EFFECTIONS OF NETWORKED LANGUAGE LEARNING:
A COMPARISON BETWEEN SYNCHRONOUS ONLINE DISCUSSIONS AND
FACE-TO-FACE DISCUSSIONS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the
Graduate School of The Ohio State University

By

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ABSTRACT

The use of electronic communication via networked computers has recently been evaluated as an effective medium for authentic communication in the field of foreign and second language instruction. This study investigated the effects of networked computers in foreign and second language learning by comparing electronic discussions (more specifically, synchronous online discussions) with traditional face-to-face discussions.

The purpose of this study was to examine the conversation data of NNSE (Non-native Speakers of English)-NSE (Native Speakers of English) pair discussions in two different formats: electronic discussions and face-to-face discussions. This study sought to investigate if there were any significant differences between electronic and traditional face-to-face communications in terms of linguistic productivity, syntactic complexity, linguistic accuracy and interactional features.

The subjects of this study were ten NNSEs and ten NSEs, who were paired up to participate in the electronic discussion once and the face-to-face discussion once. The data elicited from the electronic and face-to-face discussions were examined and analyzed. The main frame of this study was a statistical analysis using paired t-tests and Wilcoxon matched-pairs signed-ranks tests. However, in order to better interpret findings obtained from this study, follow-up interviews were also conducted.
The results of this study showed that electronic communication provided more opportunities for NNSEs to participate in the discussion and, as a result, the electronic mode contributed to more equal sharing of participation whereas face-to-face communication was more dominated by NSEs. In terms of syntactic complexity, the results exhibited that the discourse generated by electronic discussions contained a lower level of syntactic complexity than face-to-face discussions. With respect to grammatical accuracy, it was observed that NNSEs paid more attention to grammatical forms in the electronic discussions and made less grammatical errors under the electronic format. The findings of this study also showed that synchronous online discussion promoted interactive exchanges between communicators just as the traditional face-to-face discussion did. The electronic medium encouraged communicators to take more initiative, to produce more questions/answers and to provide more feedback. However, the slower pace of interaction in the electronic discussion seemed to restrain communicators from expanding and explaining on a topic in more detail. Finally, reports from follow-up interviews provided information that would help explain the participants’ attitudes towards electronic and face-to-face discussions.

Following the findings of this research, pedagogical implications, limitations of the study and recommendation for further research are presented.
Dedicated to my parents,
to my husband, Richard Pyun
and to my daughter, Alexa
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CHAPTER 1

THE PROBLEM

1.1 Introduction

Concurrent with the rapid development of advanced technologies and the global use of electronic communications are the growing interests and attempts to utilize technology in second and foreign language education. Since the early 1990s, networked computers have been used in a variety of ways in order to promote language teaching and learning. Networked communications such as electronic mail and real-time chat have been suggested as effective mediators that provide language learners with a vehicle to convey thought as well as to negotiate meanings with others (Chun & Plass, 2000). Networked computers are a particularly useful medium for second language acquisition when one considers that the ultimate goal of learning a second language is to communicate with other people and deliver and share one’s ideas in the target language (Chun & Plass, 2000). The advantages of networked multimedia environments in fostering communicative competence in L2 (Second Language) learning have been well documented in a number of studies (Chun, 1994; Kern, 1995; Warschauer, 1996; Kelm, 1992). In general, studies reported that networked computers provided L2 learners with
increased opportunities to participate in authentic interaction as well as with an empowering environment where non-native speakers can freely express their emotions and thoughts in the target language (Beauvois, 1992; Kelm, 1992; Kern, 1995; Belcher, 1999).

Among the variety of network-based communications (often referred to as Computer-Mediated Communication or CMC), the synchronous online interaction has recently emerged as a promising means to facilitate the development of a second language. As opposed to asynchronous communication such as e-mail correspondence, synchronous chat resembles oral communication in that it provides real-time communication where messages are delivered instantly and participants become engaged in dynamic exchanges (Pellettieri, 2000). The characteristics of synchronous chat allow L2 learners to develop discourse competence and socio-cultural competence in the second language by actively negotiating meaning with others connected online (Kern, 1995; Chun, 1994). In addition, a networked setting was advocated for aiding L2 comprehension, for its visualized communication allowed L2 learners to read given information and think about their responses (Chun & Plass, 2000).

The potential of synchronous on-line interaction, however, has not been sufficiently investigated. The majority of previous research on the use of networked computers in language learning has been carried out using asynchronous media, mostly for the purpose of improving second language writing skills. Little empirical research has been reported regarding the linguistic characteristics and interactional features of real-time communication on cyberspace and how the outcomes of electronic discussion resemble or differ from those of face-to-face discussion. Exploring the differences
between text-based synchronous communication and face-to-face communication has some pedagogical implications regarding the advantages of networked computers and the specific ways in which those advantages can be exploited in the area of second language acquisition.

1.2 Statement of Problem

One characteristic of synchronous online chat is its capacity to generate a greater amount of interaction and L2 production (Kelm, 1992; Beauvois, 1992). Kelm (1992) reported that using a synchronous networking software, ‘Interchange,’ created a quicker paced interaction among participants, allowing his Portuguese language students to produce a larger amount of target language than they would off-line. Beauvois (1992) also noted that the communicative opportunities could be magnified through a computer network, in her case, in the form of a LAN (Local Area Network), which provided a highly interactive environment for student-to-student as well as student-to-teacher interactions creating a considerable amount of target language.

The advantage of linguistic productivity in networked communication seems closely related to the learners’ low level of anxiety while they are engaged in networked communications. A number of researchers supported the psychological comfort that electronic space provides to the interlocutors who are online. According to Barker and Kemp (1990), in cyberspace, interactants tend to be less conscious about their social and cultural traits such as voice, accent, appearance and unusual speech mannerism which are often distractors or hindrances in face-to-face communications. Particularly in foreign
and second language contexts, learners in computer-mediated communications seem to worry less about their non-nativeness or the speed and fluency of their L2 performance and hence participate in the discussions more freely and actively (Kelm, 1992).

In other words, not only does the computer-mediated communication serve as an effective medium for interactive communications that are similar to face-to-face communications, but it furthermore provides a more comfortable environment than the face-to-face mode, where even reticent or linguistically less confident learners feel empowered to speak up as equally as those who tend to dominate face-to-face interaction. Both Kelm’s (1992) and Beauvois’ (1992) findings about computer-mediated discussions, however, were not derived from the explicit comparison between electronic and face-to-face discussions. Their explanations for the linguistic and psychological effects of CMC are to a large extent conjectural with very little empirical evidence to support them.

Among the few studies that have reported explicit comparisons between the two modes are those by Kern (1995) and Warschauer (1996). Evidence of the equalizing effect and benefits in increased participation in those studies, however, were based on the larger size of the discussion group such as whole-class or small-group discussions. As Ortega (1997) critically pointed out, the positive equalizing effect of the electronic mode could be easily exaggerated when it is tested in a larger group format, because of the unobtrusive or multithreaded nature of electronic communications in which people can speak simultaneously without being interrupted. No published studies were found to have compared the electronic discussion and face-to-face discussion that takes place in NNSE (Non-native Speakers of English)-NSE (Native Speakers of English) pairs, where
the interactional features might be different from group or whole-class discussions, and where learners’ participation behaviors in association with native speakers may be revealed.

The purpose of this study was to investigate the linguistic and interactional characteristics of NNSE-NSE pair discussions in electronic communication as compared to face-to-face communication. This study intended to investigate the electronic mode of communication as an empowering format for NNSEs in their interaction with NSEs, and, in addition, whether or not the electronic mode had any impact on the linguistic quality of NNSEs’ production as compared to the production in face-to-face setting.

1.3 Research Questions

The theoretical issues raised in the previous section were explored in this study through the framework of the following empirical questions. For the NNSE-NSE pair discussions:

1. How are NNSE-NSE electronic discussions different from NNSE-NSE face-to-face discussions in terms of linguistic quantity? Are NNSEs more productive linguistically in the electronic mode than in the face-to-face mode?

   a) Is there any statistically significant difference between the ratio of NNSE’s turn-taking to NSE’s turn-taking in the electronic mode and the ratio of NNSE’s turn-taking to NSE’s turn-taking in the face-to-face mode?
b) Is there any statistically significant difference between the ratio of the amount of words produced by NNSE to the amount of words produced by NSE in the electronic mode and the ratio found in the face-to-face mode?

c) Is there any statistically significant difference between the ratio of average number of words per NNSE’s turn to the average number of words per NSE’s turn in the electronic mode and the ratio appeared in the face-to-face mode?

2. How is electronic discussion different from face-to-face discussion in terms of the syntactic complexity in the language generated by both NNSEs and NSEs?

a) Is there any statistically significant difference between the average length of T-unit\(^1\) in the electronic discussion and the average length of T-unit in the face-to-face discussion?

b) Is there any statistically significant difference between the percentage of T-units containing a dependent clause in the electronic mode and the percentage of T-units containing a dependent clause in the face-to-face discussion?

3. How is electronic discussion different from face-to-face discussion with respect to the grammatical accuracy in the language generated by NNSEs?

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\(^1\) T-unit is an index of syntactic complexity which is defined as an independent clause and its accompanying modifiers (Hunt, 1970). An Example of T-unit analysis is provided in chapter 3 and Appendix E.
a) Is there any statistically significant difference between the percentage of error-free T-units in the NNSE’s utterances via the electronic mode and the percentage of error-free T-unit in the NNSE’s utterances via face-to-face talk?

b) Among the grammatical errors observed in this study (i.e., morphological errors, syntactic errors and lexical errors), which of the errors occurred more frequently in the electronic discussion and which in the face-to-face discussion?

4. How is the NNSE-NSE pair interaction in the electronic mode different from that in the face-to-face mode in terms of interactional features (i.e., (a) initiatives, (b) questions/answers, (c) statements, (d) requests, (e) feedback)? Is there any statistically significant difference in each interactional feature between the two discussion modes?

a) Is there any statistically significant difference between the percentage of T-units containing initiatives in the electronic mode and the percentage of T-units containing initiatives in the face-to-face mode?

b) Is there any statistically significant difference between the percentage of T-units containing questions/answers in the electronic mode and the percentage of T-units containing questions/answers in the face-to-face mode?

c) Is there any statistically significant difference between the percentage of T-units containing statements in the electronic mode and the percentage of T-units containing statements in the face-to-face mode?
d) Is there any statistically significant difference between the percentage of T-units containing requests in the electronic mode and the percentage of T-units containing requests in the face-to-face mode?

e) Is there any statistically significant difference between the percentage of T-units containing feedback in the electronic mode and the percentage of T-units containing feedback in the face-to-face mode?

5. How do participants describe and evaluate their experience of electronic discussions in comparison to face-to-face discussions? Do the participants find the two modes of discussion different? Is there any individual preference for a certain mode? If so, how do the participants like or dislike each discussion mode?

Among the above, research questions 1 through 4 will be tested through a controlled experiment. The answers to question 5, information obtained through follow-up interviews will serve as the basis for interpreting and explaining the data.

1.4 Basic Assumptions

The basic concepts and assumptions to be clarified in order to understand the decisions made and process used in this study are as follows:

1. T-unit is a valid means to measure syntactic complexity.
2. The amount of dependent clauses is a valid index to measure the degree of syntactic complexity.

3. The information provided in the personal data survey including their recent TOEFL scores is all accurate and honestly reported.

4. TOEFL (Test of English as a Foreign Language) is a valid and reliable means to assess the proficiency level of each student. Therefore, subjects with TOEFL scores ranging from 520-559 are considered to belong to a similar level of English proficiency. The range of 520-559 was set based on the average Korean students’ TOEFL score (i.e., 535) which has been reported in the ETS (Educational Testing Service) 1999 booklet. Therefore, participants in this study can be considered to be of average English proficiency level among Korean English-speaking students.

5. The subjects in this study will participate in the discussions to the best of their knowledge and efforts.

6. Several basic assumptions pertinent to each research question raised in this study are:
   
   a. In terms of linguistic amount, there is a tendency that NSEs verbally dominate NNSEs and take more turns than NNSEs because NSEs are more fluent in the English language and more knowledgeable about the pragmatics involved in the English language.

   b. In terms of syntactic complexity, students of lower English proficiency level tend to produce syntactically less complex sentences.

   c. In terms of grammatical accuracy, NSEs tend to produce grammatically accurate speech whereas NNSEs tend to produce more grammatical errors.
d. The five interactional features that were examined in this study are the qualities that are frequently found in the face-to-face discussions and are believed to be important in generating meaningful communication.

1.5 Definition of Terms

1. Average turn length

**Connotative definition:** Average is defined as “a single value (as a mean, mode, median) that summarizes or represents the general significance of a set of unequal values” (Webster’s Seventh New Collegiate Dictionary, 1967). Turn is referred to as “a time for action” (Webster’s Dictionary of American English, 1997). Length refers to “the longest extent of anything measured from end to end” (Webster’s Dictionary of American English, 1997). Average turn length can therefore be defined as the single value as a mean that summarizes the extent of a period of action.

**Operational definition:** Average turn length is operationally defined as the mean number of words contained per turn, which is measured by calculating the total number of words divided by the total number of turns.

2. Syntactic complexity

**Connotative definition:** Syntax is defined as “the study of the patterns of formation of sentences and phrases from words in a language” (Webster’s Dictionary of American English, 1997). Complexity is referred to as something that has “a
complicated arrangement of parts or pieces” (Webster’s Dictionary of American English, 1997). Syntactic complexity can, therefore, be defined as a complicated arrangement in the way words are put together to form phrases or sentences.

**Operational definition**: Syntactic complexity is operationally defined as the ability to produce longer and complicated sentences, which can be measured by calculating (1) the average length of T-unit; (2) the percentage of T-units with dependent clauses. The average length of T-unit is calculated by dividing the total number of words in T-units by the total number of T-units. The percentage of T-units with dependent clauses is calculated by dividing the total number of T-units containing dependent clauses by the total number of T-units and then multiplying it by one hundred.

3. Dependent clauses

**Connotative definition**: Dependent refers to “relying on another for support” (Webster’s Seventh New Collegiate Dictionary, 1967). Clause is defined as “a group of words containing a subject and predicate and functioning as a member of a complex or compound sentence” (Webster’s Seventh New Collegiate Dictionary, 1967). Dependent clauses can therefore be defined as a group of words containing a subject and predicate that cannot stand alone but rely on another for support.

**Operational definition**: Dependent clauses in this study is defined as clauses that cannot stand on their own as sentences but depend on the main clauses with an introducing word (e.g. *for, that, because, although, since, after and if*). For example: James said [*that* his car had broken down]; I saw James’ new car when *I visited his place last week*. 
4. T-unit

Connotative definition: T-unit is defined as an independent clause and its accompanying modifiers (Hunt, 1970).

Operational definition: In this study, Hunt’s definition of T-unit (i.e., an independent clause and its accompanying modifiers) was used as an index of syntactic complexity. That is, T-unit is an independent clause with or without dependent clauses that go with it. An independent clause is a clause containing a subject and predicate that can stand on its own. A dependent clause is introduced by such words as since, because, when, where, after, while, although, as if and even though. Examples of T-unit are: [A lot of people didn’t like it]; [It’s better to change their customs when they move to another country]; [I don’t think you really have to do that].

5. Grammatical errors

Connotative definition: Grammar is defined as “the study of the way that the sentences or words of language are constructed”(Webster’s Dictionary of American English, 1997). Error refers to “mistake” or “inaccuracy”(Webster’s Dictionary of American English, 1997). Therefore, grammatical errors can be defined as inaccuracy in the way that the sentences or words are constructed.

Operational definition: In this study, grammatical errors were delimited to morphological errors, syntactic errors, and lexical errors. Morphological errors are the errors in word formation such as in the use of indefinite articles and tenses (e.g. * I have a idea; * He go to college; *I runned fast). Syntactic errors are the errors in sentence
organization such as wrong word order or missing words (e.g. * I went two times there; * He goes ___ college). Lexical errors are the errors in word selections (e.g. * how many butter do you want?) (Refer to Appendix D, for detailed account of error categorization.)

6. Grammatical accuracy

**Connotative definition:** Grammar is defined as “the study of the way that the sentences or words of language are constructed” (Webster’s Dictionary of American English, 1997). Accuracy refers to “exactness” or “correctness” (Webster’s Dictionary of American English, 1997). Therefore, grammatical accuracy refers to the way that the sentences or words are correctly constructed.

**Operational definition:** Grammatical accuracy is operationally defined as the percentage of error-free T-units. An error-free T-units is a T-unit that does not contain morphological, syntactic or lexical errors. The percentage of error-free T-units is calculated by dividing the total number of error-free T-units by the total number of T-units and multiplying it by one hundred.

7. Interactional features

**Connotative definition:** Interaction refers to “mutual or reciprocal action or influence” (Webster’s Seventh New Collegiate Dictionary, 1967). Feature is defined as “a prominent part or characteristic” (Webster’s Seventh New Collegiate Dictionary, 1967). Interactional features can therefore be defined as characteristics of mutual or reciprocal action.
Operational definition: In this study, interactional features of communication are measured by the following five indicators (a more detailed account of interactional features is provided in chapter 3):

1. Initiatives: greetings; farewells; introducing topics; shifting topics.
2. Questions/Answers: general questions and answers to general questions.
3. Statements: general statements or statements to expand on a topic.
4. Requests: requests for clarification or explanation.
5. Feedback: giving feedback to the other person.

8. Percentage of each interactional feature

Connotative definition: Percentage refers to “a rate for a hundred” (Webster’s Dictionary of American English, 1997). As defined above, interactional feature refers to a characteristic of mutual or reciprocal action. Therefore, percentage of each interactional feature can be defined as a proportion of the characteristics of mutual or reciprocal action on a scale of one hundred.

Operational definition: In this study, the percentage of each interactional feature is measured by calculating the total number of T-units containing each interactional feature divided by the total number of T-units and multiplied by one hundred.

1.6 Significance of the study

Many people have labeled the twenty-first century an information age or the era of a networked society, where technology and computers will become indispensable in
many parts of the world. In the context of second language learning, the increasing ubiquity of computers has made it possible for language teachers and learners to extend their communicative experience to worlds that go far beyond the classroom. As Salaberry (1996) has suggested, network-based telecommunications are emerging technologies that serve as effective tools to provide authentic and purposeful interactions among L2 learners.

