6 Japanese participants noted that they felt the skill area of speaking could be improved through the use of electronic communication. This is an interesting observation, since Japanese students are traditionally known amongst ESL teachers as shy students who are attentive to grammatical accuracy and reluctant to speak up in class. Perhaps the Japanese participants felt that chat allows them the freedom to check postings for accuracy and participate when ready. In the poststudy questionnaire, 11 students checked off the skill area of speaking. Perhaps they came to realize that electronic communication did not have a substantial immediate impact on their speaking abilities. The students who still felt electronic communication was beneficial to speaking claimed that the language used during chat is similar to spoken language in register, or level of formality. As such, they felt that they learned useful vocabulary and expressions that they could transfer to spoken discussions. Some students also felt that chat helps them to formulate and state their opinions quickly and directly, a skill that would also help them when discussing topics orally. Therefore, some students were able to recognize and explain what they saw as a possible connection between electronic communication and spoken conversation.

Interestingly, in the poststudy questionnaire, 9 students noted they felt “very comfortable” using computers, the same number of respondents as in the presurvey questionnaire. However, only 16 stated that they felt “comfortable” using computers while 4 circled “uncomfortable.” In the presurvey questionnaire, no participants noted that they felt uncomfortable using computers. Perhaps the experience of communicating electronically with classmates was not positive for all study participants. However, Internet use was still very common with participants, with 23 stating they use the Internet
“every day” and 6 noting they use it “a few times a week.” Poststudy results to questions about locations of Internet use and reasons for Internet use are summarized in Table 15.

Summary

The results of this study reveal that in terms of the quantity and quality of output produced, face-to-face sessions are significantly more productive than electronic sessions. While typing skills factor into these results, they cannot account for the vast differences observed. In terms of preparing students for the production of spoken language, the results are much less distinct, and lacking in statistical significance. Speaking sessions that followed face-to-face reading sessions did not differ statistically from speaking sessions that followed electronic reading sessions in terms of either the quantity or quality of language produced. As such, it seems that face-to-face and electronic discussions equally prepare ESL students for spoken communication. When all three types of speaking sessions were compared, no significant differences were found in either the quantity or quality of output produced, ruling out the possibility of a practice effect influencing the scores of speaking sessions that followed face-to-face reading sessions.

Regarding the question of gender, no statistically significant differences were found in the performance of males and females. Finally, in terms of student perceptions of face-to-face and electronic communication, most participants stated that they prefer face-to-face communication. This preference was even more evident in the poststudy questionnaire where 21 of 30 respondents stated that they felt more comfortable expressing themselves in a face-to-face setting. In addition, participants stated that they
Table 15

Poststudy Locations of and Reasons for Participants’ Internet Use

<table>
<thead>
<tr>
<th>Location of Internet Use</th>
<th>Number of Participants</th>
<th>Reasons for Internet Use</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>24</td>
<td>Email</td>
<td>25</td>
</tr>
<tr>
<td>Home</td>
<td>17</td>
<td>Searching for information</td>
<td>18</td>
</tr>
<tr>
<td>Public library</td>
<td>3</td>
<td>Chatting</td>
<td>16</td>
</tr>
<tr>
<td>Cyber café</td>
<td>2</td>
<td>News</td>
<td>14</td>
</tr>
<tr>
<td>Work</td>
<td>2</td>
<td>Playing games</td>
<td>3</td>
</tr>
<tr>
<td>Phone</td>
<td>1</td>
<td>Doing homework</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Downloading music</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Doing business</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>49</strong></td>
<td><strong>TOTAL</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>
believe reading and writing are the skills most likely to be improved through the use of online discussions. In the poststudy questionnaire, only 11 of 71 responses indicated that online discussions were believed to be valuable in the improvement of speaking skills. In conclusion, the results of this study do not reveal any statistically significant differences in the effects of electronic communication and face-to-face communication on the quantity and quality of verbal output produced by intermediate-level ESL students.
CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

This chapter focuses on the discussion of findings and their relevance to previous research comparing synchronous computer-mediated communication and face-to-face communication, especially that which explores the quantity and quality of discourse produced, as well as equality of participation and student attitudes. In particular, the hypothesized pedagogical effectiveness of synchronous computer-mediated discussions for enhancing oral communication abilities is explored. Results of the research are related to the Interaction and Output hypotheses for theoretical perspective. Finally, implications of the findings for theory and practice are discussed, and recommendations are made for future research.

The principal question addressed in this study was whether small-group computer-mediated communication differs from small-group face-to-face communication in terms of preparing ESL students for spoken discourse. This question was of interest to me due to previous research that suggested that because of its similarity to oral interaction, synchronous computer-mediated communication may aid students in gaining competence in spoken communication (Beauvois, 1998; Chun, 1994). Additional research questions related to the quantity and quality of discourse produced during small-group computer-mediated and face-to-face interaction. According to the Interaction Hypothesis, interaction between ESL learners is necessary because it provides them with linguistically modified forms of the language, in the way of repetitions and simplifications of grammatical structures, hence making grammatical structures more comprehensible. This comprehensibility draws learners' attention to the structures, helping them to learn the structures correctly (Long, 1996; Pica, 1994). The Output
Hypothesis further stresses the need for interaction and negotiation. According to this hypothesis, by producing output, learners are forced to pay attention to syntactic processing rather than relying merely on semantic clues to understand the gist of a message. In addition, creating output provides learners with corrective feedback since their conversation partners negotiate unclear meanings with them, providing direct or indirect corrections of utterances (Swain, 1995). Because of these two theories, the quantity and quality of output produced in the computer-mediated and face-to-face sessions was of interest. It was hypothesized that the condition producing the greater quantity of output would also display a higher syntactic quality of output since greater interaction and negotiation would lead to higher uptake of grammatical structures. In addition, it was believed that the condition producing a higher quantity or quality of output would also serve as better preparation for spoken discourse, thereby leading to a higher quantity and quality of discourse being produced in spoken language. Small-group comparisons of computer-mediated and face-to-face discourse were of interest since most previous studies either explored synchronous computer-mediated communication in isolation (Chun, 1994) or as compared to whole-class, teacher-led discussions (Kern, 1995).