On the other hand, there are those who are concerned about the use of computer-assisted language learning that does not carefully incorporate the orientations and disciplines of second language pedagogy. Chapelle (1997) suggested that researchers raise critical questions regarding the kind of language produced by learners in computer-mediated communication and the quality of the language learning experience in the electronic environment in order to ensure that the electronic medium is a pedagogically sound learning experience. In other words, an evaluation of the nature of computer-mediated communication is essential in making informed decisions about the ways in which networked computers can be successfully used in second language acquisition. The fact that there is a dearth of empirical research regarding the quantity and quality of computer-mediated communication as compared to the traditional face-to-face communication provides the need for and underscores the significance of this study.

First, this study will serve as an empirical investigation for the growing support for the synchronous electronic communication as an effective device that encourages greater empowerment for L2 learners and high-quality interaction among interlocutors (e.g. Warschauer, 1996; Salaberry, 1999; Chun, 1994). The observations resulting from this study will be used to support or reject claims made in previous research.
Second, this study was also intended to investigate some of the controversial claims made in previous research. The few studies that have compared synchronous online discussions and face-to-face discussions have shown discrepancies in the measures of syntactic complexity and grammatical accuracy (e.g., Warschauer, 1996; Kern, 1995; Pellettieri, 2000). Findings in this study will expand the knowledge regarding the differences in syntactic complexity and grammatical accuracy between the two communication modes.

Third, by providing knowledge of what computer-mediated communication can offer, this study may provide useful information to second language teachers who would want to use this pedagogical tool in their foreign/second language classrooms. Differences or similarities between electronic and face-to-face discussion obtained in this study may inform language educators of how the two modes of discussion can complement each other and how the advantages of computer-mediated communication can be judiciously practiced in their instructional settings.

In addition, this study has included interviews with participants regarding their perception, attitudes and preference for the two modes of discussion. Therefore, the data obtained from the interviews may provide crucial information revealing ways to better meet the needs of L2 learners when using computer-mediated communication.

1.7 Limitations

The subjects in this exploratory study were not randomly selected from a population. The sample of this study is a set of transcribed data derived from twenty
volunteer participants, namely ten ESL students from South Korea and ten native
speakers of American English. The results, therefore, may not be generalizable to other
ESL students from different backgrounds and different nationalities. In addition, the data
in this study were obtained from Korean ESL students whose TOEFL scores ranged from
520-559. Therefore, the results may not be applicable to other Korean students whose
levels of English proficiency are higher or lower than the participants in this study.

In analyzing the grammatical accuracy of the linguistic output derived from the
discussions between a NNSE and an NSE, the researcher took into consideration only the
output of NNSEs, excluding NSEs’ output in the measure of grammatical accuracy.
Although, it is possible that NSEs may make grammatical mistakes, the researcher’s
interests was to examine if NNSEs pay more conscious attention to grammatical accuracy
in one mode than in the other. Therefore, the utterances of native English speakers were
excluded in the examination of grammatical accuracy of the data.

In this study, the gender of each participant was not taken into consideration.
Therefore, it is unknown whether the genders of participants (e.g., a mixed gender dyad
or the same gender dyad) played a role in the quantity and quality of linguistic outcome
produced by each dyad.

1.8 Organization of the dissertation

The present study consists of five chapters. Chapter 1 includes an introduction to
the problem under investigation along with the specific research questions to be pursued
in this study. Some of the background information necessary in understanding the
present study is also provided here, such as basic assumptions, definition of terms, the significance of the study and its limitations. In chapter 2, a review of previous literature relevant to the present study is provided. Chapter 3 concerns the methods and procedures used in this study such as the selection of the subjects and samples, research design, instruments, and the methods of data collection and analysis. A discussion of the results of the analysis of the data is presented in chapter 4. The final chapter 5 is a conclusion of this study, providing answers to the research questions, exploring the implications of the study and making recommendations for further research. A bibliography and appendices are provided at the end of the dissertation.

1.9 Conclusion

Recent attempts to explore the benefits of computer-mediated communication in second language acquisition have not provided conclusive evaluations of the medium (i.e., computer networks) in language learning. In this chapter, some problems pertinent to the evaluation of networked computers in L2 acquisition were covered and research questions of further investigation were raised. The goal of this study is to examine the quantity and characteristics of synchronous online discussion and compare them with the quantity and characteristics of face-to-face discussion. Examination of these questions would assist in the development to incorporate computer networks in second/foreign language acquisition. In order to understand the usefulness of CMC, the following chapter will review previous literature on computer-mediated communication and the comparison of CMC with face-to-face communication.
CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Herring (1996) defines Computer-Mediated Communication (CMC) as a communication that takes place between human beings via the instrumentality of computers (p.13). According to her definition, CMC embraces a broad range of telecommunications including web board, electronic mail, and audio/video conference via computers. In this study, however, the discussion of CMC will be delimited to text-based communication both in its synchronous and its asynchronous form, as its use and applications are widely available and being popularly used in contemporary societies. The discussion of CMC-related literature in this chapter is divided into three parts. First, a historical background of CMC will be introduced with a focus on some of the earlier research in this area. The second part of this chapter concerns the implications of CMC in language learning in general, including some pedagogical claims made by proponents of CMC. Finally, the research on comparing synchronous online communication and face-to-face communication will be discussed, which may provide more direct implications for this study.
2.2 A Historical Background of CMC Research

Computer networks were first introduced in the 1960s with the purpose of transferring information from one computer to another. It was not until the late 1980s, however, that computer networks were widely recognized as a cost-effective medium for “human-to-human” communications. The earliest research on computer-mediated human interactions was conducted by sociologists and psychologists including Hiltz and Turoff (1978/1993), and Kiesler, Siegel and McGuire (1984), who were primarily concerned about the computing environment in terms of its social and psychological effects. Hiltz and Turoff’s study (1978/1993), where the word CMC (Computer-Mediated Communication) was first introduced, examined the implications of computerized conferencing for government communications. The authors evaluated computer networks as “the cheapest, most convenient, and potentially most powerful option for geographically dispersed groups of people” (1993:30) and foresaw that the computer networks would make social and psychological impacts on human-to-human communications. By comparing CMC with face-to-face talk, Kiesler et. al. (1984) observed the behavioral and societal aspects of computer-mediated communication. The authors examined how online communication affects group interaction, for example, whether CMC makes it easier or harder for participants to reach a consensus. The authors reported that in CMC, as compared to face-to-face talk, people tended to be less inhibited in terms of verbal behavior as they showed a higher frequency of remarks
containing hostile comments. The authors suggested that the anonymous environment of computer-mediated communication appeared to influence the interpersonal and verbal behaviors of participants.

Several years later, an increasing number of studies, initiated by composition specialists, were conducted on the pedagogical implications of CMC, exploring the potential of networked computers in the writing courses. Batson (1988) discussed the positive effects of networked computers for hearing-impaired students learning L1 composition. According to Barker and Kemp (1990), the computer network contributed to meaningful and collaborative interaction among students in a composition class. Similarly, Cooper and Selfe (1990) also advocated CMC for writing classes, as they found that CMC encouraged student-oriented writing activities while decreasing the emphasis on teacher instruction. In general, the use of electronic communication has been positively evaluated in the L1 composition classrooms on the grounds that electronic communication provided students with more opportunities for writing practice as well as a more inviting atmosphere for collaborative writing and peer editing (Barker and Kemp, 1990; Boiarsky, 1990).

From the mid 1990s, coupled with remarkable technological advances, research on the hypertext and networked communication started to burgeon in the literatures of languages, education, and communication with broader attention paid to meaningful human-to-human interactions in authentic discourse communities. As networked computers have become one of the primary media of communication in many industrial societies, the use of CMC not only has expanded one’s view of literacy, but it also has transformed the ways in which one writes, reads and thinks (Selfe, 1989). The unique
style and characteristic of CMC that distinguishes itself from traditional communications
with regards to time, space, speed, delivery and expanse, has diversified the concept of
language, learning and communication. Currently, inquiries into CMC are expanding and
surging in multiple directions. In the present chapter, however, discussions of computer-
mediated communication will be centered on its role and implications in language
learning.

2.3 Computer-Mediated Communication and its implications for Language Learning

Over the past twenty years, efforts have been made to integrate computer
technology in language learning. A number of reports on computer-mediated
communication have given a glimpse of what networked computers can do for language
learning. In general, studies reported that computer-mediated communication in the form
of e-mail, real-time chat, instructional delivery, and computer conferencing can serve as a
replacement for or as a supportive aid for the traditional language classroom. In what
follows, features and benefits of computer-mediated communication in language learning
will be discussed based on the findings of previous research. The general pedagogical
implications of CMC in language learning can be summarized in three categories,
namely, in terms of (1) linguistic, (2) social–psychological, and (3) communicative
aspects. The three areas of implications, however, are not mutually exclusive but closely
related.

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2.3.1 Linguistic Aspects of CMC

It has been suggested by a number of researchers that the forms of interactive written discourse generated through CMC are linguistically different from both traditional written and traditional spoken languages (Yates, 1996; Chun, 1994; Kern, 1995; Murray, 1988). While CMC bears some similarities to written discourse as regards its linguistic complexity and lexical density (Yates, 1996; Chun, 1994) and to spoken discourse with respect to its interactive discourse functions (Chun, 1994), it also carries its own unique discourse features that are neither quite spoken language-like nor quite written-language like but rather, as some scholars put it, a hybrid of written and spoken discourse. For example, Davis and Brewer (1997) labeled electronic discourse as “writing talking” (p. 164), stating that electronic discourse is a variety of language which has the characteristic of both speech and writing. In this section, some of the important linguistic characteristics of computer-mediated communication are discussed, namely the degree of syntactic complexity, linguistic productivity and grammatical accuracy of computer-mediated communication.

Syntactic Complexity

One of the most frequently discussed linguistic features of CMC is its degree of syntactic complexity. Among the researchers who provided the analyses of syntactic complexity of CMC are Chun (1994), Kern (1995), Warschauer (1996) and Sotillo (2000). Richard Kern (1995) reported that the synchronous chat created more various forms of verbs and clause types than the oral discussion mode did. In an observation of morphosyntactic features, he observed that language output in the networked
communication contained more sophisticated sentences than those found in oral discussion, having more subordinating conjunctions, if-clauses and negative clauses. However, he also noted that the language produced in the online mode contained a higher proportion of simple sentences than did the language produced in the oral discussion mode, indicating that the language in online chat was quantitatively more diverse and contained a variety of complex structures, but qualitatively, the density of complex structures was lower than that present in the oral discussions. A similar result was echoed by Chun (1994) who found that the proportion of simple sentences in synchronous chat mode was much higher (three times as much) over the complex sentences.

Contrary to Kern’s (1995) and Chun’s (1994) results, however, Mark Warschauer (1996) reported that the level of syntactic complexity was higher in the electronic mode than in the face-to-face mode, when he compared the values of lexical and syntactic complexity between the two modes. The contradictory results with respect to the level of syntactic complexity in electronic as compared to oral discussion may have resulted from different methods and procedures employed by the researchers. For example, Kern (1995) used the number of conjunctions and types of clauses as measures of syntactic complexity, whereas Warschauer used lexical range and the number of clause coordination as an index of syntactic complexity. In addition, while Kern’s study was conducted in a whole-class format, Warschauer’s study was administered in small group format. These distinctions might have resulted in the differences in the measures of syntactic complexity between the two modes of discussion.
Unlike Kern (1995) and Warschauer (1996) who compared synchronous discussion with face-to-face discussion, Sotillo (2000) compared the degree of syntactic complexity between synchronous online discussion and asynchronous discussion (i.e., an ESL discussion forum). It was not too surprising that the findings revealed that the complexity index (subordination and embedded subordinate clauses) was higher in the asynchronous mode, since the asynchronous mode allowed students to have more time to plan, write, edit and re-write the texts. In the synchronous discussion, the author reported that learners produced more informal speech and seemed to focus more on meaning, while learners communicating asynchronously had more time to plan their outputs and produced lengthier and syntactically more complex output.

Still, there is much to be investigated concerning syntactic complexity of CMC both in synchronous and asynchronous forms. A range of carefully controlled measures of syntactic complexity and lexical density is in demand in order to accurately assess the linguistic quality of learner output generated via electronic discussion as compared to those generated in traditional forms of communication.

**Linguistic Productivity**

Another frequently discussed feature of CMC is its linguistic productivity or the capability to produce increased amount of linguistic outcomes. The increased amount of linguistic outcomes and the increased participation per individual have been discussed as one of the most beneficial effects of CMC. According to Kelm (1992), all members of his foreign language class generated a greater amount of interaction through synchronous hypertext software (i.e., Interchange) and as one of his students commented, “I think that
I participated 100 times more during Interchange than in class.” Kroonenberg (1994/1995) also observed that CMC motivated students to create a substantial amount of target language in her EFL classrooms. In her high school English class, Kroonenberg implemented electronic interaction by having students write a dialogue journal as well as chat online. She reported that the interpersonal correspondence via electronic discussion outside the classroom increased the amount of opportunities for students to communicate in a foreign language.

In the context of L2 acquisition, scholars have suggested that the linguistic productivity in the networked environment could be a significant facilitator in the development of second and foreign languages. This suggestion stemmed from the belief that the linguistic output forced through meaningful interaction is a result of an L2 learner’s cognitive endeavor to retrieve appropriate forms and functions from his/her mental map. Often referred to as the Output Hypothesis, which was posited by Swain (1985), this kind of forced linguistic output has been suggested to play a significant role in the development and facilitation of L2 acquisition (Ellis, 1980; Long & Sato, 1984). What can be deduced from these findings is that CMC may create an instructional context which provides more opportunities for students to produce desirable linguistic output than the traditional L2 classrooms may do (Ortega, 1997).

**Linguistic Accuracy**

While there are studies that support CMC for contributing to linguistic productivity or linguistic fluency, little is known about the linguistic accuracy in CMC. Several scholars have speculated that the degree of accuracy in CMC, particularly in the
simultaneous online interactions, would be low because CMC tends to foster a focus on meaning (Beauvois, 1992; Kelm, 1992; Kern, 1995). In other words, in real-time online communication, participants tend to engage in quick-paced dynamic exchanges and thus tend to focus on delivering meanings with less concern about the grammatical forms of their utterances. Kern (1995) even cautioned that grammatical accuracy and discursive coherence would not be well achieved in real-time networked-based communications.

However, Pellettieri (2000) offered a different perspective. In her descriptive research, Pellettieri (2000) argued that in network-based communications, both in the synchronous and asynchronous forms, students are more likely to focus on language-form than they are in oral discussions because they can visually monitor their messages and they have more time to process language than in face-to-face discussions. In her study, twenty students from a college Spanish program participated in five communication tasks using a synchronous chat software, ‘ytalk’ and the transcripts of their interactions were analyzed. The results demonstrated that learners were attending to language form in their output. For example, when a student typed a wrong verbal form, the student backspaced and changed it before entering it as a final statement. The author argued that in electronic discussions, learners focus on both form and meaning, and linguistic accuracy is not sacrificed at the expense of focusing on the meaning.

Obviously, the issue of focus on form and function in computer-mediated communication is an area that needs further empirical testing. With the paucity of research on the role of “focus on form” in electronic communication, it seems premature to judge what CMC can offer for formal accuracy in L2. To summarize the linguistic aspects of CMC, previous studies reported that CMC led to quantitatively more target
language production. With respect to quality, to what extent computer-generated communication can promote the grammatical competence in L2 including grammatical complexity and accuracy still remains unclear. Regarding the linguistic characteristics of computer-mediated communication, some scholars suggested that greater quantity of L2 production has to do with the social psychological effects of CMC. This will be discussed next.

2.3.2 Social Psychological Aspect of CMC

A close examination of the linguistic productivity of CMC shows its strong correlation with the degrees of interlocutors’ emotional solidarity while they engage in the medium. Research has demonstrated that computer networks provide interactants with a psychologically more comfortable and less threatening environment. The discussion on the CMC’s capability to provide a supportive, inviting atmosphere is pervasive in the literature of second and foreign language acquisition (Beauvois, 1992; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996; Belcher, 1999) as well as first language writing instruction (Hartman, Neuwirth, Kiesler, Sproull, Cochran, Plamquist, and Zubrow, 1991). For instance, Kroonenberg (1994/1995) evaluated interaction via computers as less intimidating than interaction with humans and, hence, suggested that even shy or reluctant speakers could be suddenly very verbal in electronic discussion. A similar statement was made by Beauvois (1992) who observed that less motivated language learners in the traditional classroom became “naturally” involved in
the networked environment (p. 462). Chun (1994) also witnessed that several of the quieter” students in her class were, indeed, the most “prolific” during computer-mediated discussions.

In particular, scholars pointed out that CMC can be very beneficial for people in the subordinated positions such as women, minorities, and linguistically, culturally or physically disadvantaged people (Bruce, Peyton, and Bastson, 1993; Kiesler, Siegel, and McGuire, 1984; Belcher, 1999). For example, Belcher (1999) found evidence of the computer’s ability to generate an empowering environment for linguistically and culturally disadvantaged students. In her observation of an ESL graduate seminar, which consisted of eight NNSEs out of seventeen students, she noted that the e-space (in her case, the asynchronous online communication via electronic newsgroup) provided NNSEs, in their interaction with NSEs, frequent opportunities to express their views, which seldom occurred in the regular classroom.

Why do people engaged in telecommunication, especially those who are seemingly disadvantaged, feel confident and encouraged to speak out with more freedom and comfort? Answers to this question have been addressed often by comparing electronic communication to oral or face-to-face communication. In Rheingold’s view (1993), a virtual community removes prejudices that can be formed by seeing one another. He noted that “people who are thoughtful but who are not quick to formulate a reply often do better in CMC than face-to-face or over the telephone” (p. 66). Barker and Kemp (1990) suggested that there is a kind of “psychological filtering” in CMC, where participants feel less threatened or less constrained. This psychological filtering of CMC, according to them, is largely due to the absence of potential barriers commonly found in
face-to-face interaction such as voice, intonation and appearance (p. 21). Chun (1994) pointed out that in computer-assisted classroom discussions, “there is no time pressure to respond nor the psychological pressure of making a mistake or looking foolish” (p. 28).

Such claims concerning the social and psychological advantages of a networked environment for the linguistically and culturally disadvantaged seem convincing to a great extent. Particularly for the case of non-native speakers of English, there are numerous studies previously reported in the literature regarding the effects of affective states on their speaking and writing performance. A number of second language researchers reported that adult L2 learners often experience affective barriers such as anxiety in language classrooms which can limit or hinder their L2 performance (Horwitz and Young, 1991; Young, 1991; Price, 1991; MacIntyre & Gardner, 1991). The electronic medium where one cannot see the other’s physical presence may help to lower the affective filter of interlocutors and therefore can be affectively beneficial for those who experience a high level of anxiety in language classrooms or in face-to-face interactions.