Two secondary research questions that were also explored related to differences in interaction among male and female participants in the different sessions, and student attitudes toward the computer-mediated sessions. Since most previous research exploring gender differences in interaction had been conducted comparing computer-mediated communication with whole-class discussions (Chun, 1994; Kern, 1995), differences in small-group interactions were of interest. In addition, I was interested in discovering
student attitudes toward computer-mediated communication, especially in comparison with small-group face-to-face communication. Finally, I wanted to discover whether students felt computer-mediated communication could help them improve their English language abilities, and especially their spoken language abilities.

In order to explore these research questions, two groups of intermediate-level students were chosen to participate in this study. Groups alternated in their participation in small-group computer-mediated and face-to-face discussions. These discussions were always followed by small-group spoken discussions. The quantity of output in all computer-mediated and spoken discussions was measured by turns taken per minute, words produced per minute, and AS-units produced per minute. The syntactic quality, or complexity of output produced was measured by number of words produced per AS-unit. Student attitudes were measured by pre- and poststudy questionnaires.

**Summary of Findings**

Relating to the principal question of which condition provides better preparation for oral communication, no significant differences were found between speaking sessions that followed computer-mediated or face-to-face conditions in either quantity or quality of output produced. Therefore, computer-mediated communication did not aid students in terms of helping them to produce a greater quantity of verbal output in follow-up speaking sessions. On the other hand, face-to-face communication also did not provide an advantage in terms of the quantity of verbal output produced in follow-up speaking sessions. Therefore, no practice effect of speaking was evident. Computer-mediated and
face-to-face communication appear to equally allow students to formulate their thoughts and opinions about the topic before participating in speaking sessions.

In terms of quality of verbal output produced in speaking sessions, Warschauer (1997) notes that students may notice grammatical structures more readily during electronic discussions since all interaction takes place in a written form. In addition, in the poststudy questionnaire, some students expressed that they felt the electronic sessions helped them improve their grammar since they could actually see and not just hear the grammatical structures their peers were using. While students may have "noticed" grammatical structures, they did not adapt these structures into their developing grammar any more than they did during face-to-face sessions, at least not as revealed by the post-electronic speaking session quality measure of words produced per AS-unit. Therefore, for the measures used in this study, electronic and face-to-face communication do not differ in terms of how they prepare students for the production of syntactically complex utterances in follow-up spoken communication.

A comparison of the quantity and quality of output produced during computer-mediated and face-to-face discussions in reading classes revealed that a significantly higher amount of output was produced during face-to-face discussions. In addition, output produced during face-to-face sessions was significantly higher in syntactic quality than output produced during electronic sessions. These results differ from the results of previous research. For example, Kern (1995) found that a higher quantity of output was produced during electronic discussion than face-to-face discussion. However, as was discussed previously, this result may have been affected by many factors, such as the fact that face-to-face discussions were teacher-led, involving the whole class, and that face-to-
face discussions always followed electronic discussions. Wang and Hurst (1997) also found that a greater number of turns were taken during online than face-to-face discussions. However, once again, this may have been a result of the fact that face-to-face discussions always followed online discussions. As such, participants in Wang and Hurst’s (1997) study may have felt their ideas regarding the topic of discussion were exhausted by the time they engaged in spoken interaction.

The results of this study also differ from previous studies that explored the syntactic quality of output produced during electronic and face-to-face discussions. For example, Beauvois (1998) found that students produced more compound, complex sentences during electronic discussions, while face-to-face conversations consisted more of simple sentences. Similarly, Warschauer (1996) found electronic discussions to be more complex both lexically and syntactically than face-to-face discussions. In addition, Pelletieri (2000) claimed:

because in [chat] students have more time to process language than in oral conversations, and because they can view their language as they produce it, they are more likely to focus on language form and “monitor” their messages, all of which can result in even more “quality” interlanguage than there would be in a nonelectronic environment. (pp. 82-83)

Despite students’ ability to take their time in producing and correcting electronic messages, face-to-face communication still maintained a higher level of syntactic complexity.

However, some researchers have noted that length and complexity of electronic utterances often vary significantly from person to person depending on individual style.
For example, Chun (1994) found that during electronic interaction, some students preferred to submit simple, one-sentence entries while other students wrote complex, paragraph-length entries. This difference relates to how students interpret where along the continuum from oral to written interaction the medium of computer-mediated communication falls (Baron, 1998). Students who prefer to interact via short, simple submissions may be treating chat as an oral medium, and are thus trying to preserve the interactive nature of the "conversation." As Werry (1996) states, "in order to keep up with the flow of conversation it is often necessary to respond quickly and this means that unless one can type very rapidly, messages must be kept short" (p. 53). On the other hand, students who perceive computer-mediated communication to be a written medium may be more likely to write longer, more complex submissions since they are less concerned with maintaining the interactivity of the discussion. In general, the level of formality employed by communicators in an electronic environment is often determined by the task and the person with whom they are communicating (Murray, 2000). Students in this study, who generally produced shorter and less complex utterances during electronic discussions, may have been trying to maintain the interactivity and turn-taking system of oral discussion. However, these students may have just been shy and reluctant to participate in the form of longer contributions. Thus, it is difficult to distinguish the reasons for varying lengths of electronic utterances.

In addition, the definition of a "word" used in this study may have limited the quantity measure, words produced per minute, and the quality measure, words produced per AS-unit. In this study, a word was defined as "a speech sound or series of speech sounds that symbolizes and communicates a meaning without being divisible into smaller
units capable of independent use" (Merriam-Webster online dictionary, 2003). Added to the Merriam-Webster definition were compound words such as “raincoat” and “girlfriend.” While the definition itself was not a problem, the fact that repetitions, false starts, hedges, and minimal responses were included in the word count may have skewed the results in favour of the face-to-face sessions. This is due to the fact that face-to-face sessions necessitated a certain immediacy in responses that was not as noticeable in electronic sessions. In spoken conversations, participants are expected to respond quickly in order to maintain the flow of conversation. Therefore, when speaking, participants do not generally have time to mentally edit their contributions before uttering them. As a result, they tend to edit as they speak, resulting in repetitions of words and false starts, where participants begin with one idea and then change to another. This feature of spoken conversations is not as evident in electronic discussions, where participants have the ability to type and edit their responses before “sending” them. In addition, spoken conversations are very interactive in nature, and speakers have the expectation that listeners will show their attentiveness through the use of minimal responses, such as “uh huh” and “ya.” On the other hand, minimal responses are not as necessary in electronic discussions, especially when more than two participants are involved and more than one thread of discussion exists.