Naturally, the affectively empowering environment of CMC contributes to the equalization or democratization of participation. McGuire, Kiesler, and Siegel (1987), Flores (1990) and Selfe (1990) have all found that women participated in electronic discussions as equally as men which is often not the case in face-to-face discussions. Kern (1995), in his experimental comparison of a traditional class discussion and an electronic discussion in French classes, observed that in the electronic mode, teacher discourse became less dominant and student utterances increased, consequently contributing to the equalization of teacher versus student talk. Consistent evidence was
also shown in Kelm’s research (1992), who reported that “computer-assisted classroom
discussions were great equalizers” of student participation (p.443) in his Portuguese
language class. In sum, in the electronic mode, the published studies indicate that each
individual seems able to contribute equally at his/her own pace and leisure with more
freedom and comfort.

2.3.3 Communicative and Interactive Aspects of CMC

One of the widely held beliefs in SLA is that language proficiency involves not
only linguistic or grammatical competence but, equally important, it also involves
communicative, interactive and strategic competence, which deals with the ability to use
appropriate, functional and meaningful language in situated contexts. Recently, there has
been a growing interest in the role of CMC as a means to practice interactive competence
and communicative strategies, through meaning negotiation in an authentic real-life
environment. Salaberry (1999) proposed that CMC generated a high level of interactivity,
and that this interaction helped learners improve the quality of their written and spoken
discourse. Kern (1995) also advocated computer networks through which a wide variety
of discourse structures were generated. Most recently, Chun and Plass (2000) evaluated
“networked computers” as an effective medium to promote L2 learners’ communicative
competence, by providing L2 learners with ample opportunities to use context-specific
knowledge and discourse strategies while negotiating meaning with others.

An extensive analysis of communicative and interactional features of CMC was
provided by Chun (1994). Chun (1994) examined discourse functions and characteristics
of real-time networked communication generated by first-year German language students.
According to her, computer assisted classroom discussion facilitated a number of interactive discoursal moves, such as initiative in asking questions, expanding on topics, request for clarification, providing feedback and so on. Based on her findings, she concluded that computer assisted communication allowed students to “take a more active role in the discourse management than is typically found in normal classroom discussion” (p. 28) and hence CMC lends itself to be “an effective medium for facilitating the acquisition of interactive competence in second language writing and speaking” (p.28).

The interactive capability of CMC carries a valuable implication particularly in EFL contexts where L2 learners often do not have sufficient opportunities to interact in the target language. A representative example can be found by Kroonenberg (1994/1995), who strongly supported the role of keyboard and screen in developing communicative skills in EFL class. As an assistant principal of the Hong Kong International School, Kroonenberg found that her students, whose first language was Cantonese, benefited from e-mail interaction as an authentic form of communication in English. She observed that not only did e-mail activities improve students’ writing skills but also developed learners’ reading ability and thinking processes, as a result of the students’ high motivation to eagerly communicate with others in comprehensible language.

In order to ensure that online discussions would produce qualitatively and quantitatively desirable negotiations, Pellettierie (2000) raised the importance of the language task. In her study of nonnative speaker of Spanish chats, Pellettier provided twenty college students with five communication tasks to be completed by each dyad. From the language data generated from the five tasks, she observed that learners actively negotiated to resolve problems when trouble arose and as a result, the task-based
communication fostered the negotiation of meaning. Based on her findings, she argued that if the task is highly goal-oriented, synchronous online discussion could facilitate the meaning negotiation, comprehension and successful communication.

In general, those who are in favor of CMC for interactive and communicative activities base their argument on the theoretical foundation called “interactionist approach,” which emphasizes the importance of interaction in SLA (refer to Pica, 1987; Pica, 1994; Long, 1981). Interactionists believe that conversational interaction and comprehensible input generated by those interactions can significantly enhance L2 proficiency. The ability to create meaningful interaction was also advocated by Canale and Swain (1980) and Kramsch (1986). Canale and Swain (1980) argued that a learner’s language competence involves the use of authentic, communicative and socioculturally appropriate language. Similarly, Kramsch (1986, 1993) also proposed interactive competence as an essential component of L2 abilities, which she defined as “the ability to express, interpret and negotiate meaning.”

Discussion of the communicative and interactive capability of CMC has been dominantly focused on the synchronous mode of CMC (or often called real-time chat), no doubt because the synchronous mode mediates non-static instantaneous communication where participants have to be prompt in corresponding with their interactants. In general, however, the amount of research published on the potential of CMC for communicative and interactive competence is very limited. There still needs to be further investigation in the analysis of interactional features in CMC discourse in order to clarify what aspects of communicative competence can be fostered in computer-mediated communication. In successful oral conversations, there are frequent meaning negotiations between
interlocutors mediated by a number of discourse managing strategies such as comprehension check, question, request for elaboration, confirmation and feedback, which are believed to be important in the development of second language and L2 communicative competence. Therefore, it is important to investigate if these kinds of discourse features are well accomplished in computer-mediated communication, and how the discourse features in CMC are different from those found in oral communication. One of the goals of the present study is to examine these discourse features of computer-mediated discussions and to compare them with the features of oral discussions.

2.4 Research Comparing Face-to-Face and Synchronous Online Discussions

A small body of research has documented the comparative features of synchronous online discussion and face-to-face discussion. The first milestone research concerning the comparison between face-to-face and real-time communication was by Kiesler, Siegel, and McGuire (1984) who explored the social and psychological aspects of computer-mediated communication. Kiesler et. al. particularly focused on the impacts of computerization on the way people participate and behave in the communication. Through three different kinds of experiments, they compared groups using a computer software, called “Converse,” where messages of different people appeared simultaneously, with the groups talking face-to-face. Their findings included: (1) In computer communication, “there was less influence and control of a dominant person, moderator, or leader,” (p.1130) thus people in real-time computer communication participated in the discussion more equally than when they were engaged in face-to-face
discussions; (2) People in computer-mediated communication were less inhibited but rather aggressive, easily commenting even negative remarks. Kiesler et. al.’s study implies that there are some unique affective and cognitive dimensions involved in computer-mediated communication that are different from those in oral or face-to-face communication, which affects the participation structure and interpersonal behavior.

Condon and Cech (1996) compared synchronous computer-mediated interactions with face-to-face interactions on the discourse level. Data were collected from sixty native English speakers who, in pairs, participated in face-to-face conversations and computer conferences with problem-solving tasks. Transcriptions of each thirty dyads’ interactions were divided into utterance units and examined in terms of discourse functions. They found that in the electronic condition, there was a tendency to express orientations more overtly than in face-to-face interactions making more requests for information and more requests for action in decision-making. In addition, they reported that participants in the electronic mode tended to omit unnecessary linguistic materials, thus conversations were more efficient in the electronic interactions than in face-to-face interactions. While there were some differences between the two modes, the researchers also noted that both types of discourse created similar decision-making schemata, which implies that similar discourse processes can be achieved in the two media.

In the context of second and foreign languages, Kern (1995) and Warshcauer’s (1996) work is representative of studies comparing face-to-face and synchronous computer communication. Kern (1995) compared the quantity and quality of synchronous written classroom interaction to those of oral class discussions produced by second-semester French language students. Transcripts from oral and computer
interactions were coded for discourse functions (such as greetings, assertions and questions) and morphosyntactic features (such as tense, mood and conjunctions). The number and length of the messages were also calculated. A substantial difference that was found was that students produced two to four times more sentences during the compute-mediated class discussions than they did during the oral class discussions. Consistent with this was that there were over twice as many turns in the computer sessions than in the oral discussions. On the discourse level, a larger variety of discourse functions was evidenced in real-time computer discussion. For example, four times as many assertions during computer discussion and seven times more student questions were found in computer discussions as compared to oral discussions. On the other hand, the researcher noted that students created more grammatical errors in the electronic mode, which indicates that linguistic accuracy may not be well served by computer conference.

In the follow-up survey, Kern found that students responded in favor of computer-mediated discussion because it created more student-to-student interaction and tended to decrease teacher domination in class. According to Kern, in the electronic mode, students felt “freer to communicate in what they considered a more informal atmosphere” and thus even those students “who were often reluctant to participate in oral discussions participated more actively” in electronic discussions (p.470).

Whereas Kern (1995) compared face-to-face and electronic interactions in the whole-class condition, Warschauer (1996) compared the two modes in small groups. The patterns of student participation and the linguistic complexity of the discourse, in the dataset generated by 16 ESL students from different national backgrounds, were compared. In terms of student participation, the result was consistent with that of Kern's
More equal participation was realized in the electronic discussions with more favorable attitudes towards the computer mode, as the researcher reported that students could express themselves “freely, comfortably, and creatively” during the electronic discussion (p.16). Particularly, he noted that students who perceived themselves as not being fluent in spoken language tended to more actively participate in the computer-mediated discussion than in the oral discussion. In terms of lexical and syntactic features, discourse generated by electronic discussion contained a wider range of lexicons and lexically more formal expressions such as “in my opinion” and “therefore” as well as syntactically more complex language with a higher value of “coordination index” (i.e., “the number of independent clause coordinations divided by the total number of clauses”) than did the face-to-face discussion. On the other hand, Warschauer (1996) reported that the electronic discussion produced a fewer number of interaction features including “questioning, recasting, confirmation checks, and paraphrasing” as compared to those found in the face-to-face discussion. In general, Warschauer evaluated the electronic discussion to be a medium of communication that serves as a great equalizer of participation without disadvantaging the more verbal students.

2.5 Conclusion

Over the past decades, various dimensions of computer-mediated communication, including its linguistic, social psychological and communicative characteristics, have been explored with an attempt to utilize its advantages in the study of languages, education, and communication. In the context of second and foreign language teaching
and learning, computer-mediated communication has been assessed as an inexpensive, cost-effective medium for interactive communication that can be accessed by anyone connected online.

Unlike traditional oral discussions where a few verbally outspoken students may dominate the discussion, a networked environment tends to be an equalizer or democratizer of participation in which each student may contribute to the discussion more equally. The more equal participation structure in CMC can be attributed partly to the multi-threaded nature of electronic communication where a number of interlocutors can communicate at the same time, and partly to the absence of potential distractors that exist in oral interactions (e.g., voice, accent, and appearance). In addition, a number of researchers have reported that people in more subordinated positions (e.g. women, linguistic or cultural minorities, shy or less extraverted students) tend to favor a networked environment in which they feel more comfortable to articulate their views (Beauvois, 1992; Belcher, 1999; Kern, 1995; Warschauer, 1996).

Regarding the type of language produced in electronic communications, different findings have been reported. In terms of syntactic complexity, Chun (1994) and Kern (1995) emphasized the higher proportion of simple sentences in the electronic discourse, whereas Warschuer (1996) pointed out that the discourse generated from electronic discussion contained a higher value of lexical and syntactic complexity than that of oral discussions. In addition, some contradictions were found with respect to grammatical accuracy in computer-assisted communication. While Kern (1995) claimed that linguistic accuracy was not well achieved in electronic communication, Pellettieri (2000) observed that students paid more attention to linguistic form in the electronic mode than
in the oral mode. Basing on the previous research, it appears to be premature to judge the linguistic quality of computer-mediated communication for now. The issue of linguistic complexity and accuracy of synchronous online communication is an area that needs further investigation.

Recent research also suggested that computer-mediated communication produced many opportunities for meaningful, constructive, interpretive L2 interaction to help an L2 learner to expand both communicative and interactive competence. However, it is not yet certain how similar or different the interactional features of CMC are as compared to those of face-to-face conversation. Chun (1994) reported that the computer-mediated class discussion produced a number of interactional speech acts such as questions, answers, feedbacks and requests, which “strongly” resembled the interactional features that would appear in a spoken conversation. On the other hand, Warschauer (1996) observed that the electronic discussion produced fewer interactional features (e.g., questioning, recasting, confirmation checks and paraphrasing) that often appear in a spoken conversation. The comparison of interactional features between electronic and face-to-face conversation is another area which has to be further explored.

Overall, studies have found computer-mediated communication to provide positive learning experiences. However, further empirical investigation should be conducted regarding the potential of online communication as compared to the traditional oral communication in order to confirm the advantages of computer-mediated communication in L2 learning. The present study was designed to shed more light on the differences between electronic and face-to-face discussion and to add a database in this area.
CHAPTER 3

METHODS AND PROCEDURES

3.1 Introduction

As discussed in the previous chapter, recent publications on the computer-mediated communication (CMC) suggested electronic communication as an effective medium of second and foreign language learning. Some studies that examined the data elicited from electronic discussions concluded that learners of second/foreign languages feel less anxiety in the electronic environment and thus produce more utterances in electronic discussions than they would in face-to-face discussions. However, many of the studies that praised the psychological benefits of electronic communication lacked empirical evidence (including Kelm, 1992 and Beauvois, 1992). In addition, a few studies that compared the degrees of syntactic complexity and grammatical accuracy between electronic and face-to-face mode have yielded different findings (e.g., Kern, 1995; Warschauer, 1996). In order to fully understand the benefits of computer-mediated communication as compared to face-to-face communication, which may provide the implications of how to utilize CMC in L2 acquisition, it is necessary to conduct more
empirical research that compares electronic with face-to-face discussion. The present study attempts to fill this gap by providing an experiment that compares the discourses generated by the two modes of discussion.

3.2 Research Design

This study compared the quantity (i.e., the amount of talk, and the amount of turn-taking) and quality (i.e., syntactic complexity, grammatical accuracy and interactional features) of discussion between electronic and face-to-face communication. The data in this study were collected from NNSE (Nonnative speaker of English)-NSE (Native speaker of English) paired interactions. Ten dyads of NNSE-NSE participated in this study. The main frame of this study was a statistical analysis using t-tests and Wilcoxon matched-pairs signed-ranks tests. However, in order to better interpret findings obtained from this study, follow-up interviews were also conducted.

In this chapter, examples and references are made to a pilot study conducted during Summer Quarter 2001 with a dyad of NNSE-NSE. The pilot study provided the basis for the procedures and decisions made in the present study.

In analyzing the data collected from electronic and face-to-face discussions, “t-test for dependent groups” was used as a technique for statistical analysis. The t-test is a hypothesis-testing procedure to determine whether two group means differ significantly or not (Hopkins et. al., 1996). The subjects from the two groups in this study were paired, thus paired t-test (also known as dependent samples t-test) was used. The paired t-test is a technique which may be used when the same group of subjects (i.e., in this case, each
dyad) is tested twice. In addition to the paired t-test, the Wilcoxon matched-pairs signed-ranks test was also used for the detection of statistical significance between the two groups. Wilcoxon matched-pairs signed-ranks test is a nonparametric statistic which is used when the researcher cannot assume that the population is normally distributed (McMillan and Schumacher, 1997). The sample size of this study was rather small and the sample was not randomly selected from a population. Therefore, as a distribution-free alternative to the paired t-test, the Wilcoxon matched-pairs signed-ranks test was used.

In this study, the subjects were measured on two comparable variables: (1) electronic discussion; (2) face-to-face discussion. The two comparable variables were examined in terms of linguistic quantity, syntactic complexity, grammatical accuracy, and interactional features.

**Independent variables**

The two sets of data derived from twenty subjects (i.e., 10 dyads) are independent variables.

(1) Electronic discussion group (ELEC)

Ten pairs of NNSE-NSE participated in electronic discussions for fifteen minutes. The conversation data on the screen were printed out at the end of the discussions. A total of ten pieces of written data from NNSE-NSE electronic discussions was the independent variable ELEC.
(2) Face-to-face discussions group (FACE)

The same ten pairs participated in face-to-face discussion for fifteen minutes. The conversations were recorded. After the completion of each discussion, the recorded data were collected and transcribed. A total of ten pieces of transcribed data of NNSE-NSE face-to-face discussions was the independent variable FACE.

Dependent variables

The means of scores on quantity, syntactic complexity, grammatical accuracy and discourse management are the dependent variables.

(1) Quantity of discussion (QUAN)
(2) Syntactic complexity (S-COM)
(3) Grammatical accuracy (G-ACC)
(4) Interactional features (INTER)

3.3 Subjects and Sample

The subjects involved in this study were twenty volunteers. Of them, ten were Korean ESL students and the other ten were native speakers of American English. The number of ten dyads of NNSE-NSE was arbitrarily determined by the researcher as the researcher felt that ten cases of observation would be enough to observe the similarities and differences between electronic and face-to-face communication.
Subjects

The ten NNSE participants in this study were 5 males and 5 females who were studying at a major public Midwestern university in the United States. For the homogeneity of the sample, several criteria were applied in selecting NNSE participants. First, they had to be Korean non-native speakers of English. Second, the subjects had to have already taken the TOEFL (Test of English as a Foreign Language) test and their TOEFL score had to fall between 520 and 559. The range of 520-559 was set based on the average Korean students’ TOEFL score (i.e., 535) which has been reported in the ETS (Educational Testing Service) 1999 booklet. Third, they had to have not lived in the United States for more than two years. Fourth, they had to have typing skills of 30 words per minute or above. In order to recruit ten NNSEs who fit these criteria, flyers were distributed on campus (refer to Appendix A). Those who volunteered participation were asked to fill out the demographic information questionnaire, which included questions regarding their TOEFL scores and their typing skills (This survey form is provided in Appendix B). The NNSE subjects’ fields of study included science, engineering, education, humanities and business. The length of their stay in the United States varied from 7 to 18 months. The average time the subjects had been in the U.S. was 11.2 months. The age of NNSE Korean students ranged from 20 years to 26 years old. The average age was 22 years.

The ten native speakers of English were volunteers who willingly joined the discussions with NNSE students. They were 3 females and 7 males who were students of the same university as the NNSE participants or recent graduates of the university. The ten NSE participants were recruited from the flyers distributed on campus based on their
typing skills (The flyer is provided in Appendix A). The recruited NSE volunteers were asked to fill out the demographic information questionnaire (refer to Appendix B). The NSE subjects’ fields of study included science, pharmacy, engineering, humanities and business. The age of NSEs ranged from 22 to 28 years old. The average age was 25.4 years.

Each NSE (Native Speaker of English) was randomly assigned to a NNSE (Nonnative speakers of English) partner to create 10 dyads. Prior to the actual study, all twenty participants were tested if their word-processing skills were sufficient to carry out online discussion, that is, 30 words per minute or above. The twenty participants all had typing skills of 30 words or above per minute and, therefore, it was assumed that there would be no constraints for them to type and exchange written messages online.

Sample

The sample of this study was a total of twenty pieces of transcripts derived from

<table>
<thead>
<tr>
<th>Dyad</th>
<th>ELEC</th>
<th>FACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (NNSE1-NSE1)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2 (NNSE2-NSE2)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3 (NNSE3-NSE3)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4 (NNSE4-NSE4)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5 (NNSE5-NSE5)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6 (NNSE6-NSE6)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>7 (NNSE7-NSE7)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8 (NNSE8-NSE8)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9 (NNSE9-NSE9)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10 (NNSE10-NSE10)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Table 3.1: Sample: 2 sets of data from 10 dyads (Total 20 pieces)
10 dyads of NNSE-NSE interactions. Each pair of NNSE-NSE participated in electronic
discussion for fifteen minutes (ten 15-minute transcripts) and face-to-face discussions for
fifteen minutes (ten 15-minute transcripts).

3.4 Instrumentation

Messenger

This instrument was chosen as a medium for electronic discussions. Messenger is
a highly accessible program that can be downloaded from the Internet. There are a
number of web sites that provide Messenger services including Yahoo, Netscape and
MSN. For this present study, Yahoo Messenger was used for real-time communication
where messages are instantly delivered. The screen of Yahoo Messenger is divided into
two. The top is a dialog box which shows the dynamic interaction and exchanges of
written messages between the two parties, and the bottom box is an editing box, where
the writer can see his/her typing process and can edit before he/she delivers a message.

Audiotape Recorder

Audiotape was used to record each dyad’s face-to-face discussion. Students were
instructed to push the record button before starting discussion. Each dyad was instructed
to have a discussion for 15 minutes.
Data Coding Sheet

In analyzing the data, data coding sheets (shown in Table 3.2) were used to count the number of occurrences of the items pertaining to the research questions 1 to 4 in this study.

3.5. Data Collection and Procedures

This study was conducted over the period of an academic quarter in spring 2002 at a major public university in the Midwest. Prior to conducting this study, the researcher first submitted an application form for permission to use human subjects to the office of Behavioral and Social Science Institutional Review Board (IRB). The researcher reported the description of the proposed research and the approval was granted from IRB in March 2002.

All of the subjects participated in this study voluntarily. In order to recruit NNSE and NSE volunteers, flyers containing participants’ requirements were distributed (refer to flyer 1 and flyer 2 in Appendix A). The recruited volunteers were asked to fill out the demographic information questionnaire which provided information regarding their age, major, typing skill and so on. This questionnaire form is provided in Appendix B. In addition, all of the participants were tested on their typing skills in order to confirm if they indeed possessed typing skills of 30 words per minute or above.

Shortly before the research was conducted, thank-you notes and thank-you gifts were sent to all participants. Also, a practice session for Yahoo Messenger was provided to all participants in order to familiarize them with the real-time online communication.
<table>
<thead>
<tr>
<th>QUAN</th>
<th>Turn-taking</th>
<th>ELEC</th>
<th>FACE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-COM</td>
<td>T-units</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T-units</td>
<td></td>
<td></td>
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<td></td>
<td>containing</td>
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<td></td>
<td>dependent</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>clauses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G-ACC</td>
<td>Error-free</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T-unit</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Morphological</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Syntactic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lexical</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTER</td>
<td>Initiatives</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Questions/Answers</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Statements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Requests</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feedback</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2: A blank data coding sheet
Before proceeding with the experiment, a short pre-experiment interview was conducted to ask each participant about their perceptions or beliefs regarding the two different modes of interaction (i.e., electronic communication and face-to-face communication). They were asked to tell the researcher what they believed as appropriate behaviors, in the two different communication modes. The purpose of this interview was to examine if there was any protocol that people would follow in electronic interaction or in face-to-face interaction, and if there was, how this protocol would possibly influence the types of interaction generated by different communication modes.

For the actual experiment, each NNSE was randomly assigned to a NSE in order to create ten dyads. During the spring quarter 2002, each of the ten dyads completed two discussions, one via computer and the other face-to-face. The day each dyad completed two discussions varied. It was not feasible to administer the dialogues on the same day with all the ten dyads together because of the differences in each participant’s schedule. However, each dyad completed the two discussions on the same day. Among the ten dyads, five dyads were randomly chosen and assigned to discuss electronically first and then to alternate to face-to-face mode. The other five dyads were assigned to discuss face-to-face first and then electronically. Each dyad was instructed to discuss two counter-balanced questions, one face-to-face and one online. Each dyad was randomly assigned to one of the two questions for their first discussion mode, and then when they switched to the other mode, the other question was used. In consultation with two ESL (English as a Second Language) professionals, and also in reference to TOEFL (Test of English as a Foreign Language) writing topics, the following two questions (prompts) were chosen:
(1) When people move to another country, some of them decide to follow the customs of the new country. Others prefer to keep their own customs. Which one do you prefer?

(2) Some high schools require all students to wear school uniforms. Other high schools permit students to decide what to wear to school. Which of these two school policies do you think is better? And why do you think so?

Each discussion was supposed to last 15 minutes. The electronic discussion was administered in the computer laboratories on campus. During the electronic discussion, the two people of each dyad were not at the same laboratory, thus the participants could not see each other. Participants in the electronic mode were instructed to print out their discussion at the end of the discussion. The face-to-face discussion was conducted in a quiet conference room on campus arranged by the researcher. When participating in face-to-face discussion, subjects were asked to audio record their discussion.

After the completion of the discussions, all participants were interviewed about their experience with real-time electronic interaction and face-to-face interaction. The follow-up interviews were conducted face-to-face for about 20 minutes. Participants were asked what they felt was the difference between the two modes and what they liked or disliked about each discussion mode. The interviews started with open-ended general questions and then moved on to more specific questions such as in which mode of discussion they felt they contributed more, whether or not they felt more comfortable in
the electronic mode, or if there were certain things they seemed to pay more attention to or to be more conscious about in a certain mode of discussion. Finally, thank-you notes were sent out once again to show appreciation for their participation.

The data from face-to-face discussions (i.e., audio recorded tapes) were transcribed by the researcher and a native speaker of English. And then the written output from electronic discussions and transcribed data from face-to-face discussions were compared. Collected data were coded by the researcher and an experienced ESL professional. Any questions that arose in the course of data coding, such as in identifying error types and classifying the five interactional features, were solved by discussing it with the ESL professional. A brief summary of the research procedure is as follows:

1. Approval was granted from Behavioral and Social Science Institutional Review Board (IRB).
2. Flyers were distributed to recruit participants.
3. Demographic information questionnaires were completed by the participants.
4. Thank-you notes were sent out.
5. A practice session for Yahoo Instant Messenger was provided.
6. A short pre-experiment interview was conducted regarding participants’ perception or protocol about synchronous electronic communication versus face-to-face communication.
7. The experiment was conducted. Each dyad participated once in electronic discussion and once in face-to-face discussion.
8. The follow-up interview was administered with all the subjects.
9. Thank-you notes were sent out again.

3.6 Data Analysis

In order to investigate how electronic discussion is different from oral discussion in NNSE-NSE interactions, both quantitative and qualitative data were collected and analyzed.

The quantitative data were analyzed in four categories which corresponded to research questions 1 through 4: (1) linguistic productivity, (2) syntactic complexity, (3) grammatical accuracy and (4) interactional features. Because of the inherent differences in the two discussion modes in terms of their nature as well as the differences among the dyads in observing 15 minutes time for each discussion (for example, some dyads may discuss for a little less than 15 minutes or some dyads may discuss for a little more than 15 minutes), the researcher judged that comparing the exact amount of words or utterances between the two modes was not indicative. Therefore, the researcher focused on the comparison of the ratio or the percentage of each dependent variable between the two modes of discussion. For example, the analyses focused on whether or not the ratio of the number of NNSE’s turn-taking to the number of NSE’s turn-taking in one mode was significantly different from the ratio found in the other mode.

The following items were compared between electronic and face-to-face discussions based on the quantitative data obtained from the experiment.
(1) Linguistic productivity
   a. The ratio of the amount of NNSE turns to the amount of NSE turns
   b. The ratio of the amount of NNSE words to the amount of NSE words
   c. The ratio of average turn length of NNSEs to the average turn length of NSEs

(2) Syntactic complexity of utterances
   a. The average length of T-unit
   b. The percentage of T-units containing dependent clauses

(3) Grammatical accuracy of NNSE utterances
   a. The percentage of error-free T-unit in the NNSEs’ utterances
   b. The grammatical errors that occur frequently in the NNSEs’ utterances

(4) Interactional (Discourse) features
   a. The percentage of T-units containing Initiatives
   b. The percentage of T-units containing Questions/Answers
   c. The percentage of T-units containing Statements
   d. The percentage of T-units containing Requests
   e. The percentage of T-units containing Feedback

In order to detect the statistical significance between electronic and face-to-face discussions on the above items, the paired t-test and the Wilcoxon matched-pairs signed-
ranks test was used. The statistical package used for this study was “Minitab 13.” All comparisons were tested for significance at least at the alpha 0.05 level. Also, Microsoft Excel was used to present the graphs.

As for the qualitative data, information obtained from the short pre-experiment interview and the follow-up interview after the experiment was analyzed. Subjects’ opinions obtained from the interviews were described and then compared with the experiment data.

In what follows, the procedures that were used for data analysis in this study are presented in the order of each research question.

3.6.1 The pre-experiment interview

Prior to the experiment, five-minute interviews were conducted with all the participants regarding their perception or belief about electronic discussion and face-to-face discussion. Each participant was asked to tell the researcher if he/she had any different protocols regarding electronic and face-to-face talk. Students’ reports from the pre-experiment interviews were described focusing on frequently addressed differences between electronic and face-to-face communication.

3.6.2 Research Question 1 (Linguistic Productivity)

Linguistic productivity was measured by the number of words and turns generated in each discussion mode. The ratios of NNSE to NSE participation were examined in
terms of turn-taking, amount of words and average length of words per turn. First, the ratio of NNSE’s turn to NSE’s turn in the electronic mode was compared to the ratio found in the face-to-face mode. Second, the ratio of NNSE’s amount of words to NSE’s amount of words in the electronic mode was compared to the ratio found in the face-to-face discussion. The mean scores of NNSE’s and NSE’s word amounts was calculated and compared. Third, the ratio of NNSEs turn length to NSEs turn length in the electronic discussion was compared to the ratio found in the face-to-face discussion. The average turn length was calculated by dividing the total number of words generated in each discussion mode by the number of turns taken by the subject in each discussion mode.

When measuring linguistic quantity, the same words repeated in sequence were not counted as two words but were counted as one word. Also nonverbal utterances such as “uh” and “umm” were not counted as words.

In order to see if NNSEs were linguistically more productive in the electronic mode than in the face-to-face mode, the analysis focused on whether or not the ratio of NNSEs’ utterances increased by adopting the electronic mode. Therefore, the null hypothesis was set as “There is no significant increase in the ratio of NNSE’s (a) turn-taking, (b) amount of words, (c) the average length of turn, by adopting the electronic mode.” This hypothesis was tested for statistical significance using a one-tailed paired t-test and a one-tailed Wilcoxon matched-pairs signed-ranks test.
3.6.3 Research Question 2 (Syntactic Complexity)

The syntactic complexity in the electronic discussion versus that in the face-to-face discussion was measured using T-units and dependent clauses. First, the average length of T-unit was compared between electronic and face-to-face discussion. T-unit is an index for syntactic complexity, defined as “an independent clause and its accompanying modifiers” (Hunt, 1970). All the entries and utterances generated in discussions were coded into T-unit using brackets. An example of the T-unit analysis of student utterances is as follows:

“[Yes, I have.] [I liked it very much because I didn’t have to worry about clothes every morning.]”

The average length of a T-unit was calculated by dividing the total number of words within T-units in each discussion mode by the total number of T-units in each discussion mode.

The percentage of T-units containing dependent clauses in each participant’s utterances was calculated by dividing the number of T-units pertaining dependent clauses by the total number of T-units. A dependent clause can be introduced either by subordinators such as since, because, when, where, after, while, although, as if, even though, despite, so that, in order that, so as, in order, so (that), as (many) as and than, or by the complementizer, that. Examples of sentences containing dependent clauses are:
“Since each one has different preference, we should leave it up to individual’s choice.”; “I think (that) keeping one’s own customs is also important.”

In Appendix E, sample data of T-unit analysis and T-unit containing dependent clauses are provided.

Two-tailed paired t-tests and Wilcoxon matched-pairs signed-ranks tests were performed in order to determine whether or not there was any statistically significant difference between electronic and face-to-face discussions in terms of syntactic complexity. The hypothesis was set as “There is no significant difference between electronic discussion and face-to-face discussion in terms of (a) the average length of T-unit and (b) the percentage of T-unit that contains dependent clauses.”

3.6.3 Research Question 3 (Grammatical Accuracy)

In order to compare the grammatical accuracy of electronic discussions to that of face-to-face discussions, an error-free T-unit was used as an index. An error-free T-unit is a T-unit that does not contain any grammatical errors. As defined in Chapter I, grammatical errors in this study included: (a) morphological errors: errors in word formation such as in the use of tenses or indefinite articles (e.g. * He go to college; *I runned fast; *I have a idea), (b) syntactic errors: errors in sentence organization such as wrong word order or missing words (e.g. * I went two times there; * He goes ___ college), and (3) lexical errors: errors in word selections (e.g. * how many butter do you want?). Guidelines for error categorization are provided in Appendix D.
The percentage of error-free T-units in each NNSE’s utterances was compared between the two modes of discussion. The percentage of error-free T-units in each NNSE’s utterances was calculated by dividing the number of each NNSE’s error-free T-units by the total number of each NNSE’s T-units. NSEs’ utterances were not examined in the analysis of grammatical accuracy because the focus of this study was to observe whether non-native speakers of English or learners of English pay more attention to the linguistic form of their utterances in one mode of discussion than in the other.

Paired t-tests and Wilcoxon matched-pairs signed-ranks tests were performed to test the statistical significance of the null hypothesis: “There is no statistically significant difference between electronic discussion and face-to-face discussion in terms of (a) the amount of error-free T-units and (b) error classification.”

3.6.4 Research Question 4 (Interactional Features)

Five interactional features were compared between electronic discussions and face-to-face discussions. The features of discourse management examined were: Initiatives, Questions/Answers, Statements, Requests and Feedback. These features were determined by the researcher based on the observations from the data obtained from the pilot study as well as the data from previous research. The percentage of each discourse feature was compared between electronic and face-to-face discussions. According to previous research, these five interactional features are considered to facilitate negotiations of meaning and L2 communication. Therefore, it was examined how frequently these interactional features appeared in electronic and face-to-face discussion. Two-tailed paired t-tests and Wilcoxon matched-pairs signed-ranks tests were performed
to see if there is any statistically significant difference between electronic and face-to-face discussions in terms of each interactional feature. Categories of interactional features and their examples are shown in Table 3.3 (also refer to Appendix E for sample analysis of interactional features.)

<table>
<thead>
<tr>
<th>Interactional Features</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Initiatives</td>
<td>Greetings; Farewells; Introducing topics; Shifting topics.</td>
</tr>
<tr>
<td></td>
<td>e.g., My name is Lee. How do you do?; Time is over. I enjoyed talking to you; What do you think of Americans who come to Korea?</td>
</tr>
<tr>
<td>(2) Questions/Answers</td>
<td>General questions/Answers to general questions</td>
</tr>
<tr>
<td></td>
<td>e.g., How about you?: I am fine. Do you like trees and grass?; Yes, I do.</td>
</tr>
<tr>
<td>(3) Statements</td>
<td>General statements or statements to expand on a topic.</td>
</tr>
<tr>
<td></td>
<td>e.g., I like to learn different culture or custom; I did not like to live in such a huge city.</td>
</tr>
<tr>
<td>(4) Requests</td>
<td>Request for clarification or explanation</td>
</tr>
<tr>
<td></td>
<td>e.g., What is bumping?; What do you mean by that?</td>
</tr>
<tr>
<td>(5) Feedback</td>
<td>Giving feedback to the other</td>
</tr>
<tr>
<td></td>
<td>e.g., That’s so funny!; I agree; I see.</td>
</tr>
</tbody>
</table>

Table 3.3 Classification of Interactional Features
3.6.5 Research Question 5 (Follow-up Interviews)

In the follow-up interviews, participants were asked what they felt was the difference between the two modes of discussions and what they liked or disliked about each discussion mode. The interviews started with open-ended general questions as seen in questions 1 and 2 below and then moved on to more specific questions. Specific questions were addressed in terms of three aspects of communication that were discussed in chapter 2: (1) linguistic performance, (2) affective and psychological aspects, and (3) interactional and communicative aspects. Student reports in the follow-up interviews were described in terms of these three aspects.

1. How would you describe or evaluate your experience of electronic discussion as compared to face-to-face discussion? Did you find the two modes of discussion different or similar?

2. Did you like one mode of discussion better than the other? If so, how did you like or dislike each discussion mode?

3. In which mode of discussion do you think you contributed more? Do you think one mode of discussion was linguistically more productive or beneficial than the other? Do you think you paid more attention to accurate use of language in one mode than in the other?
4. In which mode of discussion did you feel comfortable? Did you feel emotionally more comfortable in one mode as compared to the other?

5. How would you evaluate electronic and face-to-face discussion in terms of generating interactions? Was one mode of communication more interactive than the other?

3.7 Pilot Study

Prior to the actual study, a pilot study was administered with a Korean NNSE female student and a NSE male student who were enrolled in a graduate program at a U.S. university. The pilot testing was conducted in August 2001. The same instruments as described in this chapter were used in pilot testing. The pilot study helped the researcher to revise some of the original methodological decisions made in this study. For example, at the beginning, the researcher delimited grammatical errors of NNSEs’ output to morphological and syntactic errors. However, based on the observations from the pilot testing, the researcher decided to include lexical errors as well for grammatical errors. The data obtained from the pilot study also helped the researcher to identify and determine the five interactional features of communication that were examined in this study. In addition, the pilot study helped the researcher to understand the general procedure to be followed for this study as well as to be better prepared for the possible technical difficulties that might be encountered in using the Yahoo Messenger Service.
The results of the pilot study suggested that in terms of quantity, the NSEs dominated the conversation slightly more in the face-to-face mode. In the electronic discussion, the amount of NNSE’s utterances was almost equal to that of NSE’s utterances, which seemed to indicate that more equal participation occurred in the electronic mode. In terms of syntactic complexity, it appeared that there is not much difference between the two modes. In terms of grammatical accuracy, however, NNSEs paid more attention to grammatical forms in the electronic mode than in the face-to-face mode.