Therefore, the word count of face-to-face sessions may have been inflated due to the inclusion of repetitions, false starts, minimal responses, and hedges. During the process of data analysis, consideration was given to the idea of eliminating these features from the word count. However, this would have led to two problems. First, deciding whether or not to include the repetition of a word is rather arbitrary since the researcher
would have to decide whether that repetition was intended, perhaps because conversational participants did not hear or understand the word, or whether the word was a stutter, or was used to fill in space while the speaker was thinking of what to say next. Second, not including features such as repetitions, false starts, minimal responses, and hedges in the word count falsely represents the nature of spoken conversation, which is interactive, and which involves on-the-spot editing. Therefore, the limitation may not be due to the definition of “word” used in this study, but instead the fact that face-to-face communication and electronic communication, one being spoken, and one written, encourage different levels of interactivity and different forms of communication.

Another question of this research related to exploring whether any differences existed in male and female patterns of interaction. According to the results of this study, no significant differences existed in male and female interaction. These findings do not support previous research that found that vast differences exist in the equality of interaction of males and females in spoken conversation, and that electronic communication equalizes these differences (Sullivan & Pratt, 1996; Warschauer, 1996). This may have been due to the fact that this study compared output produced in small-group settings whereas previous studies compared computer-mediated discussions to whole-class oral discussions (Kern, 1995; Wang & Hurst, 1997). Perhaps the dynamic of small groups differs from large group settings, encouraging more equality in participation. In his study, Kern (1995) suggests that since electronic interaction is written, it encourages the participation of students who normally hesitate to contribute to oral conversation. However, this was not found in this study. For example, Ak, a Japanese female student from class 032, rarely participated in spoken conversations. In
addition, she rarely contributed to electronic discussions, even though she noted on the prestudy questionnaire that she felt "comfortable" using computers and that she had used chat before to meet new people. Also, Fu, a Japanese male from class 032 noted on the poststudy questionnaire, "for introvert students both speaking (face-to-face) and chat made nervous." Thus, electronic communication may not serve as the equalizer it has been touted to be. Finally, responses to both pre- and poststudy questionnaires indicated that most students, male and female, preferred face-to-face conversation to chat discussions. Previous studies have noted that females often preferred electronic communication, since they felt more liberated in the online environment (Bump, 1990; Wang & Hurst, 1997). However, responses to the questionnaires in this study do not support this finding. This may be partly due to the fact that electronic sessions were not anonymous since participants' names appeared on the computer screen each time they posted a message.

A final question of the research investigated student attitudes toward computer-mediated communication as compared to face-to-face communication. While students had favourable attitudes toward electronic communication, they still stated a preference for face-to-face interaction if given the choice, in both pre- and poststudy questionnaires. This result differs from previous research by Warschauer (1996), who found that overall student attitudes were slightly more favourable for chat than for face-to-face interaction. Warschauer's results, however, may have been due to the fact that his study occurred over only one day. As such, participants in his study may have been influenced by the novelty of the electronic medium. However, feedback from the participants in this study often reflected student feedback given in previous studies. For example, students felt the
Electronic medium gave them more time to compose their thoughts before presenting them, a finding also found by Bump (1990) and Kern (1995). On the downside, students felt frustrated by the way their typing skills limited the speed of their contributions, which were comments also made by participants in Bump’s (1990) and Wang and Hurst’s (1997) studies. Finally, students often felt the lack of visual cues, such as body language and facial expressions limited their comprehension of messages. As such, while students enjoyed communicating with one another electronically, they still preferred face-to-face conversation.

Finally, when asked which language skills they felt would be improved through their use of computer-mediated communication, most students felt their reading and writing would be most affected. Fewer students had confidence that their speaking abilities would be influenced by their participation in computer-mediated discussions. In the prestudy questionnaire, 56.67% of students felt their speaking might improve. However, this number dropped to 37.93% in the poststudy questionnaire. Therefore, while researchers have suggested that synchronous computer-mediated communication, with its similarities in style to spoken conversation, may help improve ESL students speaking abilities (Beauvois, 1998; Chun, 1994), most of the participants in this study did not perceive this benefit.

**Relating the Results to Theory**

According to the Interaction Hypothesis, negotiation among learners is crucial to the language learning process since as negotiations occur about the language, modified output is produced in the form of comprehension checks and repetitions (Pica, 1994).
This modified output is also more comprehensible to the students than unmodified output, drawing their attention to the form of the language, and to what grammatical constructions are and are not possible (Ellis, 1999). Similarly, the Output Hypothesis also places great importance on collaborative negotiation among language learners. According to Swain (1995), the production of output promotes fluency in the language and grants learners the opportunity to test their hypotheses about the language. In addition, as students actively produce the language, they process it more deeply, leading to greater grammatical accuracy.

In this study, interaction in terms of negotiation of utterances was not directly measured. It was assumed that as participants communicated with one another, misunderstanding would occur, leading to the necessity of negotiation over vocabulary and grammar, and then the production of more comprehensible language. While some instances of negotiation were observed in face-to-face and electronic discussions, they were not overtly measured. Therefore, conclusions about the effectiveness of the Interaction Hypothesis to explain language learning cannot be made.

On the other hand, output, the importance of which is stressed by the Output Hypothesis, was measured, in terms of both quantity and quality of output produced. According to the Output Hypothesis, output, especially when produced in a collaborative learning environment, helps to promote fluency in the language (Kowal & Swain, 1994). Learners cannot pretend to comprehend the language by relying on semantic cues given. Instead, they must actively process the language that in turn leads to a higher level of language ability. Simply put, a higher level of output will lead to a better level of output (Swain, 1995). In this study, face-to-face reading classes resulted in a significantly
greater amount of produced output than electronic reading classes. Additionally, the quality of the output, as judged by the number of words produced per AS-unit, was significantly higher in face-to-face reading sessions than electronic sessions. These results confirm the Output Hypothesis in that a higher quantity of output leads to a higher quality of output. However, this increased quantity and quality of output did not transfer into the follow-up speaking sessions since speaking sessions that followed face-to-face and computer-mediated reading classes did not have any significant differences in the quantity or quality of output produced. It is unclear why this happened. Perhaps the reading class sessions were too short to produce a lasting effect. In addition, in terms of quality, the definition used in this study was limited to syntactic complexity as revealed by the number of words produced per AS-unit. Other measures of complexity, such as lexical complexity, may have led to different results.