3.8 Conclusion

In this chapter, the methods and procedures used in this study were explained and described, including a description of research design, subjects, samples, variables, instrumentation and data measurement. Observations obtained from the pilot study aided the researcher in making decisions about the design of this study. In the following chapter, the results of the data analysis will be presented in order to discuss and answer the research questions posed in the present study.
CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

In this chapter, the results of the data collected in the experiment and follow-up interviews are presented and discussed. The purpose of this study was to investigate the linguistic and interactional characteristics of NNSE-NSE (Non-native Speakers of English - Native Speakers of English) pair discussions in electronic communication as compared with face-to-face communication. In order to achieve that purpose, an experiment was conducted with twenty college students participating in electronic discussion and face-to-face discussion. This experiment was preceded by a short interview with the subjects regarding their ideas or perceptions of electronic and face-to-face communication. The ten NNSEs and ten NSEs were then paired up to participate once in an electronic discussion and once in a face-to-face discussion. After the experiment, follow-up interviews were conducted with all subjects in regards to their experience in the electronic and face-to-face discussion. The raw data from the experiment are presented in Appendix F. Based on the raw data, the analyses and
discussion for each research question are reported in this chapter. For statistical analyses of the experiment data, the paired t-test and the Wilcoxon matched-pairs signed-ranks test were used in order to detect statistical significance between electronic and face-to-face discussion. All comparisons were tested for significance at least at the alpha 0.05 level.

4.2 Results of Data Analysis

4.2.1. A Short Pre-Experiment Interview

Before proceeding with the experiment, a five-minute interview was conducted with each participant asking his/her perception of electronic and face-to-face conversation. Each participant was asked to tell the researcher if he/she had any different perceptions regarding electronic and face-to-face talk. Participants addressed their perceived differences about the two conversation modes. The most commonly addressed differences were attributed to the fact that “visual cues” are present in the face-to-face discussion while they are absent in the electronic discussion.

Electronic discussions in which interlocutors cannot see each other’s physical presence were perceived as “anonymous,” “impersonal,” and “informal.” The “anonymity” and “informality” of electronic discussions seemed to help the interlocutor feel freer to talk and to speak up. Some participants mentioned that electronic communication would allow people to be more aggressive, more uninhibited and more assertive in their speech because they are distant to each other. On the other hand, some of the difficulties of electronic communication due to the absence of visual cues were also pointed out. Comments included: “Since you do not see the other person’s facial
expression, it is hard to be sarcastic or to be funny”; “Lots of miscommunication can occur”; “You say something but the other may interpret differently, so it may cause confusion.” Another comment stated that in the electronic communication, people tend to avoid unnecessary words or phrases because of the large amount of time consumed by typing the message.

In contrast, face-to-face discussions in which interlocutors see each other’s physical presence were evaluated as “personal,” “courteous,” “trustable” and “more accurate in expressing meanings.” For example, because of the presence of physical appearance, more attempts can be made to be considerate and responsive about the other’s speech in face-to-face communication. Direct person-to-person communication was also considered as more trustable and personal because individual characteristics are easily embodied in their speech and behaviors. It was also pointed out that many filler terms and expressions such as ‘you know’ and ‘actually’ are typically used in the face-to-face conversation. Furthermore, participants pointed out that face-to-face communication is more efficient in terms of delivering meaning because it is easier to express nuances of meanings in oral talk by using facial, verbal and nonverbal cues whereas it is rather difficult to deliver nuances of meanings in written talk. Therefore, it was reported that jokes or sarcasm could be more easily communicated through face-to-face interaction than through electronic interaction.

While most answers focused on the differences of the two modes, similarities between written and oral communication were also addressed. One subject mentioned that synchronous written dialog and spoken dialog are much alike and there is no
difference. Another participant said that if the conversers know each other very well, there would not be much difference between oral and text-based communication.

4.2.2 Analysis of Research Questions

In this section, analyses for each research question are reported based on the data collected in the experiment and from follow-up interviews.

4.2.2.1 Research Questions 1: How are NNSE-NSE electronic discussions different from NNSE-NSE face-to-face discussions in terms of linguistic quantity? Are NNSEs more productive linguistically in the electronic mode than in the face-to-face mode?

In order to compare linguistic quantity of electronic discussion with that of face-to-face discussion, the ratios of NNSE to NSE participation were examined in terms of turn-taking, amount of words, and average number of words per turn. The analysis focused on whether or not the ratio of NNSEs’ utterances increased by adopting the electronic mode. Table 4.1 summarizes the difference between electronic discussions and face-to-face discussions in terms of linguistic quantity. For example, the mean of NNSEs’ turn-taking (0.571) increased in electronic discussions by 0.07, whereas the mean of NSEs’ turn-taking (0.429) decreased in electronic discussions by 0.07. Detailed statistical results for each sub-question are as follows.
Table 4.1: Linguistic Quantity (NNSE : NSE)

<table>
<thead>
<tr>
<th></th>
<th>Ratio of turn taking (NNSE : NSE)</th>
<th>Ratio of Amount of Words (NNSE : NSE)</th>
<th>Average number of Words per turn (NNSE vs. NSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACE (N =10 pairs)</td>
<td>0.5 : 0.5</td>
<td>0.359 : 0.641</td>
<td>0.362 : 0.638</td>
</tr>
<tr>
<td>ELEC (N =10 pairs)</td>
<td>0.571 : 0.429</td>
<td>0.471 : 0.529</td>
<td>0.378 : 0.622</td>
</tr>
</tbody>
</table>

Sub-question a: Is there any statistically significant difference between the ratio of NNSE’s turn-taking to NSE’s turn-taking in the electronic mode and the ratio of NNSE’s turn-taking to NSE’s turn-taking in the face-to-face mode?

In order to detect the statistical significance for the ratio of turn-taking, a one-tailed paired t-test and a one-tailed Wilcoxon matched-pairs signed-ranks test were performed, which tested the null hypothesis of “There is no significant increase in the ratio of NNSE’s turn-taking by adopting the electronic mode.” This hypothesis was rejected at the alpha level 0.01 (P=0.0055 < .01) by the paired t-test, indicating that the amount of NNSEs’ turns increased in the electronic mode (see Table 4.2). The Wilcoxon matched-pairs signed-ranks test (one-tailed) also detected a significant difference in the ratio of NNSE’s turn-taking between the two types of discussions (Wilcoxon statistic= 35, p= 0.010), indicating that the average NNSE turns increased by adopting the electronic mode. Based on this result, it can be said that within this population, there is a predictable
increase in terms of turn-taking when these NNSEs communicate in the electronic mode.

As shown in Table 4.1, turns were taken equally (0.5 vs. 0.5) in the face-to-face dialog where one’s turn is always followed by the other person’s turn. In the electronic mode, however, turns can be taken by two people at the same time because of the multi-threaded nature of online communication. In Figure 4.1, which shows NNSE’s ratio of turn-taking, nine out of ten NNSEs took equal or increased turns in the electronic mode, whereas only one NNSE (NNSE 10) took decreased turns in the electronic mode.

<table>
<thead>
<tr>
<th></th>
<th>Ratio of NNSE turn-taking</th>
<th>Ratio of NNSE Amount of words</th>
<th>Ratio of NNSE average number of words per turn</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC (N=10)</td>
<td>0.5700 ± 0.0721</td>
<td>0.4710 ± 0.1714</td>
<td>0.3784 ± 0.1208</td>
</tr>
<tr>
<td></td>
<td>{0.0228}</td>
<td>{0.0542}</td>
<td>{0.0382}</td>
</tr>
<tr>
<td>FACE (N=10)</td>
<td>0.5000 ± 0.0047</td>
<td>0.3590 ± 0.1914</td>
<td>0.3615 ± 0.1909</td>
</tr>
<tr>
<td></td>
<td>{0.0015}</td>
<td>{0.0605}</td>
<td>{0.0604}</td>
</tr>
<tr>
<td>Difference</td>
<td>0.0700 ± 0.0698</td>
<td>0.1120 ± 0.1949</td>
<td>0.0169 ± 0.1716</td>
</tr>
<tr>
<td></td>
<td>{0.0221}</td>
<td>{0.0613}</td>
<td>{0.0543}</td>
</tr>
<tr>
<td>T-value</td>
<td>3.17</td>
<td>1.83</td>
<td>0.31</td>
</tr>
<tr>
<td>P-value</td>
<td>0.0055**</td>
<td>0.0505</td>
<td>0.763</td>
</tr>
</tbody>
</table>

(   ) = standard deviation;   {   }=SE Mean; T-value = values from paired t-test; P-value= probability level; * = values significant at p < .05; ** = values significant at p < .01

Table 4.2: NNSE Performance in Linguistic Quantity (one-tailed paired t-test)
Sub-question b: Is there any statistically significant difference between the ratio of the amount of words produced by NNSE to the amount of words produced by NSE in the electronic mode and the ratio found in the face-to-face mode?

As shown in Table 4.1, the mean ratio of NNSEs’ amount of words increased (from 0.359 to 0.471) in the electronic mode while the mean ratio of NSEs’ decreased (from 0.641 to 0.529) in the electronic mode. In order to determine if this increased performance by NNSEs in the electronic mode was statistically significant, a paired t-test (one-tailed) and a Wilcoxon matched-pairs signed-ranks test (one-tailed) were performed. The null hypothesis was set as “There is no significant increase in the ratio of NNSE words amount by adopting the electronic mode.” This hypothesis was accepted by the
paired t-test with a p-value of 0.0505 (p > 0.05), which means that the increased words amount by NNSEs in the electronic mode was not statistically significant. The Wilcoxon matched-pairs signed-ranks test (one-tailed) also identified this difference as statistically not significant (Wilcoxon statistic= 42, p= 0.077). Although both tests identified no statistical significance on the increased amount of words from NNSEs in the electronic format, note that their p-values (0.0505 by paired t-test and 0.077 by Wilcoxon matched-pairs signed-ranks test) are close to 0.05. In general, the results indicated that there is a tendency for NNSEs in this population to produce an increased amount of words when they communicate in the electronic mode. As shown in Table 4.1, in the face-to-face

![Figure 4.2: Ratio of NNSE Amount of Words](image)

Figure 4.2: Ratio of NNSE Amount of Words
discussion, NSEs dominated NNSEs a lot more in terms of the amount of words (0.641 vs. 0.359). However, NSEs’ dominance decreased a lot in the electronic discussion and, as a result, more equalized participation was achieved in the electronic communication (0.529 vs. 0.471). Figure 4.2 shows each NNSE’s performance in terms of amount of words. Eight out of ten NNSEs showed increased ratios in the electronic mode. Only two NNSEs (NNSE 3 and NNSE 4) showed decreased ratios of words amount in the electronic mode. Overall, the results provide evidence that the electronic mode contributed to the equalization of participation.

Sub-question c: Is there any statistically significant difference between the ratio of average number of words per NNSE’s turn to the average number of words per NSE’s turn in the electronic mode and the ratio appeared in the face-to-face mode?

The average turn length was calculated by dividing the total words generated in each discussion mode by the number of turns taken by the subject in each mode. In general, NSEs produced longer turn lengths than NNSEs in both electronic and face-to-face discussions. In terms of ratios, as shown in Table 4.1, the mean ratio of NNSE’s average turn length slightly increased (from 0.362 to 0.378) during the electronic mode whereas the mean ratio of NSEs’ average turn length slightly decreased (from 0.638 to 0.622) in the electronic discussions. This increased average turn length by NNSEs was revealed as statistically not significant by one-tailed paired t-test (p > .05) as shown in Table 4.2. The Wilcoxon matched-pairs signed-ranks test (one-tailed) also did not detect any statistically significant difference in the NNSE average turn length (Wilcoxon
This indicates that NNSE’s performance in terms of average turn length did not consistently increase in the electronic mode. This is likely due to the fact that NNSEs took more turns in the electronic mode; therefore, the average turn length, which was calculated by dividing the total number of words by the number of turns, tended not to increase much in the electronic mode.

Ratios of average turn length by each NNSE are presented in Figure 4.3. Some NNSEs’ ratios of average number of words per turn increased in the electronic mode as in the case of NNSE 1, 2, 5, 6, 8 and 9, whereas the other NNSEs’ ratios of average number of words per turn decreased in the electronic mode as in the case of NNSE 3, 4, 7 and 10.

![Figure 4.3: Ratio of Average Number of Words per turn](image-url)
4.2.2 Research Question 2: How is electronic discussion different from face-to-face discussion in terms of the syntactic complexity in the language generated by both NNSEs and NSEs?

Syntactic complexity was defined in this study as the ability to produce longer and more complicated sentences, which was measured by computing (1) the average length of T-unit; (2) the percentage of T-unit that contains dependent clauses. In order to examine

<table>
<thead>
<tr>
<th></th>
<th>Average length of T-unit</th>
<th>Percentage of T-unit containing dependent clauses</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC</td>
<td>8.277</td>
<td>27.76</td>
</tr>
<tr>
<td>N = 10 pairs</td>
<td>(0.388)</td>
<td>(7.94)</td>
</tr>
<tr>
<td></td>
<td>{0.123}</td>
<td>{2.51}</td>
</tr>
<tr>
<td>FACE</td>
<td>11.481</td>
<td>34.11</td>
</tr>
<tr>
<td>N = 10 pairs</td>
<td>(1.568)</td>
<td>(8.17)</td>
</tr>
<tr>
<td></td>
<td>{0.496}</td>
<td>{2.58}</td>
</tr>
<tr>
<td>Difference</td>
<td>-3.204</td>
<td>-6.35</td>
</tr>
<tr>
<td></td>
<td>(1.352)</td>
<td>(11.56)</td>
</tr>
<tr>
<td></td>
<td>{0.428}</td>
<td>{3.65}</td>
</tr>
<tr>
<td>T-value</td>
<td>-7.49</td>
<td>-1.74</td>
</tr>
<tr>
<td>P-value</td>
<td>0.000 **</td>
<td>0.116</td>
</tr>
</tbody>
</table>

( ) = standard deviation; { } = SE Mean; T-value = values from paired t-test; P-value= probability level; * = values significant at p < .05; ** = values significant at p < .01

Table 4.3: Comparison of Syntactic Complexity
syntactic complexity, the data were first divided into T-units and then the T-units that contained dependent clauses were marked. Two-tailed paired t-tests and two-tailed Wilcoxon matched-pairs signed-ranks tests were performed in order to determine whether or not there was any statistically significant difference in syntactic complexity between electronic and face-to-face discussions.

Sub-question a: Is there any statistically significant difference between the average length of T-unit in the electronic discussion and the average length of T-unit in the face-to-face discussion?

The mean length of T-unit in the face-to-face discussions was 11.48 while the mean length of T-unit in the electronic discussions was 8.23 (see Table 4.3). A statistically significant difference at p < .01 was obtained by paired t-test, indicating that T-units produced in the face-to-face mode were consistently longer than the T-units produced in the electronic discussion. The difference was also found to be statistically significant when the Wilcoxon matched-pairs signed-ranks test was applied (Wilcoxon statistic=0.0, p =0.006).

As seen in Figure 4.4, all ten pairs produced longer T-units in the face-to-face mode. The result suggested that subjects tended to produce shorter sentences in the electronic communication than in the face-to-face discussions. An example of electronic discussion and face-to-face discussion is provided in excerpts 1 and 2. As seen in excerpts 1 and 2, the average length of T-units in the electronic interaction was shorter than in face-to-face interaction. Excerpts 1 and 2 also shows that T-unit containing
dependent clauses which were introduced by subordinators like *because, if, when, how, what* and by the complementizer, *that*, were more frequent in the face-to-face discussion than in the electronic discussion. It appears that in the textual conversation, since the pace of communication was typically slower than that of face-to-face communication, interlocutors tended to make shorter utterances, usually excluding unnecessary words or phrases.

*Excerpt 1: Excerpt from electronic discussion done by pair 2 (unedited)*
T-units are marked with [ ] and dependent clauses are italicized

NSE 2: [I guess *(that)* uniforms tend to be very conservative]  
NNSE 2: [i agree]  
NNSE 2: [but in my high school days, I had been a girl to be interested in fashion.]  
NSE 2: [I understand]  
NNSE 2: [so I tried to wear new and good cloth]  
NSE 2: [I went to school *which* did not require uniforms]  
NSE 2: [but uniform prevented to me to do so.]  
NNSE 2: [so u were lucky]  
NSE 2: [I can see *how* important it would be to you.]  
NNSE 2: [only school picnic day]  
NSE 2: [Yes, but sometimes trying to choose *what* to wear took some time]  
NNSE 2: [we could wear other cloth ]  
NSE 2: [U must have really liked picnic days]  
NNSE 2: [of course]  
NSE 2: [I guess *(that)* I take it for granted *(that)* I was allowed to wear different clothes.]  
NSE 2: [We still had rules of course]  
NSE 2: [Certain clothes were not permitted]  
NNSE 2: [for example?]  
NSE 2: [Clothes *(that)* were too transparent or "see through" were not allowed.]  
NSE 2: [Also, I'm not sure *(that)* sleeveless clothes were allowed]  
NNSE 2: [that' s too funny!]

*Excerpt 2: Excerpt from face-to-face discussion done by pair 2 (unedited)*
T-units are marked with [ ] and dependent clauses are italicized
NSE 2: [so... what do you feel about... this topic here?]
NNSE 2: [actually I think that follow the customs of the country is better than keep your own Custom]... [but.. in my case.. I am Korean] [and USA is not my country]...[because in like... and all my friends.. almost my friends are Korean... so... obey to American custom is makes some problem in real life]....[but without... like... Korean friend, I can agree.. ]
NSE 2: [It’s kind of hard to pick up customs of another country.] [Yeah. I.. I think it’s very important to respect another country’s customs.] [If I ever go abroad, I have to keep in mind that umm the customs and culture is very different here] [so I have to think]. [Like when I go to Korea I have to be sure and actually be respectful to elders and so forth]. [And in many ways I still use it in this country too.] Umm [I guess the good thing about this country is that you can pretty much kind of follow your customs too as well.] Customs here umm.... [There are different cultures here] [so they can kind of follow a little bit of their customs] [and there are certain customs in this country.] [But I think overall you are still free to choose.] [This is how we interact in this country I guess.]
[Are there some customs that you don’t like in this country?]
NNSE 2: umm [some kind of customs I like very good but than my own customs], [some kind of umm... actually I find it a little too dressy or sexual identity.] [It kind of, that kind of custom is hard to follow.]
NSE 2: Oh yeah. [oh wait] how... [they’re a little bit more liberal or free about that in this country]. [Is that what you mean?]

Figure 4.4: Average length of T-units
Sub-question b: Is there any statistically significant difference between the percentage of T-units containing a dependent clause in the electronic mode and the percentage of T-units containing a dependent clause in the face-to-face discussion?

In terms of the percentage of T-unit containing dependent clauses, 28 % of T-units contained dependent clauses in the electronic discussion whereas 34% of T-units contained dependent clauses in the face-to-face discussion (see Table 4.3). That is,

![Percentage of T-units containing dependent clauses](image)

**Figure 4.5: Percentage of T-units containing dependent clauses**
subjects produced syntactically more complex T-units in the face-to-face conversation than in the electronic discussion. This difference was not found to be statistically significant by paired t-test (p > 0.05, 2-tailed). The Wilcoxon matched-pairs signed-ranks test (two-tailed) also showed this difference as statistically not significant (Wilcoxon statistic = 13.0 p = 0.154). Although the paired t-test and the Wilcoxon matched-pairs signed-ranks test did not find it statistically significant, eight pairs produced higher percentages of T-units containing dependent clauses. Figure 4.5 presents the percentage of T-units containing dependent clauses produced by each pair. Note that eight out of ten pairs produced more T-units that contained dependent clauses in the face-to-face discussion than in the electronic discussion. Only two pairs (pair 1 and pair 7) produced more T-units that contained dependent clauses under the electronic condition.

4.2.3 Research Question 3: How is electronic discussion different from face-to-face discussion with respect to the grammatical accuracy in the language generated by NNSEs?

Research question 3 concerned the grammatical accuracy of NNSE speech in the face-to-face and electronic conversations. Grammatical accuracy was defined in this study as the percentage of error-free T-units produced by non-native speakers of English. To measure the grammatical accuracy, the grammatical errors in the NNSEs’ face-to-face and online output were first identified by the researcher and a native speaker of English. The percentage of error-free units was calculated by dividing the total number of error-free T-units by the total number of T-units and multiplying it by one hundred. Then each
error was classified into morphological, syntactic and lexical errors. Table 4.4 summarizes the mean numbers of error-free T-units as well as classification of error types.

<table>
<thead>
<tr>
<th></th>
<th>Percentage of error-free T-units</th>
<th>Error Classification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage of morphological errors</td>
<td>Percentage of Syntactic errors</td>
<td>Percentage of Lexical errors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC</td>
<td>62.70 (7.22) {2.28}</td>
<td>6.09 (7.78) {2.46}</td>
<td>88.48 (11.12) {3.52}</td>
</tr>
<tr>
<td>(N = 10)</td>
<td></td>
<td></td>
<td>5.43 (6.93) {2.19}</td>
</tr>
<tr>
<td>FACE</td>
<td>52.14 (12.34) {3.90}</td>
<td>4.09 (5.13) {1.62}</td>
<td>86.97 (11.49) {3.63}</td>
</tr>
<tr>
<td>(N = 10)</td>
<td></td>
<td></td>
<td>7.24 (6.38) {2.02}</td>
</tr>
<tr>
<td>Difference</td>
<td>10.56 (11.93) {3.77}</td>
<td>2.00 (9.34) {2.95}</td>
<td>1.52 (16.24) {5.14}</td>
</tr>
<tr>
<td>T-value</td>
<td>2.80</td>
<td>0.68</td>
<td>0.30</td>
</tr>
<tr>
<td>P-value</td>
<td>0.021*</td>
<td>0.516</td>
<td>0.775</td>
</tr>
</tbody>
</table>

( ) = standard deviation; { } = SE Mean; T-value = values from paired t-test; P-value= probability level; * = values significant at p < .05; ** = values significant at p < .01

Table 4.4: Grammatical Accuracy in the NNSE’s utterances

Sub-question a: Is there any statistically significant difference between the percentage of error-free T-unit in the NNSE’s utterances via the electronic mode and the percentage of error-free T-unit in the NNSE’s utterances via face-to-face talk?
Percentage of error-free T-units in Table 4.4 shows that subjects communicating under the electronic mode produced more error-free T-units than subjects participating in face-to-face discussions. In the electronic discussion, 63% of T-units were error free whereas in the face-to-face discussion, 52% of T-units were error free. The difference of error-free T-units between electronic and face-to-face communication was statistically significant by a 2-tailed paired t-test (p <0.05). This difference was also found to be statistically significant by 2-tailed Wilcoxon matched-pairs signed-ranks test (Wilcoxon statistic=45.0, p=0.009). This result suggested that within this population there is a predictable increase in terms of grammatical accuracy when NNSEs communicate in the
electronic mode. As shown in Figure 4.6, nine out of ten NNSE subjects showed a higher percentage of error-free T-units in the electronic discussion. Only one subject (NNSE 6) displayed the same frequencies of error-free T-units in the electronic and face-to-face discussions. The result suggests that NNSEs tend to pay more attention to grammatical forms when they communicate electronically than when they communicate face-to-face.

Increased control over linguistic forms by NNSEs is also manifested in the electronic conversation data. In the following examples, NNSE 10 and 7 acknowledged an error in their utterance and self-corrected it in their following utterance.

**Examples of errors elicited from electronic discussions (unedited)**

- **NNSE 10:** Somtime I have some trouble, but not a bog deal anyway.
  
  **NNSE 10:** big
  
  **NNSE 10:** sorry mistyped
  
  **NSE 10:** that’s okay. I figured out.

- **NNSE 7:** but when older people meet younger people their conversation is a litte difficult, compared to conversation that is between friends.
  
  **NNSE 7:** different I made a mistake
  
  **NSE 7:** I see...
  
  **NNSE 7:** it is different not difficult

In the electronic communication where the conversation occurs in text form, the communicator can visually monitor his/her speech and have time to edit their words, which typically results in increased grammatical accuracy in the electronic mode.

**Sub-question b:** Among the grammatical errors observed in this study (i.e., morphological errors, syntactic errors and lexical errors), which of the errors occurred more frequently in the electronic discussion and which in the face-to-face discussion?
Table 4.4 gives information of error classification, which explains what percentage of errors fall into morphological, syntactic or lexical errors. For example, in the electronic mode, 6% of errors by NNSEs were morphological errors whereas in the face-to-face mode, 4% of errors were morphological errors. As shown in Table 4.4, most errors were syntactic errors and the percentages of morphological and lexical errors were low in both modes of communication. That is, errors in constructing a sentence comprised a greater proportion of errors, such as missing words, incorrect uses of noun or verb phrases and wrong word order. For example, a number of errors were made in the use of articles and number. The lowest proportion of errors in the face-to-face discussions was morphological errors such as incorrect uses of indefinite articles and tenses. Lexical errors such as inappropriate use of vocabulary took the lowest proportion in the electronic discussion. The following examples provide types of errors identified in the electronic and face-to-face discussions. In both examples, one can notice that a greater proportion of errors are syntactic errors, such as incorrect uses of noun phrases or verb phrases (for classification and examples of grammatical errors, refer to Appendix D and E).

**Examples of Errors from electronic discussions**

*NNSE 5: I want to come to here to learn new things and meet a new people*
  ("want" $\rightarrow$ wanted, morphological error; "to here" $\rightarrow$ here, Syntactic error; "a new people" $\rightarrow$ new people, syntactic error)

*NNSE 3: I prefer adopt*
  ("adopt" $\rightarrow$ to adopt, syntactic error)

*NNSE 7: and me either*
  ("either" $\rightarrow$ too, lexical error)

*NNSE 9: How can I answer to that topic.....?*
  ("answer to" $\rightarrow$ answer, syntactic error)

*NNSE 4: I used to wear uniform in high school*
  ("uniform" $\rightarrow$ a uniform, syntactic error)
NNSE 2: but it depend on personality of each student
(“depend” → depends, syntactic error; “personality” → the personality, syntactic error)

Examples of Errors from face-to-face discussions
NNSE 1: At first...I...when I first recognized I have to wear uniforms, I was...I felt so bad. (“have” → had, syntactic error)
NNSE 4: So I think someday culture changes like America but it takes very very long time. (“culture” → the culture, syntactic error; “very very long time” → a very very long time, syntactic error)
NNSE 8: like...to keep appointment....before I go to hospital I make reservation. I think that is good. (“keep” → make an, lexical and syntactic error; “hospital” → the hospital, syntactic error; “reservation” → a reservation, syntactic error)
NNSE 7: Yeah...it’s better I think..ah no. I mean it’s not better because it takes time....you said to decide how..what to wear. In my opinion, I, I like to wear school uniform. It was better. (“uniform” → the uniform, syntactic error)
NNSE 10: And I very know about the advantages of each side. (“very” → really, lexical error)
NNN 9: yeah...I never weared uniform when I was in student in Korea in my country Korea. (“weared” → wore, morphological error; “in student” → a student, syntactic error)

In terms of statistical significance, both the paired t-test (p=0.516) and the Wilcoxon matched-pairs signed-ranks test (Wilcoxon statistic=14.0, p=0.529) found no significant difference on the morphological errors between electronic and face-to-face discussion at the alpha 0.05 level. Also statistically no significant differences were found in the percentage of syntactic errors (paired t-test: T-value=0.68, p=0.516; Wilcoxon matched-pairs signed-ranks test: Wilcoxon statistic= 26.0, p=0.722) nor in the percentage of lexical errors (paired t-test: T-value= -0.65, p=0.532; Wilcoxon matched-pairs signed-ranks test: Wilcoxon statistic= 13.0, p=0.529). This suggests that the percentages of
Figure 4.7: Comparison of Error Classification between Electronic and Face-to-face Discussions
morphological, syntactic and lexical errors NNSEs made in the electronic discussions are similar to the errors found in the face-to-face discussions. The difference of error classification between the two modes can also be compared in Figure 4.7.

4.2.4 Research Question 4: How is the NNSE-NSE interaction in the online mode different from that in the face-to-face mode in terms of interactional features (i.e., (a) initiatives, (b) questions/answers, (c) statements, (d) requests, (e) feedback)? Is there any statistically significant difference in each interactional feature between the two discussion modes?

In order to compare interactional patterns of electronic and face-to-face talk, five discursive features were set by the researcher and then each T-unit was classified into each discourse feature, namely, initiatives, questions/answers, statements, requests and feedback. These interactive features are characteristics that are frequently found in traditional oral communication and are regarded as necessary for successful L2 learning (see Long, 1981; Pica, 1994). By comparing these interactive features between electronic and face-to-face discussions, the way in which the interactional pattern of text-based communication resembles or differs from the interactional pattern of face-to-face communication can be uncovered. An example of this classification is provided in the Appendix E.

Table 4.5 summarizes the percentage of each interactional feature. Figures in Table 4.5 represent the percentage of T-units that fall into each classification. For example, 45.83 % of T-units produced in the electronic discussion were statements while
67.33% of T-units produced in the face-to-face discussion were statements. In both modes of discussion, the highest percentage of T-units were statements and the second highest percentage of T-units were questions/answers. Paired T-tests and Wilcoxon matched-pairs signed-ranks tests were conducted to examine if significant differences in each interactional feature existed between electronic and face-to-face conversations.

<table>
<thead>
<tr>
<th></th>
<th>Initiatives</th>
<th>Q/A</th>
<th>Statements</th>
<th>Requests</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC</strong></td>
<td>10.95</td>
<td>27.17</td>
<td>45.83</td>
<td>4.60</td>
<td>11.45</td>
</tr>
<tr>
<td>N=10 pairs</td>
<td>(4.52)</td>
<td>(11.95)</td>
<td>(11.58)</td>
<td>(2.56)</td>
<td>(4.13)</td>
</tr>
<tr>
<td></td>
<td>{1.43}</td>
<td>{3.78}</td>
<td>{3.66}</td>
<td>{0.81}</td>
<td>{1.31}</td>
</tr>
<tr>
<td><strong>FACE</strong></td>
<td>2.95</td>
<td>20.27</td>
<td>67.73</td>
<td>6.03</td>
<td>3.03</td>
</tr>
<tr>
<td>N=10 pairs</td>
<td>(1.30)</td>
<td>(12.43)</td>
<td>(15.33)</td>
<td>(5.05)</td>
<td>(1.75)</td>
</tr>
<tr>
<td></td>
<td>{0.41}</td>
<td>{3.93}</td>
<td>{4.85}</td>
<td>{1.60}</td>
<td>{0.55}</td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td>8.00</td>
<td>6.90</td>
<td>-21.90</td>
<td>-1.42</td>
<td>8.43</td>
</tr>
<tr>
<td></td>
<td>(4.78)</td>
<td>(14.24)</td>
<td>(18.04)</td>
<td>(5.18)</td>
<td>(4.82)</td>
</tr>
<tr>
<td></td>
<td>{1.51}</td>
<td>{4.50}</td>
<td>{5.70}</td>
<td>{1.64}</td>
<td>{1.52}</td>
</tr>
<tr>
<td><strong>T-value</strong></td>
<td>5.28</td>
<td>1.53</td>
<td>-3.84</td>
<td>-0.87</td>
<td>5.53</td>
</tr>
<tr>
<td><strong>P-value</strong></td>
<td>0.001**</td>
<td>0.160</td>
<td>0.004**</td>
<td>0.408</td>
<td>0.000**</td>
</tr>
</tbody>
</table>

( ) = standard deviation; { } = SE Mean; T-value = values from paired t-test; P-value = probability level; * = values significant at p < .05; ** = values significant at p < .01

Table 4.5: Classification of Interactional Features
Sub-question a: Is there any statistically significant difference between the percentage of initiatives in the electronic mode and the percentage of initiatives in the face-to-face mode?

Initiatives were identified based on the following categories: greetings; farewells; introducing topics; shifting/changing topics. As shown in Table 4.5, 10.95% of T-units produced in the electronic discussion were classified as initiatives whereas 2.95% were classified as initiatives in the faces-to-face mode. In the statistical tests for significance, 2-tailed paired t-test detected significant difference on initiatives between electronic and face-to-face discussions (p <0.01). The same result was obtained by Wilcoxon matched-pairs signed-ranks test (Wilcoxon statistic = 55.0, p= 0.006). This indicates that, within this population, there is a predictable increase in terms of initiatives when participants communicate electronically. It seems that the electronic mode of discussion provides participants with an atmosphere where the interlocutors feel more freely to initiate conversation, close conversation, bring up topics and shift topics. More research to confirm this tendency is needed.

Sub-question b: Is there any statistically significant difference between the percentage of questions/answers in the electronic mode and the percentage of questions/answers in the face-to-face mode?

Questions/Answers are important devices that facilitate meaning negations in interactive communication. Twenty-seven percent of T-units comprised
questions/answers in the electronic discussions whereas twenty percent of T-units were questions/answers in the face-to-face discussions (see Table 4.5). Two-tailed paired t-test revealed that there is no significant difference in the percentage of questions/answers between electronic and face-to-face discussion (p>0.05). The Wilcoxon matched-pairs signed-ranks test (two-tailed) also identified no significant difference in the percentage of questions/answers between the two modes (Wilcoxon statistic= 40.0, p= 0.221). This implies that electronic textual conversation facilitates information exchange by asking questions and answering those questions just as traditional oral conversation does.

Although there was no statistically significant difference in terms of the frequency of questions/answers, some qualitative differences were found in the pattern of questions/answers between electronic and face-to-face discussions. In the electronic discussions, there was a frequent lack of adjacency and this seemed to sometimes hinder the comprehension of the intentions of interlocutors. For example, look at the following unedited exchanges in the electronic mode:

NSE 4: Are you the kind of person who cares about how you look?
NNSE 4: but my uniform is not good so I did not like my uniform
NSE 4: do you have to stand out in the crowd?
NNSE 4: yes
NNSE 4: no
NSE 4: Then I don’t see how you could wear a uniform day in and day out.

In lines 1 and 3, NSE 4 asked questions. In line 5 and 6, NNSE 4 first answered yes and then answered no. However, it is not clear which questions these answers are for. Unlike
oral conversations, questions and answers to those questions are frequently interrupted or delayed in the textual conversation, which results in a lack of adjacency and intervening of sequences.

**Sub-question c**: Is there any statistically significant difference between the percentage of statements in the electronic mode and the percentage of statements in the face-to-face mode?

Statements were the most frequent feature among the five interactional features. Statements were identified when the sentence involved a general statement or a statement that explained or expanded on a topic. In terms of percentages, 68% of all T-units were statements in the face-to-face discussions whereas 46% of T-units were statements in the electronic discussions. That is, one and a half times more statements were found in the face-to-face conversation. This difference was revealed as statistically significant by the paired t-test at the alpha 0.05 level with a probability of 0.004. The Wilcoxon matched-pairs signed-ranks test also found this difference statistically significant (Wilcoxon statistic= 1.0, p= 0.008). Statements was also the interactional feature with the greatest difference in mean scores between the electronic discussions and the face to face discussions.

More statements in the face-to-face discussions implies that the subjects explained and expanded a topic in more detail in face-to-face discussions. In the following excerpts, note that many more statements are present in the face-to-face mode than in the electronic mode. One can easily notice from excerpts 3 and 4 that statements were less frequent in
electronic discussions than in face-to-face discussions. It appears that in the electronic
discussions, since the conversational pace is typically slower than oral discussions,
subjects tended to address statements less often than in the oral discussions.

Excerpt 3: Electronic discussions done by Pair 9 (unedited)
NSE 9: [anyway…what did you think about the question?] Question
NNSE 9: [I think…we should follow the custom…] Answer
NSE 9: [Otherwise…
NNSE 9: [as you know, I was born in the U.S, so I cannot say I follow the customs of
another country.] Statement [So I was wondering about how to answer this question.] Statement
NNSE 9: We might be isolate] Statement
NSE 9:[you think we should follow the customs?] Question
NSE 9: Yes…
NNSE 9: [Yes I do.] Answer
NSE 9: [What do you mean isolate?] Request

Excerpt 4: Face-to-face discussion done by Pair 9 (unedited)
NSE 9: I mean.. That’s why people…. [we don’t always wanna conform] Statement [we wanna be different and do what we want.] Statement
NNSE 9: [It happened to me] Statement [I wanna wear the my friend’s clothes because his clothes is looks like better than mine] Statement [so I asked my mother] Statement so..yeah..
NSE 9: Yeah.. and [when you see that in schools it just .. you want that too.] Statement
[But when you see someone wearing same uniform and she would just … Oh… okay.. nothing different, you know.] Statement And even…. [I think so much of schools have uniforms] Statement [I think they have days when you can just wear regular clothes and come to school.] Statement [So that’s fair, right?] Question
NNSE 9: Yeah..
NSE 9: Yeah.. [so that’s good too.] Statement [So if I went to a school where we had to wear uniforms and they allowed us once a week or twice a week to just wear regular clothes, I will be glad with that, you know.] Statement [As long as I don’t have to wear it all the time, I will be happy with that.] Statement But umm.. [in Korea do some of the schools do you still wear uniforms?] Question
NNSE 9: Yeah..[I think most of school wears uniforms recently.] Answer
Figure 4.8: Comparison of Interactional Features between Face-to-face and Electronic Discussions
**Sub-question d:** Is there any statistically significant difference between the percentage of requests in the electronic mode and the percentage of requests in the face-to-face mode?