Although speaking sessions that followed face-to-face and computer-mediated reading classes did not differ significantly in the quantity and quality of output produced, the fact remains that face-to-face reading sessions resulted in the production of significantly higher levels of quantity and quality in output than electronic sessions. According to the Output Hypothesis, this high level of production will eventually lead to a higher level of language accuracy. In the future, a longer study with defined control and experimental groups may further reveal the differences between face-to-face and electronic communication in terms of language learning.
Educational Implications

The results of this study carry important educational implications. According to Walther, Anderson, and Park (1994) "due to cue limitations of computer-mediated communication, the medium cannot convey all the task-related as well as social information in as little time as multi-channel face-to-face communication" (p. 465). This quote represents the findings of this study well. Although valuable interaction occurred during computer-mediated sessions, factors including the limitations of typing and the absence of visual cues slowed the communicative process, limiting the amount of interaction that took place. Thus, echoing the findings of Walther et al. (1994), the primary difference between electronic and oral interaction is one of rate, or time, not capability. Although computer-mediated communication may have certain benefits for classroom situations, basic communication and understanding can take a much longer time than during face-to-face discussions because of the medium of the computer.

However, this difference is important when considering the application of computer technology for language education. Many intensive English programs, such as Brock University's, run for very short periods of time, some as short as 3 weeks. Students often take time off from work or school to participate in these programs. These students can only afford a few weeks to a few semesters to study their second language. As such, they are interested in receiving the greatest value for their time and money. While computer-mediated communication offers an exciting alternative to the traditional classroom experience, it is questionable whether the time and money invested into technology-based programs is worth it. Training sessions must be conducted to familiarize students with software programs. Instructors must also be equipped with the skills to run and often
troubleshoot these programs. In addition, money must be invested into purchasing and upgrading computers and software packages. In the end, as the results of this study reveal, traditional oral classroom interaction is just as beneficial to students as electronic interaction in terms of money and time.

Salaberry (2001), in a review article focusing on the use of technology in the language classroom, pointed out that many of the studies that have investigated the impact of computer-mediated communication, while revealing positive results, have been plagued with methodological limitations, thus weakening their results. In fact, many of the studies referred to in this thesis lacked adequate numbers of participants to complete statistical tests of significance on the results (Beauvois, 1998; Chun, 1994; Kern, 1995; Warschauer, 1996). However, these same studies are repeatedly referred to in the literature as proof of the ability of computer-mediated communication to advance students' language abilities. Salaberry (2001) stresses the importance of critically evaluating the pedagogical effectiveness of new technology and warns against language classrooms that are technology driven rather than principle driven. As Marjanovic (1999) states, "technology must fit classroom activities and not vice-versa" (p. 132). Thus, according to the results of this study, computer-mediated communication could be used as a supplement to regular classroom work, to encourage the practice of language skills in a variety of contexts and situations. For example, students could be required to chat online with their classmates about a discussion topic in the evening, or they could be asked to post responses to an online discussion list of grammatical queries. In addition, in an English as a Foreign Language (EFL) setting, where native English speakers are not always available, teachers could set up online exchanges with English speakers from a
foreign country. However, according to the results of this study, students produce a higher quantity and quality of language output when communicating orally than when communicating electronically. In view of the results of this study, English language classrooms that provide students with the opportunity to communicate orally in small groups provide a positive environment for the production of a high quantity and quality of language output.

Recommendations for Future Research

For the purposes of this study, both groups of students engaged in the face-to-face and computer-mediated discussions. Since the groups constituted two classes of Level 3 IELP students, denying one class access to computer-mediated discussions was felt to be unethical since previous research indicated many possible communicative benefits of electronic interaction. Thus, the two groups alternated in their participation in face-to-face and electronic discussions. As such, only the immediate effects of these conditions on speaking abilities could be observed in the follow-up speaking sessions that occurred. However, in the future it would be interesting to study the long-term effects of chat discussion on speaking abilities, as compared to face-to-face discussion. Therefore, a research design could include two comparison groups: one that engages only in face-to-face discussion and one that engages only in computer-mediated discussion. This could help keep the effects of these two conditions distinct, revealing the long-term effects of the two conditions on the quantity and quality of output produced during follow-up speaking sessions. In addition, random assignment and large sample sizes, perhaps
involving multiple classes, would be required to counteract the threats to validity in this research design.

Secondly, since synchronous electronic communication has been found to be similar to spoken conversation in terms of the level of formality and discourse functions used during the discussions (Chun, 1994; Sotillo, 2000), it would be interesting to explore whether electronic communication helps prepare ESL students for spoken conversation in terms of the use of appropriate discourse functions. This study could employ a similar design to the current study, but explore the quantity and type of discourse functions used, such as topic initiations and requests for clarification, instead of the quantity and quality of output produced. Alternatively, the transcripts produced in this study could be re-analyzed for this purpose. Such a study could reveal important information about the potential of computer-mediated communication to prepare students for the appropriate use of discourse in oral communication.

Also, while this study explored quantity in terms of number of turns taken, and number of words and AS-units produced, and quality in terms of syntactic complexity, future studies could explore quantity and quality in terms of actual vocabulary produced. For example, the use of a concordance would allow for an analysis of the vocabulary produced in face-to-face and computer-mediated discussions, revealing the variety of vocabulary used, as well as its relevance to the topic of discussion. This could help researchers understand the quantity and lexical complexity of vocabulary used in these two different settings.

Next, since many students in this study felt computer-mediated communication helped to improve their reading skills, future research could investigate the impact of chat
on students' reading skills, including their comprehension, speed, ability to chunk ideas into meaningful units, and ability to recognize parts of speech.

In addition, future research could explore the connection between personality and learning style and the perceived or actual benefits of computer-mediated communication for language development. In this study, some students revealed that they enjoyed the visual representation of language in chat. Perhaps electronic discussion could be found to benefit more visual learners, as determined by a learning styles questionnaire, because they are able to see the text. In terms of personality, some students expressed that electronic communication was less intimidating for shy students while other students expressed that they felt uncomfortable during both electronic and spoken communication for fear of making grammatical errors. Beauvois and Eledge (1996) studied the relationship between personality as indicated by the Myers-Briggs Type Indicator and attitude toward computer-mediated discussion. However, a broader exploration of personality and learning style in relation to computer-mediated communication could reveal the positive impact electronic communication may have for different populations of students.