Interactional modifications such as requests for clarification or explanation are considered important for successful meaning negotiation. In terms of frequencies, 6% of T-units were requests in the face-to-face discussions whereas 4.6% of T-units were requests in the electronic discussions. This negligible difference was revealed to be not significant by both the paired t-test ($p>0.05$) and the Wilcoxon matched-pairs signed-ranks test (Wilcoxon statistic= 18.0, $p= 0.359$). This is not surprising since a very similar proportion of requests were present in the face-to-face and electronic discussions. Some examples of requests in the electronic and face-to-face discussions are as follows:

**Examples of Request from Electronic Discussions**
- **NSE 7:** Can you explain what you mean by exotic?
- **NSE 3:** What is your reason for adopting
- **NSE 9:** what do you mean, need?
  - **NSE 9:** Do you mean, need because you may forget who you really are, a Korean?
- **NNSE 6:** What is “plain”?
  - **NNSE 6:** What do you mean?
  - **NNSE 6:** Do you mean a girl wears uniform or men wear uniform?

**Examples of Request from Face-to-face discussions**
- **NNSE 10:** it depends on the president of the school or depends on the district you mean?
- **NSE 10:** junior high school and high school? Why is that? Do you know why they would have to wear uniforms?
- **NSE 7:** So then you didn’t like uniforms because of that?
- **NNSE 8:** I couldn’t understand. Can you say that again?
As seen in above examples, in both modes of conversation, subjects displayed the ability to request clarification and explanation when they did not fully understand the questions or statements.

**Sub-question e**: Is there any statistically significant difference between the percentage of feedback in the electronic mode and the percentage of feedback in the face-to-face mode?

In both modes of communication, subjects provided feedback in various ways. As seen in the following examples, feedback was provided by mostly agreeing on what was previously said or by complimenting the other person. Particularly, in the electronic discussions, emotional icons were sometimes used in order to deliver one’s feedback more effectively.

**Examples of Feedback from Electronic discussions**
- **NNSE1**: but for most Koreans who study abroad it is very big worrying thing.  
  **NSE1**: I see (feedback)
- **NSE 2**: I guess uniforms tend to be very conservative  
  **NNSE 2**: I agree (feedback)
- **NNSE 7**: it is easy to be adopted...  
  **NSE 7**: that’ true (feedback)
- **NNSE 8**: almost of students wear uniform in Korea  
  **NSE 8**: I see (feedback)  
  **NSE 8**: I think that’s a good idea (feedback)
- **NNSE 2**: In heavy snowy day, we had to wear skirt  
  **NSE 2**: That must have been awful. 😞 (feedback)
Examples of Feedback from Face-to-face discussions

- NSE 9: You have to be very strict too and...yeah...I think in the United States, they’re giving you more. I think they’re giving students more choice, more freedom to wear what they wanna wear and...
  NNSE 9: Umm. I like that (feedback)
- NNSE 5: yeah but sometime like...it make more time to spend more time when their dress like..you have to ironing and everything
  NSE 5: yeah that is true (feedback)
- NNSE 4: But I think if the person who has very rich or very high level in society they will get married. It’s not his or his or her will...
  NSE 4: Oh I see. (feedback)

In terms of frequency, 11% of the T-units accounted for feedback in the electronic mode while 3% of T-units accounted for feedback in the face-to-face discussion. This difference was statistically significant at the alpha level 0.01 by both the paired t-test (p < .01) and the Wilcoxon matched-pairs signed-ranks test (Wilcoxon statistic = 55.0, p = 0.006), indicating that the percentage of feedback was higher in the electronic mode than in the face-to-face mode. That is, subjects showed more reactions to the preceding statement and response in the electronic mode than in the face-to-face mode.

4.2.2.5 Research Question 5 (Follow-up Interviews): How do participants describe and evaluate their experience of electronic discussions in comparison to face-to-face discussions? Do the participants find the two modes of discussion different? Is there any individual preference for a certain mode? If so, how do the participants like or dislike each discussion mode?
The data collected from the follow-up interview with the participants provided valuable observations about electronic and face-to-face discussions. Responses (N=20) on their experience of electronic and face-to-face discussions after the experiment varied with some favoring the electronic mode and the others favoring the face-to-face mode. Participants were asked to evaluate their experience of using electronic and face-to-face discussions in terms of three aspects: (1) linguistic performance, (2) affective and psychological aspects and (3) Interactional and communicative aspects. These three aspects, however, are very closely related to each other, thus many overlaps were found in the answers to these questions. In what follows, data from the follow-up interviews are presented according to these three aspects.

**Linguistic Aspects**

When subjects were asked to evaluate the electronic and face-to-face conversations in terms of linguistic perspectives, such as ‘which mode of conversation was linguistically more productive or beneficial,’ diverse comments were reported ranging from positive to negative. For NSE participants, the majority (eight out of ten) found face-to-face more effective for generating more linguistic output. Comments from NSE participants included: “I think in the face-to-face format, we talked more continuously whereas in the computer discussion we had lots of pauses. A long pause was a bit irritating. We talked about the subject more and faster in the face-to-face format”; “My opinion did not flow on a keyboard as much as in the face-to-face discussion for I was concerned with my spelling and sentence structures. It was more productive to voice my opinion talking face-to-face.” Many NSEs reported that they
were much more fluent in the face-to-face mode because it was faster to speak than to type. In the electronic mode, they reported that they did not explain things in detail which they would have done in the face-to-face mode because of the slower pace of electronic interaction. Rather, in the electronic mode, they reported that their messages were more brief and succinct, focusing more on delivering meanings. Two other NSEs, however, reported that the online format was linguistically more productive when talking to NNSEs. They stated, “Overall, I liked typing on the computer better because I had a chance to process my thoughts before writing it down on the computer” and “I think it was hard for my partner to understand me when we were talking face-to-face since I was talking fast. I liked online better since my partner understood me better.”

In terms of linguistic accuracy, most NSEs reported that they were more attentive about grammar during textual exchanges than during oral exchanges.

While the majority of NSEs favored the face-to-face mode for generating more linguistic output, NNSE participants expressed mixed opinions in their assessments of electronic and face-to-face discussions. Five students assessed the online mode positively in terms of linguistic productivity while three assessed the face-to-face mode linguistically more productive, and two assessed both formats equally effective. Those who evaluated the online mode positively reported in common that in the face-to-face mode, the NSE talked fast and dominated the conversation, so they didn’t feel that they talked much. Another source of linguistic benefit of the electronic mode that was reported was its composed text, which allowed NNSEs to understand the message clearly. One student stated that she couldn’t understand the NSE’s speech in the face-to-face talk
because of her poor listening ability and this led her to not speak much, whereas in the electronic format she could participate in the conversation more actively by understanding what was said by the NSE. One NNSE pointed out that she had adequate time to think and compose her thoughts in online talk, thus it was easier to converse in the electronic format than in the face-to-face format.

Whereas some NNSE students found compositional talk easier and thus more productive than oral talk, some NNSE students reported the opposite. Two NNSEs reported that they felt linguistically very limited in the electronic discussion because of the composition-like aspect of online talk. One observation stated, “I had to think for long to compose a message when I talked online, so it was more difficult to talk.” Another subject mentioned, “I am not confident about writing or composition so I was less fluent in the electronic talk than in the face-to-face talk.” In fact, those two NNSEs were NNSE 3 and NNSE 4 who showed decreased ratios of words amount in the electronic mode (see Figure 4.2). It should be noted, therefore, that for some second language learners, particularly for those who feel less confident about L2 composition, the electronic mode can be an additional burden in communication.

Two other NNSEs evaluated both modes of conversation equally effective in generating linguistic outcome, stating that online chatting was similar to face-to-face dialog and both modes facilitated conversation. Interestingly, these two NNSEs (NNSE 7 and NNSE 10) produced a relatively similar amount of words during electronic and face-to-face discussions (see Figure 4.2).

In terms of linguistic accuracy, most NNSEs reported that they paid more attention to what they wrote and to the accurate use of grammar in the electronic
discussions than in the face-to-face discussions. Although they sometimes used an abbreviation such as “u” instead of “you,” in terms of grammatical construction, more accurate uses were found in the electronic mode.

To summarize, regarding linguistic fluency, most NSE subjects preferred face-to-face conversation whereas NNSE subjects’ opinions varied from positive to negative. However, both NNSEs and NSEs agreed that in the electronic mode, they were more attentive to grammar and focused on more accurate usage of the language.

**Affective and psychological Aspects**

In order to assess affective aspects of the two formats, the researcher asked participants in which mode of conversation he/she felt emotionally more comfortable. In general, NSEs favored the face-to-face mode whereas the NNSEs responded less favorably to the face-to-face mode. Of ten NSEs, seven stated that they felt more comfortable talking face-to-face because seeing the person’s reactions and expressions allowed them to speak more freely. It was reported that talking to a computer was very impersonal and thus felt uncomfortable. Mostly, the positive aspects of face-to-face format were attributed to the fact that body language such as gestures and facial expressions are present in the face-to-face talk, which allowed them to comfortably carry on conversations. However, three NSEs recognized online conversation as a more comfortable medium in that its atmosphere was less formal and thus made them feel more relaxed. In addition, they reported that in the online mode, they had time to process their thoughts before typing it on the computer, which made them feel more at ease.
For NNSEs, the fact that one cannot see the other’s physical presence in the electronic mode whereas the opposite is true in the face-to-face mode turned out to be the reason for both comfort and discomfort in conversation. Six stated that the face-to-face mode was more comfortable and four stated that the electronic mode was more comfortable. Those who liked the visibility of face-to-face mode mentioned: “I could use body language. So I felt a little relieved in the face-to-face mode because this could compensate for my poor English”; “My partner figured out my level of English real quick in the face-to-face talk, and thus was more considerate about my limited English. This made me feel comfortable to talk to him”; “I felt more comfortable in the face-to-face discussion since I could see the immediate reaction of my partner”; “Because I still have difficulty in English composition, I was afraid of composing my ideas on the screen and transfer it through computer. However, even those expressions that I was not sure, when I expressed it orally, I could express it freely and better”; “when I got stuck in some expression, I was able to use body language such as gestures. So it was more comfortable to talk face-to-face.”

In contrast, those who liked the invisibility of the online mode stated: “Since I was not seeing the other person, I could deliver my opinion more frankly”; “Since I don’t see the person, I was able to speak up my opinion more comfortably, particularly things that could possibly bring an opposing argument. I felt more comfortable to debate online than when I was actually seeing the person”; “In the face-to-face mode, my partner seemed not to listen to me because of my poor speech and this discouraged me very much. It seemed that my partner guessed what I was going to say based on my facial expressions rather than based on my speech”; “In the face-to-face mode, I just couldn’t
speak much. I was going to say something but it just didn’t come out. So I often missed
the opportunities to speak because the pace of interaction was much faster in the face-to-
face discussion. However, in the online mode, at least I had some time to process my
thought. So even with the person I don’t really know, I could comfortably talk online.”

While the electronic medium was reported to provide a less intimidating
environment where some of the NNSEs in this study felt more comfortable with speaking
up their opinions at their own pace, some of the constraints in the electronic mode were
also pointed out. Many of the NNSE participants mentioned that they felt less
constrained in the face-to-face mode than in the electronic mode because they could
make use of aural and visual cues such as eye contact, smiles, intonation and gestures,
which provided a lot of information to the listener as well as compensated for their
limited English speaking ability. Therefore, despite the frequent recommendation from
existing literature for the use of electronic medium as a less threatening and less
constraining environment, the result of this study does not exclusively support the
computer’s capability to provide an emotionally secure environment. Rather, it appears
that different individuals perceive differently in regard to the relative degrees of
emotional solidarity in face-to-face and electronic discussions.

**Interactional and Communicative Aspects**

Subjects were asked to compare the relative benefits of electronic and face-to-face
discussions in terms of fostering interaction and meaning negotiations. The majority of
subjects (both NNSEs and NSEs) found face-to-face interaction more personal, more fun
and more dynamic. Responses included: “Face to face format stimulated more interaction
and I got to know the person better”; “It was more fun to interact with my partner face-to-face than electronically because I received immediate reactions from my partner in the face-to-face mode”; “Since I could use gestures and facial expressions in the face-to-face mode, the interaction was more real and fun”; “I was able to read the other person’s feeling in the face-to-face mode, therefore I was more cautious about the other person. But in the electronic mode, it wasn’t much interactive and we tended to focus on one’s own argument.”

As compared to the face-to-face format, the electronic discussion was evaluated by many subjects as impersonal, less dynamic and less serious. For example, one subject responded, “Since you don’t see the person, you may greet and talk not genuinely but superficially. So it was not good.” In addition, a few mentioned that the lack of visual cues in the electronic conversation sometimes led to confusion and miscommunication: “It was not easy to type what I exactly wanted to say. As a result my message was sometimes delivered wrong way”; “It was sometimes difficult to understand what the speaker meant. So the conversation went in different direction”; “I had a hard time typing my thoughts because of the online delay time. I received the answer to a different question than the one I was asking. I think it is easy to misunderstand someone in the online discussion”; “I had to make extra efforts on conveying meanings clearly in the electronic mode”; “I couldn’t coordinate communication very well in the electronic discussion. I couldn’t control over how to talk, how long my answer should be, etc.”

Some positive comments on the electronic mode were also mentioned: “I could read the written message and this helped me understand the message. So it was easier for me to respond in return.”
On the other hand, a few people mentioned that the synchronous online communication was similar to oral dialog in terms of interactions. Interestingly, these subjects appeared to be more acquainted with electronic communication. For example, they sometimes used non-linguistic devices such as graphic input or icons (i.e., ☺, ☹, ^^) for expressing emotions. Although a practice session of using Yahoo Instant Messenger was provided to all the subjects prior to the experiment, these few subjects seemed to have a better handle on electronic conversation, perhaps because they had previous experience with online chat procedures.

4.3 Conclusion

In this chapter, the results of the statistical analyses of the experimental data and follow-up interviews were presented. First, in terms of linguistic amount, the results demonstrated a tendency toward a more equal participation in the electronic mode. Second, the electronic discussion featured a language that was less complex than the language of the face-to-face discussion. On both measures of syntactic complexity, the face-to-face discussion involved more complex language than electronic discussions. Third, more error-free T-units were found in the electronic discussions, indicating that subjects paid more attention to grammatical forms in the electronic mode. In terms of error classification, both the paired t-test and the Wilcoxon matched-pairs signed-ranks test found no significant difference between electronic and face-to-face discussion. This indicated that the distribution of errors in the electronic discussions was similar to the distribution of errors in the face-to-face discussions. Fourth, regarding the interactional
features between online and face-to-face discussion, synchronous online communication produced all five interactional features just as the face-to-face communication did. That is to say, the electronic medium served as an effective medium for interactive communication or even played a more active role in generating meaningful interactions by producing more initiatives and feedback as compared to face-to-face discussions. However, the percentage of statements was significantly lower in the electronic mode, which suggested that subjects explained and expanded on a topic in less detail when they communicated electronically. Finally, reports from follow-up interviews provided information that would help explain the participants’ attitudes towards electronic and face-to-face discussions. Some subjects emphasized the benefits of electronic discussions whereas other subjects focused more on the benefits of face-to-face discussions. It seems that an individual learner’s background and characteristics (e.g., one’s competence level in composition/writing, one’s familiarity with electronic chat) has an impact on the language and interaction generated by each individual and his/her attitude towards each discussion mode.

Based on the findings reported in this chapter, more conclusive remarks are presented in the next chapter along with the limitations of this study, pedagogical implications, and recommendations for further research.
CHAPTER 5

SUMMARY OF FINDINGS, IMPLICATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

5.1 Introduction

This study was designed to explore the effects of networked computers in L2 learning by comparing synchronous online discussions with face-to-face discussions. In the field of foreign and second language education, networked computers have recently been evaluated as an effective means which provides L2 learners with increased opportunities to participate in genuine real-life communication as well as with an empowering environment where foreign language learners can freely express themselves at their own pace (Beauvois, 1992; Kelm, 1992; Kern, 1995; Belcher, 1999). Previous studies reported a number of advantages and benefits of computer-generated communication in comparison with traditional face-to-face communication. For example, electronic discussion provides opportunities for equal participation among communicators (Warschauer, 1996; Kern, 1995; Belcher, 1999) and allows L2 learners to develop discourse competence and grammatical competence in the second language (See
Chun, 1994; Pellettieri, 2000). However, little empirical research has been conducted regarding the linguistic and interactional characteristics of real-time electronic communication and how the written output of electronic communication resembles or differs from the spoken output of traditional face-to-face discussions. In addition, as discussed in Chapter 2, the existing studies that compared electronic discussion with face-to-face discussion yielded conflicting results in regards to syntactic complexity and linguistic accuracy (See Kern, 1995; Chun, 1994; Warschauer, 1996; Pellettieri, 2000). In fact, research findings concerning the comparison of electronic and face-to-face communication are inconclusive because of the limited database in this area.

Given the limited database in computer-mediated communication and the contradictory results of previous research, this study investigated the linguistic and interactional characteristics of NNSE-NSE pair discussion in electronic and face-to-face conditions. This study involved twenty voluntary subjects consisting of ten NNSEs and ten NSEs who were studying at a major public Midwestern university in the United States. The twenty subjects were randomly paired for two types of discussions: electronic and face-to-face. Two sets of data (a total of twenty discussions) derived from electronic and face-to-face discussions were compared in terms of linguistic amount, syntactic complexity, grammatical accuracy, and interactional features. Data coding was done by the researcher and an experienced ESL professional. In analyzing the data of this study, paired t-tests and Wilcoxon matched-pairs signed-ranks tests were used to examine statistical significance for each variable. After the experiment, follow-up interviews were conducted with all of the subjects regarding their experience with electronic and face-to-face discussions.
In this chapter, the research findings are summarized based on the results reported in Chapter 4 followed by pedagogical implications, limitations of this study, and recommendations for further research.