Finally, as Salaberry (2001) suggests, future research should also explore computer-mediated communication in a more qualitative manner. This could involve exploring the students' experiences during the process of electronic communication through observation, interviews, and open-ended questionnaires. Students and instructors could keep journals detailing positive and negative experiences encountered in the classroom while communicating both face-to-face and electronically. They could also note differences they perceive in the communicative nature of spoken and electronic
interaction. Most previous research has investigated electronic communication in the cause-and-effect manner typical of the physical sciences. Future studies could explore the communicative nature of computer-mediated discourse more fully, as well as students’ experiences in communicating electronically.

**Conclusion**

The findings of this study suggest that small-group face-to-face communication promotes a greater quantity and quality of interaction between second language learners than small-group computer-mediated communication. No significant differences were found in the effects of face-to-face and computer-mediated interaction on follow-up speaking sessions. In addition, no significant differences were found in the output produced by males and females during face-to-face and computer-mediated discussions. Finally, while many students perceived the value of electronic interaction in improving their language skills, especially in the areas of reading and writing, the majority of students involved in the study preferred oral communication to electronic communication. These results imply that computer-mediated communication should not be used to replace face-to-face communication. Although computer technology has been embraced with much excitement by language educators, as Salaberry (2001) notes, it is always necessary to question whether the use of sophisticated technology adds to or detracts from the pedagogical effectiveness of classroom instruction. According to the results of this study, it appears that traditional face-to-face interaction still promotes a higher quantity and quality of interaction than computer-mediated communication.
References


Lapadat, J. C., & Lindsay, A. C. (1999). Transcription in research and practice: From standardization of technique to interpretive positionings. *Qualitative Inquiry, 5* (1), 64-86.


Appendix A

Letter of Information

Title of Study: The Effect of CMC on the Quantity and Type of Written and Spoken Discourse Produced by ESL Students

Researcher: Kathy Epp
Supervisor: Hedy McGarrell, Ph.D

This letter contains details about a research project you are being invited to participate in. This study is going to analyze the discourse that is produced by small groups of ESL students in face-to-face (oral) interaction and computer-mediated (written) interaction.

This study will occur over eight weeks of the IELP. It will occur as a regular part of your reading and speaking classes. In the first week, you will complete a keyboarding assessment that will calculate your typing speed. In the second week, you will be given an introductory session to WebCT, computer software that will be used in the research for conducting chat sessions. You will have a chance to practice using chat so that you become comfortable with the software. In the second week, you will also complete a questionnaire that will ask you questions about your background and your experience with computers. In the third week, the focus of the study will begin. Once a week, in your reading class, you will read an article from your text and then discuss it in small groups, either face-to-face or via computers, using chat. These small group interactions will be recorded and transcribed. Then, on the following day, you will discuss the same article in your speaking class in different small groups, face-to-face. These interactions will also be recorded and transcribed. In the final week of the study, you will be asked to complete another keyboarding assessment to calculate your typing skills. You will also be given another questionnaire which will include more questions about your experience with computers. Although this study will be a part of the regular day-to-day tasks of your classes, you can choose to withhold any or all of the data that you produce, without being punished in any way.

All of your information will be kept completely confidential. Only the researchers will have access to your data. In addition, you will be able to choose a code name for yourself which will be used to code all of your questionnaires, assessments, and transcriptions. Your real name will not be used in the study, and will not be associated with your data.

In August 2002, once the study has been completed, you may email me if you are interested in receiving a summary of the results.
Appendix B

Informed Consent Form

Title of Study: The Effect of CMC on the Quantity and Type of Written and Spoken Discourse Produced by ESL Students

Researchers: Kathy Epp and Hedy McGarrell, Ph.D

Name of Participant: (Please Print) _______________________________________

I understand that this study in which I have agreed to participate will explore the discourse produced in both computer-mediated and face-to-face interaction. The study will involve using computer software and interacting in small groups. In addition, I will be required to complete two keyboarding assessments to calculate my typing speed, and two questionnaires. During reading class, I will read articles from my textbook and then discuss them in small groups with my classmates either face-to-face or through computers by using the 'chat' function of WebCT software. I will discuss the same articles in face-to-face small groups in my speaking class. All of these discussions will be recorded and transcribed for research purposes.

I have been given the Letter of Information which described the procedures of this study in detail, and all of my questions about the study have been answered.

I understand that during the study I will be required to fill out various questionnaires about my experience with computers. I may decide not to answer any questions which I feel are invasive.

I understand that this study will be a part of regular classroom activities. However, I may decide to withhold any or all of my information without penalty.

I understand that there will be no payment for my participation.

I understand that all of my personal information will be kept confidential. In addition, it will be coded so that my name is never associated with my information. I understand that only the researchers will have access to my data.

Participant Signature: ________________________________ Date: ____________________

This study has been reviewed and approved by the Brock Research Ethics Board. (File # 01-032, Epp).

If you have any questions or concerns about your participation in this study, you may contact Kathy Epp at (905) 688-5550 ex. 3853 or Professor Hedy McGarrell at (905) 688-5550, ex. 3757.
Feedback about the use of the data collected will be available in the first week of December, 2001, during your reading class. A written explanation will be provided for you upon request.

Thank you for your help! Please take one copy of this form with you for future reference.

*****

I have fully explained the procedures of this study to the above participant.

Researcher’s Signature: ____________________________ Date: ____________________________
Appendix C

Prestudy Demographic Questionnaire

1. What year were you born in?

2. Please circle your gender. M F

3. What language did you first learn to speak?

4. Have you studied any other languages?  If yes, how would you describe your ability?
   _____ Advanced  _____ High-Intermediate  _____ Intermediate
   _____ Low-Intermediate  _____ Beginner

5. What language do you feel most comfortable speaking?

6. What country were you born in?

7. Did you study English in your home country?
   If yes, for how long?  _____ years  _____ months

8. How long have you been in Canada?  _____ years  _____ months

9. How long have you been studying English in Canada?  _____ years  _____ months

10. How comfortable do you feel using computers? Circle one
    Very comfortable  Comfortable  Uncomfortable  Very Uncomfortable

11. How often do you use the Internet? Circle one.
    Every day  A few times a week  Once a week  A few times a month  Once a month

12. Where do you use the Internet? Check all answers that apply.
    _____ School  _____ Home  _____ Public Library  _____ Other ___________________

13. What do you use the Internet for?

14. Have you ever used ‘chat’ before?  If yes, for what purpose?
15. Is it easier for you to communicate with your friends through chat, or through spoken conversation? Please explain.

16. What skill areas do you think might improve through using chat? Circle as many as apply and explain why.

Grammar   Listening   Speaking   Reading   Writing
Appendix D

Poststudy Attitudinal Questionnaire

1. Which condition do you feel you express ideas more easily in? Please circle one and explain.

   **Face-to-Face**  
   **Computer-Mediated Communication (chat)**

   **Explanation:**

2. What skill areas do you think are improved by your use of computer-mediated communication (chat)? Circle as many as apply and explain why.

   Grammar  
   Listening  
   Speaking  
   Reading  
   Writing

   **Explanation:**

3. How comfortable do you feel using computers? Circle one.

   Very comfortable  
   Comfortable  
   Uncomfortable  
   Very Uncomfortable

4. How often do you use the Internet? Circle one.

   Every day  
   A few times a week  
   Once a week  
   A few times a month  
   Once a month

5. Where do you use the Internet? Check all answers that apply.

   ____ School  ____ Home  ____ Public Library  ____ Other
6. What do you use the Internet for?
Appendix E

Keyboarding Assessment Essay

A long time ago, people didn't have money. They traded things to get what they wanted. Suppose you had some chickens or a goat. Your friend had some vegetables and some grain. You could offer your friend three chickens or one goat for his food. If you could agree on the trade, you had a deal.

This system of trading things, called barter, worked pretty well for a long time. But what if your friend didn't want your animals? If you had something else you could use, something everyone agreed on, it would make trading easier. After a while, people started using special objects, called tokens, just for trade.

This was the beginning of money. In different countries, different things were used as tokens. Tokens were generally something unusual or something valuable. For example, in ancient Egypt, salt was very important. In ancient China, tools were very important. People made small metal tools and traded them.

In some countries, the tokens were not valuable things. They were common objects. In Africa people traded stones and beads. Native peoples in the land that later became Canada used coloured beads and shells. In other places people traded whales’ teeth, bird’s feathers, and even tea leaves. Using tea leaves had an advantage, too. If you didn’t spend your money, you could always pour hot water on it and drink it!

After a while, metal began to be used as money. Gold quickly became very popular for coins. It was popular for three reasons. First, it was hard to find, so it had a lot of value. Second, it was easy to shape into circles, so it was easy to use for making coins. Third, it stayed shiny for a long time, so it looked pretty. People in ancient Egypt
used gold rings as money. In other places, people used metals that were easier to get.

For example, people who lived near the Aegean Sea used copper. People in Great Britain used iron.

Today, in Canada, we use several metals to make our coins. Pennies are made of copper. Nickels are made of nickel, but may have some copper, brass or other metals too. Dimes and quarters are made of silver, mixed with other metals. Loonies are gold in colour, but are made from nickel covered with bronze.

Written by Kathy Epp
Appendix F

Transcription Symbols

The following symbols are adapted from Schiffrin (1987) and Silverman (1993) in order to suit the purposes of the study.

1. Overlapping Utterances
   [ -a left bracket is used to reveal the point at which the overlap begins
   ] -a right bracket denotes the end of the overlapping speech

2. Contiguous Utterances
   = -equal signs are used when there is no interval between the utterances of two different speakers

3. Doubt in Transcription
   xx -the double x represents one word is unclear to the transcriber
   (fun? dumb?) -words in parentheses denote uncertainty in transcription

4. Pauses
   (.) -one period in parentheses represents one second of pausing

5. Transcriber Comments
   (( )) -words written in double parentheses represent transcriber comments
   -double parentheses are also used to encode vocalizations other than words, such as laughter, coughing, whispering

6. Paraphrasing/Quoting
   " " -quotation marks are used to signify that the speaker is quoting or paraphrasing another speaker

7. Other Punctuation
   , -commas are used for short pauses, not necessarily between clauses
   ? -question marks are used to indicate rising intonation, not necessarily an interrogative
   ! -exclamation marks indicate an animated tone
   . -periods indicate a stopping fall in tone, not always at the end of a sentence

8. AS-Units
   « » -words written in double angle brackets represent one AS-Unit
   > -a single right angle bracket represents an AS-Unit that continues into another turn
<a single left angle bracket represents an AS-Unit that is being continued from a previous turn
Appendix G
Sample Transcribed Session

Pseudonyms are used throughout all transcribed sessions.
032 FTF Session 1b

Participants:
Se
Jo
Fu

((12.5 minutes))

Fu: <<okay.>>
Se: <<Mr. Jo what do you think, about Picasso.>>
Jo: <<Picasso>>
Se: <<ya>>
Jo: <<actually I think Picasso has a xx personality.>>
<<when I pictures Picasso’s picture I saw his personality is (too deep?) and so passionate>>
<<but after read this book, I change my mind.>>
Se: <<yes you you have read that book>>
Jo: <<ya a little>>
Se: <<oh the the article>>
Jo: <<ya the article.>>
Se: <<ya>>
Jo: <<not book>>
<<ya you’re right just this article.>>
<<I was surprised according to this book Picasso has a a little bit ya xx xx xx>>
Se: <<ya he was crazy>>
Jo: <<ya>>
Fu: <<xx>>
Se: <<I’m not sure.>>
<<I have here that he always smokes like opium or something like that, drugs>>
<<and the his art it’s a xx xx of his work because he was like “aahh” crazy and he “oh a cow” and draw a cow>>
<<but it’s, crazy>>
<<and I don’t know.>>
<<he was a mm a a strange man?>>
<<what do you think Fu.>>
Fu: <<well, I didn’t know about any Picasso’s information?>>
<<I just uh know about this picture, no this drawing, paint?>>
<<but uh I think uh it’s strange for me.>>
<<I don’t understand.>>
<<it’s very abstract, abstract painting.>>
Jo: <<what I don’t understand what they they want what they what he=>
Fu: <<[want to] say>>
Jo: <<want to [show]>>
Fu: <<what he want to express his mind>>
Se: <<a lot of money=>>
Jo: <<[but still] people why so try to buy Picasso’s>>
Fu: <<I think just their satisfaction>>
Jo: <<just satisfaction?>>
Se: <<eh I think the people who who buy that kind of=>>
Jo: <<=according this book people wanted to buy the Picasso’s picture include his personality>>
Fu: <<ohhhhh>>
Jo: <<about his passion=>
Se: <<=ya=>>
jo: <<(towards?) drawing.>>
Se: <<ya.>>
Jo: <<I don’t know.>>
Se: <<there is people who has a lot of money>>.....
Jo: <<I don’t agree to spend so much money in a in a painting.>>
Se: <<=four million dollars, nah in a paint?>>
Jo: <<so if you you have [xx]>>
Se: <<[Picasso] was a rich man at the time?>>
Jo: <<no no he=>>
Se: <<I think he was poor?>>
Jo: <<now his family is is very rich.>>
Jo: <<ya I know>>
Fu: <<ohh>>
Jo: <<xx xx poor>>
Se: <<no, from=>
Jo: <<=Italy?>>
Se: <Italy, ya.>>
<<I don't know.>>
<<you see all the the people here the the book, the the article shows a an author who xx xx who wrote a book, they try to make money with eh Picasso’s work.>>
<<it's not good.>>
<<maybe it's not fair.>>
<<but all the people want to make money>>....
<<I really don’t understand the art.>>
<<just when it’s a beautiful picture, okay>>
Fu: <<was he genius?>>
Se: <<what?!>>
Fu: <<was he genius?>>
<<I heard xx xx==>>
Jo: <<according to this author, he seems uh seems like a==
Se: <<=genius?>>
Jo: <=genius>>
Fu: <=intelligent person>>
Jo: <<but he is also a monster, monster.>>
<<his personality is a such a terrible.>>
<<but buyer don’t care about it.>>
<<just think about the money.>>
Se: <<ya.>>
<<no but I think that they here they say that the the author of the book manipulate the the personality of Picasso because in his last year when he was old he was like a he had a frustration he had a xx he was mm poor, he was like a little bit crazy>>
<<he in his eh late his late pictures the last are different to the beginning>>
<<that’s why the the first ones are more expensive because he was young he was happy>>
<<and then he was like frustrated.>>
<<he had bad feelings and everything>>..
<<I don’t know.>>
<<but I don’t think that he was a monster maybe.>>
Jo: <<so can you guys can understand this uh (paint?)>>
Se: <<xx xx xx xx xx>>
Fu: <<=mm, buyers may not care.>>
Se: <<=but that is about the the article.>>
<<they are this article tells that mm, that the author of the book the book “Picasso creator and destroyer” mm shows Picasso like a monster>>
Jo: <<so the main the main title seems to negative or positive>>
<<how about you guys opinion>>...
<<I really wonder if this main art- main title is near to negative or positive>>
Se: <<=maybe it’s negative but>>
Jo: <<=negative>>
<<but if uh the author’s opinion is near to negative the buyers have to think about the Picasso’s personality?>>
Fu: <<=mhm>>
Se: <<=ya I think that==>>
Jo: «xx xx xx»
Fu: «I think the buyers eh not doesn’t don’t care about Picasso’s personality too much»
Jo: «so when you buyer buy a picture you have to care.>>
<<they have to think about>>
Fu: «uh huh, mm>>
Se: «maybe they have»
<<but nobody people xx.>>
<<I think that just the people who knows about art that can understand can xx a picture or draw and understand what what’s the the artist trying to show or something because at least I don’t I really don’t understand>>
<<and I know that a lot of people who has money just wanna have “oh I have a a Picasso in my living room”»
<<but maybe they don’t understand why he draw that.>>
<<I don’t know.>>
<<it’s difficult>>
<<or you can understand?>>
Jo: «understand xx xx>>
Se: «xx xx like the the art?>>
Jo: «so this point is like a you just you should try to understand why the painter draw this picture, reflect on his personality, other’s personality why the =>>
Fu: «usually people just [xx xx xx]»
Jo: «[[xx xx xx] picture is xx»
<<but according to this article, we should think about money? money>>
Fu: «money?>>
Jo: «think about===>
((laughter))
Se: «money?>>
Jo: «I don’t think so»
Fu: «should think about=»
Jo: «=ya understand=»
Fu: «=behind the=>
Jo: «=behind the story>>
Fu: «=ya»
Se: «=ya»...
<<behind the story>>...
<<eh, that’s all.>>
<<it’s a lot.>>
<<I don’t wanna speak more>>..
Jo: «do you have fifteen minutes?>>...
<<but we already approach conclusion.>>
Se: «ya.>>
<<okay. if you have the money you would buy a Picasso.>>
Fu: «=no I [won’t.]»
Jo: «[[I think] that such a waste.>>
<<buy a picture.>>
"it it is such a waste."
"if I have a a lot of money to buy this picture, uh, I pay the buying a car."

((laughter))
Se: "<yes!>
Fu: "<yes> ((laughter))
Sc: "<ya, that's good.>
"<you?>
Fu: "<same, same Jo's opinion.>
"<it's waste.>
Se: "<a lot of money.>
Jo: "<there is a lot of fake>
Fu: "<oh ya>
Jo: "<imitation xx.>
"<I can't believe it.>
Se: "<ya>
Jo: "<you know even though the fake art, what do you call it. fake art fake art item. item?>
Fu: "<item>
Jo: "<is also very expensive?>
Se: "<ya>
Jo: "<ya.>
"<so I think it is such a waste to buy Picasso's picture.>
Se: "<yes, I think so that.>
"<I'm not sure.>
"<it's Picasso's or any pictures who it's like a million dollars?>
"<it's a lot.>
"<I think that the art is for decorate your house or shows that xx that looks beautiful>>
"<but not so expensive>>...
((student from other group)): "<hi!>
Se: "<hi.>
"<okay. that's all>>
Jo: "<thank you.>
"<time to finish.>
Appendix H

Sample Electronic Session

Pseudonyms are used throughout all transcribed sessions.

032B Chat Session 3c
Chat Log: Room 4
November 28, 2001

Participants:
Fl
Ju
Ch

((18 minutes))

******************************************************************************
******************************************************************************

Ch: <<hello, everybody.>>
Ch: <<What did you think about these?----Fl Ju>>


Fl: <<hihi>>
Ju: <<Good morning!>>
Fl: ^^
Ju: <<What's topic?>>
Ch: <<I've only heard about hecker and virus>>
Fl: <<about computer's crriminal,right?>>
Fl: <<i just know those hankers are really bad>>
Ch: <<the topic is about "computer Crime">>
Fl: <<my pc was hanked by them 2 months ago>>
Ju: <<In Japan,a hacker invaded the government"s cite this year>>
Ju: <<Is your computer all right now?>>
Fl: <<o----terrible!!>>
Fl: <<yep,>>
<<it spent me more than $800 to fix it>>
Ju: <<Too bad>>
Ch: <<and I heard some hacker 's storys>>
Fl: :(}
Ch: <<I feel sorry for you.--fl>>
Fl: <<I know some of them wanna to destroy other countries' pc
system>>
Fl: <<It's ok now~~~>>
<<don't worry>>
Fl: <<How about you guys, did you meet the same problem before in
ur pc?>>
Ch: <<I just knew a less about computer>>
Ju: <<Never cause my computer didn't connect with the net.>>
Fl: <<me too,>>
<<sometimes i would think those hackers are so so great,>>
<<they're so clever>>
Fl: <<u're lucky--junichi>>
Ch: <<I just knew a less about computer--fl ju>>
Fl: <<me too,>>
<<i learned how to use it after i came here>>
Ch: <<I only use computer to check send and read some News--fl ju>>
Fl: <<o--i just use it to chat with my friends are not here>>
Fl: <<and sometimes i use it to watch vcd>>
Ju: <<nowadays the computer is really helpful>>
Fl: <<yep,>>
<<almost everyone has one at home>>
Fl: <<but it also make people be lazy>>
Ju: <<yes,>>
<<but, in the future, we can buy everything on the net>>
Fl: <<why don't u connect internet in ur pc, ju?>>
Ch: <<I regretted very much about I'm so lazy and stupid--not to
learn how to use computer.>>
<<My parents bought a computer to me 9 years ago,>>
<<but I just used it to play the game--fl>>
Fl: hahaha~~~
Ju: <<I just don't have enough money to do it>>
Fl: <<u can learn ir from now on, ch>>
Fl: <<oic~~~>>
Ju: <<hang in thare>>
Fl: <<but is it expensive in japan?>>
Ju: <<Not really.>>
<<It really depends on the quality>>
Fl: <<when i went back china this summer holiday, i sa all myu
friends had a pc and connected internet at home>>
Ch: <<Why?>>
<<it's very expensive--ju>>
Fl: <<oic~~~>>
Ju: <<The cheapest one is about $1,000>>
Fl: <<wow~~~>>
Fl: «it's really expensive>>
Ju: «How about china?>>
Ch: «did you have one in Japan?ju>>


Ju: «<YES>>

*_**** Ch left IELP032B_Room_4. Time: Wed Nov 28 10:38:40 2001

******************************************************************************
Session in IELP032B_Room_4 ended (all participants have left). Time: Wed Nov 28
10:38:40 2001
******************************************************************************
### Appendix I

#### Table of Participant Data

Data for Electronic Sessions

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*Note: For the gender variable, 1 = female; 2 = male.*
Appendix J

Ethics Approval

Senate Research Ethics Board
Extensions 3205/4315, Room C315

FROM: David Butz, Chair
Senate Research Ethics Board (REB)

TO: Hedy McGarrell, Applied Language Studies
Kathy Epp

FILE: 01-032, Epp

DATE: October 18, 2001

The Brock University Research Ethics Board has reviewed the research proposal:

*The Effect of CMC on the Quantity and Type of Written and Spoken Discourse Produced by ESL Students*

The Subcommittee finds that your proposal conforms to the Brock University guidelines set out for ethical research.

** Accepted as clarified.

Please note: Changes or Modifications to this approved research must be reviewed and approved by the committee. Please complete form REB-03(2001) Request for Clearance of a Revision or Modification to an Ongoing Application to Conduct Research with Human Participants and submit it to the Chair of the Research Ethics Board. You can download this form from the Office of Research Services or visit the web site: http://www.BrockU.CA/researchservices/mainpage.html

DB/dvo

Deborah Van Oosten
Research Ethics Officer
Brock University http://www.brocku.ca/researchservices/
phone: (905)688-5550, ext. 3035 fax: (905)688-0748
Appendix K

Definition of Terms

**AS-unit** – “a single speaker’s utterance consisting of an independent clause, or sub-clausal unit, together with any subordinate clause(s) associated with either” (Foster, Tonkyn, & Wigglesworth, 2000, p. 365). The sentence “although it is difficult, I need to study English to improve my chances to get a job” constitutes one AS-unit. In this study, the number of AS-units produced per minute are one measurement of the quantity of output produced while the number of words produced per AS-unit are the measure of output quality.

**Asynchronous communication** – a form of computer-mediated communication, including applications such as email, and newsgroups. This form resembles a written letter more than a conversation, since both parties do not need to be present for communication to occur. Messages are sent to inboxes or posted on electronic bulletin boards, and may be read at a later time.

**Chat** – one popular form of synchronous computer-mediated communication, where interactions can take place either on a one-to-one basis, or one-to-many basis. Chat is one application of WebCT. In addition, many people chat using the program MSN Messenger.

**Computer-mediated communication** – this term refers to written communication that occurs between people through networked computers. It can take on a number of forms, both synchronous and asynchronous, including email, chat, and other applications.
**English as a Second Language (ESL) speakers** – usually used to refer to people whose mother tongue is not English, and who travel to a native-English speaking country in order to learn the language.

**Face-to-face** – this refers to spoken interaction that occurs between two or more individuals who are in close physical proximity to one another.

**Intensive English Language Program (IELP)** – a 14-week ESL program held at Brock University.

**Synchronous communication** – one form of computer-mediated communication that is transmitted “real-time,” or as it happens, via either the Internet, or software programs that are used on Local Area Networks (LANs). This form of computer-mediated communication resembles actual conversation in that all parties participating in the interaction are present, actively creating a conversation that is posted on their computer screens.

**T-unit** – according to Hunt (1966), a “minimally terminable unit” of language, including either an independent clause with all of its corresponding dependent clauses, or a stand-alone independent clause. This unit was used originally to determine the complexity of written work. The sentence “she enjoyed the ski trip although it was very cold” constitutes one t-unit.

**Turn** – In the face-to-face sessions, each time a participant contributed to a discussion, it was counted as a turn. In the computer-mediated sessions, each time a participant hit the “send” button, it was counted as a turn. In this study, turns taken per minute constitute one part of the measure of quantity.
**WebCT** – a networking software package used by many departments at Brock University. The software facilitates many networked computer applications, such as chat, email, and bulletin boards (WebCT, Inc., 2003).

**Word** - “a speech sound or series of speech sounds that symbolizes and communicates a meaning without being divisible into smaller units capable of independent use” (Merriam-Webster online dictionary, 2003). Compound words, such as “raincoat” and “girlfriend” have also been added to this definition. In this study, the number of words produced per minute constitute one part of the measure of quantity.