5.2 Findings

5.2.1 Pre-experiment Interviews

In a short interview conducted before the experiment, it was revealed that participants of this study had different opinions regarding electronic and face-to-face discussions. The electronic communication was perceived as “anonymous,” “impersonal,” and “informal” in which communicators felt less inhibited in terms of demonstrating their opinion. On the other hand, the face-to-face discussion was perceived as “personal,” “courteous,” and “more formal” in which interlocutors would tend to be more considerate and more courteous about what to say. In general, differences between the two modes were mostly derived from the fact that visual cues, such as facial expressions and gesturing are present in the face-to-face conversation while they are currently absent in the electronic conversation. Based on that fact, both positive and negative aspects of the two modes were addressed. For example, one subject pointed out the possibility of miscommunication in the electronic discussion caused by the absence of a physical presence while another pointed out the more informal and thus more comfortable atmosphere of the electronic mode by having some distance between communicators. While most subjects addressed the differences of the two modes, a couple of subjects mentioned that real-time online dialog and oral dialog were much alike.
In general, the pre-experiment interview showed that participants in this study had their own specific ideas and perceptions regarding electronic and face-to-face discussions. Hence, it is possible that each subject’s perceived difference or similarity between the two modes might have had an impact on the kinds of interaction he/she generated in the face-to-face and electronic discussions. Therefore, further research studies on the relationship between subjects’ perception and their performance in the electronic and face-to-face discussion format may shed more light on key differences between electronic and face-to-face discussions.

5.2.2 Findings for Research Questions 1 to 5

A summary of the results from the experiment and follow-up interviews is reported in the order the research questions were asked.

5.2.2.1. Research question 1 (Linguistic productivity)

Concerning linguistic productivity, the results revealed that in general NNSEs showed increased participation in the electronic mode whereas NSEs showed decreased participation in the electronic mode. First, NNSEs took significantly more turns in the electronic mode than in the face-to-face mode (p< .01). Of ten NNSEs, only one NNSE took decreased turns in the electronic mode. One possible reason for this increased performance by NNSEs in the electronic discussions is that, unlike in the face-to-face
discussion, turns are not sequentially displayed in electronic discussions, therefore
communicators seem to have less fear about interrupting the sequences and may take as
many turns as they want.

In terms of the amount of words, a less marked but substantial difference was
found between electronic and face-to-face discussions, although this difference was not
found to be statistically significant based on the paired t-test (p= .0505) and the Wilcoxon
matched-pairs signed-ranks test (p=0.077). The ratio of NNSEs’ words increased in the
electronic mode while the ratio of NSEs’ words decreased in the electronic mode. That is
to say, NSEs were less dominant in the electronic mode than in the face-to-face mode,
therefore, more equal sharing of participation occurred in the electronic mode. There
may be several reasons that account for NNSEs’ increased performance and more
equalized participation between NNSE and NSE in the electronic mode. In electronic
communication, one can type and plan the message at his/her own pace and leisure, and
this may be perceived as less threatening and less unnerving than oral conversations
especially by those who are linguistically less fluent (in this case, NNSEs), which, as a
result, contributes to increased amounts of linguistic outcomes by NNSE and more
equalized participation between NSE and NNSE (see Warschauer, 1996; Ortega, 1997;
Belcher, 1999).

Regarding the average turn length, NNSEs’ performance slightly increased in the
electronic mode. However, this difference was not significant (p> .05). One possible
reason why the NNSE average turn length did not increase much in the electronic
discussion is that NNSEs took more turns in the electronic mode; therefore, the average turn length, which was calculated by dividing the total amount of words by the number of turns, did not tend to increase much in the electronic mode.

Overall, the data revealed that the electronic mode provided NNSEs with opportunities to take more turns and to speak more. Although in both modes of conversation NSEs dominated the discussion, the degree of NSE’s domination decreased in the electronic mode. As a result, opportunities of speaking were more equally distributed in the electronic discussions. Therefore, the result of the present study confirms one of the beneficial effects of a networked computer that was discussed in the previous studies: Electronic discussion contributes to the equality of participation (Beauvois, 1992; Kelm, 1992; Kern, 1995, Warschauer, 1996). This result is also in accord with previous observations that those who are less fluent in the traditional oral communication (in this study, NNSEs) tend to be more actively involved in electronic discussions (Belcher, 1999; Warschauer, 1996).

5.2.2.2. Research question 2 (Syntactic complexity)

Concerning the second research question, the results showed that the linguistic output generated from face-to-face discussions were syntactically more complex than the written output generated from electronic discussions. In comparison of average length of T-unit, the mean number of average length of T-unit in the face-to-face mode was significantly higher than that found in the electronic mode (11.5 vs. 8.3). Both the paired t-test and the Wilcoxon matched-pairs signed-ranks test identified this difference as
statistically significant (p< .01). All ten pairs produced longer T-units in the face-to-face mode. This indicates that subjects produced relatively shorter sentences in the electronic communication and longer sentences in the face-to-face discussions. In terms of the percentage of T-units containing dependent clauses, a higher percentage of T-units containing dependent clauses were found in the face-to-face mode than in the electronic communication mode (34% vs. 28%). However, this difference was not found to be statistically significant by both the paired t-test and the Wilcoxon matched-pairs signed-ranks test (p> .05).

Overall, the results showed that discourse generated by electronic discussions contained a lower level of syntactic complexity than face-to-face discussions. The results of this study on the syntactic complexity provided support for previous findings by Kern (1995) and Chun (1994) who observed a higher proportion of simple and shorter sentences in electronic discussions. This result, on the other hand, conflicts with the findings by Warschauer (1996) who found a greater syntactic complexity under the electronic mode than under the face-to-face mode. One reason for the lower levels of complex structure in electronic discussions is that textual conversation via typing takes a longer time than oral conversation. Therefore, subjects tended to make their statements brief and succinct, typically excluding unnecessary words and phrases. Also in electronic communication, the communicator had time to plan his/her messages; therefore utterances tended to be edited or revised which contributed to shorter sentences in the electronic conversation.
5.2.2.3. Research question 3 (Grammatical accuracy)

With respect to grammatical accuracy in the language generated by NNSEs, a significantly higher amount of error-free T-units was found in the electronic discussions as compared to face-to-face discussions (62.7 vs. 52; p< .05). This result indicated that NNSE subjects paid more attention to grammatical forms when participating in electronic discussions than in face-to-face discussions. Nine out of ten NNSE subjects displayed a higher value of error-free T-units in the electronic mode. It was also witnessed from the conversation data that some participants self-corrected their errors during the electronic session while visually monitoring their utterances. It appears that in the electronic communication where the conversation occurs in text form, the communicator can visually monitor his/her speech and have time to edit the language, and, as a result, can pay more attention to grammatical forms.

In the existing literature, several researchers speculated that the degree of linguistic accuracy would be low in synchronous online communication, because participants tend to focus on meaning with less concern about grammatical forms (Beauvois, 1992; Kelm, 1992; Kern, 1995). However, the results of this study show the opposite of that speculation. The data from this study demonstrated that subjects were more attentive to linguistic forms while they were engaged in electronic communication. This finding, on the other hand, corroborates Pellettieri’s (2000) claim that L2 learners would pay more attention to grammatical forms in electronic communication than in oral communication. In general, the results of this study indicated that linguistic accuracy is
well served by electronic communication and therefore supports the positive role of computer-mediated communication in developing an L2 learner’s grammatical competence.

In terms of error classification, syntactic errors, which involve errors in constructing sentences, took the highest proportion in both modes of discussion. The paired t-test and the Wilcoxon matched-pairs signed-ranks test found no significant difference in the distribution of morphological, syntactic, and lexical errors between electronic and face-to-face discussions (p > .05). Based on this result, it can be said that in general, NNSEs produced similar patterns of error types in the electronic and face-to-face discussions.

5.2.2.4 Research Question 4 (Interactional Features)

Just as in face-to-face discussion, a variety of interactional features were also evident in the computer discussions. Interactional features that were observed in this study, namely, initiatives, questions/answers, statements, requests and feedback, are the discourse functions that are frequently found in traditional oral conversation and that are thought to be conducive to L2 development. The data of this study showed that interlocutors produced and utilized these discursive features frequently under the electronic mode and the patterns of these interactive features were similar to those found in face-to-face discussions. For example, a list of modificational interactions was found in the electronic mode such as requests and feedback (e.g., “what do you mean?”; “Oh, I
which fostered comprehension and modified output. This indicates that synchronous online discussion provides good opportunities for foreign language learners to acquire discourse skills and interactive competence.

In terms of frequencies of those interactional features, there were no significant differences for the variables of questions/answers and requests whereas there were significant differences for the variables of initiatives, statements and feedback. Significantly higher numbers of initiatives were identified in the electronic mode (10.95 vs. 2.95; p< .01), which implies that the electronic mode provides participants with an atmosphere where the interlocutors feel free to initiate conversation, close conversation, bring up topics and shift topics. On the other hand, the number of statements was significantly lower in the electronic mode (46 vs. 68; p< .05). One and a half times more statements were found in the face-to-face discussions. This suggests that the subjects explained and expanded on a topic more in detail and more frequently in the face-to-face mode than in the electronic mode. It seems that in the electronic mode, since the pace of conversation is typically slower than face-to-face discussion, subjects tend to expand/explain less on a topic. In terms of percentage of feedback, a higher value was found in the electronic mode than in the face-to-face mode (11 vs. 3; statistically significant, p< .01). Subjects provided feedback in various ways in the electronic mode such as by complimenting, agreeing or correcting previous information. One possible reason for the significantly higher proportion of feedback in the electronic discussions is that subjects paid more attention to what was written and provided frequent reactions to the previous response or statement.
In general, the findings of this study suggested that synchronous online discussion promotes interactive exchanges between communicators just as face-to-face discussion does. Furthermore, the electronic medium encourages communicators to take more initiatives and to provide more feedback. However, the text-based communication seemed to restrain communicators from expanding on a topic in more detail, resulting in a decreased number of statements in the electronic mode.

5.2.2.5 Research Question 5 (Follow-up Interviews)

Responses from the follow-up interviews on their experience with electronic and face-to-face discussions varied from positive to negative. Subjects were asked to evaluate electronic and face-to-face discussions in terms of (1) linguistic aspects, (2) affective and psychological aspects, and (3) interactional and communicative aspects. Some students emphasized the positive aspects of electronic discussions whereas others focused more on the positive aspects of face-to-face discussions.

Linguistic Aspects

Most of the NSEs were in favor of the face-to-face mode in generating more linguistic outcomes because the pace of oral communication was typically faster than that of written communication. It was reported that they communicated in more detail in the face-to-face mode than they did in the electronic mode. Two of the ten NSEs, however, reported that they favored typing on the computer where they would have time to process their thoughts before entering the message.
As for the NNSE participants, opinions were mixed. Five students assessed the online mode more positively, while three assessed face-to-face communication more positively and the remaining two assessed both formats as being equally effective in generating linguistic exchanges. Those who favored the online mode reported that they could sometimes not understand the NSEs’ speech in the face-to-face discussion because it was fast and this discouraged them. Two other subjects who reported the face-to-face mode as more effective stated that they felt linguistically limited in the electronic mode because they found electronic conversation more like “composition” in which they reported less confidence. So it seems that, for some learners, their experiences with electronic discussions were closer to “composing/writing” than “conversing.” It was, in fact, NNSE 3 and NNSE 4 who showed decreased ratios in the amount of words used in the electronic mode.

While opinions varied regarding linguistic productivity, in terms of linguistic accuracy, most of the NSEs and NNSE reported that they had paid more attention to grammatical forms in the electronic mode because they could visually monitor their utterances.

**Affective and Psychological Aspects**

Many existing studies claimed that computer networks provide interactants with a psychologically more comfortable and less threatening environment (see Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Belcher, 1999). Some of the NNSE participants in this study mentioned that they felt more comfortable in the online communication mode where they were able to express their opinions better and more candidly. However, other
NNSEs reported the opposite. They found the face-to-face mode more comfortable because they could use nonverbal cues such as head nods, gestures and facial expressions, which compensated for their limited oral English. Also many NSEs favored the face-to-face condition because seeing the person’s reactions and expressions allowed them to speak more freely. Therefore, the interview data of this study did not exclusively support that previous claim but only partially supported it. Individual differences seem to play a role in one’s perception and preference for a certain mode. Further research is needed on the affective and psychological benefits of electronic communication.

*Interactional and Communicative Aspects*

The majority of participants reported that face-to-face interaction was more personal and more dynamic, and thus it stimulated more interaction. It was mentioned that face-to-face interaction was faster, easier in delivering nuances of meaning and provided immediate reactions, hence miscommunication was less likely to occur. However, a few participants reported electronic discussions to be just as interactive as face-to-face discussions. Interestingly, those who evaluated electronic conversation as equally interactive to face-to-face conversation seemed to use more graphic inputs such as 😊, ^^ and 😊. It appeared that those who are more acquainted with synchronous online discussion seemed to perceive electronic discussions as more similar to “conversation” than “writing” and thus perceive it as equally interactive as the face-to-face mode.
5.3 Pedagogical Implications

There are several pedagogical implications which the results of this study suggested. First, networked computers contribute to more equal sharing of participation during communication. Therefore, teachers of foreign and second languages may utilize computer networks in their classrooms, particularly in the classroom where some students are verbally more dominant than others, such as where NSEs and NNSEs are mixed. In other words, second language learners who do not normally participate much in the traditional classroom may benefit from electronic communication. The type and amount of electronic communication in the foreign language program will need further investigation.

Second, application of networked computers lends itself as a communication tool to increase interpersonal communication and information exchanges. The result of this study showed that a variety of interactional features that are frequently found in the oral communication were also present in the electronic communication. Therefore, networked computers can promote L2 learners’ communicative competence, by providing learners with ample opportunities to negotiate meanings with others. Particularly in EFL contexts, where students do not have many opportunities to speak the target language outside the classrooms, networked computers can serve as an available, inexpensive, highly effective medium to practice a target language in meaningful contexts.

Third, one of the findings of this study is that communicators focus on grammatical forms more in the electronic discussions than in the face-to-face discussions. Therefore, one way to promote self-correction and grammatical accuracy in foreign
language classrooms would be to encourage electronic discussions. For example, during electronic discussions, a second language learner may exercise grammar in meaningful contexts in an implicit manner. Also, after electronic communication, the learner can make a hard copy of the computer interaction and can review it for the purpose of a more explicit type of grammar exercise (Beauvois, 1992).

Fourth, as reported in the follow-up interviews, individual perspectives on electronic and face-to-face discussions varied from person to person, therefore these differences should be incorporated into language teaching. For example, some students found written exchanges more informal and more comfortable while others perceived written communication as more challenging because they perceived it as more like “composition” rather than “conversation.” Also a number of students evaluated face-to-face interaction as more dynamic and more interactive than electronic discussion. Although the experimental data of this study observed numerous benefits of electronic discussions, a number of students still reported a preference for traditional face-to-face discussions. Therefore, the use of electronic communication should not be a substitute for face-to-face discussions, but it can be used as a complement to face-to-face communication.

In addition, the results of this study found that not only did electronic discussion provide good opportunities for acquiring interactive competence, it also helped NNSEs to pay more attention to grammatical accuracy. This means that electronic communication can be utilized for both meaning-focused and form-focused instruction. While meaning-focused instruction is important in order to effectively deliver one’s message in the L2,
form-focused instruction can improve linguistic accuracy by consciously monitoring specific forms and meanings. It seems that the synchronous online communication can satisfy both of these functions.

This study served as an empirical investigation for the growing support for synchronous electronic communication as an effective medium that encourages L2 learners to generate productive and meaningful interactions. By comparing the differences and similarities between electronic and face-to-face communication, this study expanded the knowledge and database regarding the characteristics of synchronous online discussion and provide a base upon which further research can be conducted.

5.4 Limitations of the Study

There are several limitations of this study, and interpretation of the results should be made based on these limitations. First, the number of participants in this study was relatively small and they were not randomly selected from a larger population. The subjects in this study were ten ESL students from South Korea and ten native speakers of American English who volunteered to participate. Hence, generalization of these results to other populations should be made cautiously.

Second, this study was administered with ESL learners whose TOEFL scores ranged from 520 to 559 and whose stay in the U.S. was less than 2 years. Subjects of different levels of English proficiency and different lengths of stay in the U.S. might have produced different outcomes.
Third, although the researcher provided subjects with a practice session in using the online chat program (i.e., Yahoo Instant Messenger), it is possible that those who had previous experience with online chat might have performed differently from those who did not have that experience. Different learner experiences and attitudes towards computer interaction might have contributed to the outcomes of the study. Therefore, such individual factors cannot be ruled out and further study is warranted.

Fourth, the gender of each participant was not taken into consideration in this study. Therefore, it is unknown whether the gender of the participants such as a mixed gender dyad or the same gender dyad played a role in the quality and quantity of linguistic outcomes generated by each dyad.

5.5 Recommendations for further Research

The findings and observations of this study reveal a need for further research in this area. First, more empirical research with a larger sample size needs to be done in order to support the findings of this study as well as to expand the database of computer-mediated communication.

The data from the pre-experiment interview showed that subjects in this study had different perceptions regarding electronic and face-to-face discussions, which might have influenced the outcomes obtained in this study. For example, in the pre-experiment interview, many participants reported that they perceived electronic discussion as less formal and less inhibited, and they would thus feel less fear to interrupt someone there
than in face-to-face interaction. This kind of perceived atmosphere of electronic
discussion may have had an influence on the interlocutor’s performance to take more
turns or take more initiatives. Therefore, as mentioned earlier, further research on the
relationship between learners’ perception and their linguistic performance in electronic
discussion is needed.

In the follow-up interview, some individuals expressed apprehension and lack of
confidence in writing/composition, and they reported that they found the electronic
discussion linguistically challenging. It seems that affective variables such as attitudes
toward writing/composition play a role in learner performance in electronic
communication. Therefore, further research that links affective variables and electronic
discussion needs to be done.

Electronic language features many different aspects of linguistic ability. It was
reported that electronic discourse has characteristics of both speech and writing (Davis &
Brewer, 1997). The impact of networked computers on different linguistic abilities such
as reading, writing and speaking is another area that needs further investigation in order
to determine which language skills can be fostered through the use of electronic
discussion and which are more feasible in face-to-face communication.

Linguistic outcomes can be influenced by the kinds of tasks that are used.
Research on the effects of different types of tasks on the linguistic performance of
electronic communication may also provide useful knowledge about computer-mediated
communication. For example, having foreign language students work collaboratively to
solve a problem may require critical reasoning skills as well as communication skills (e.g.,
questions/answers/comments) which may produce different results in terms of the amount and types of interactional features. Further research is needed on the influence of language tasks in the interaction of electronic communication.

Further research may also consider multiple independent variables and their effects on the electronic and oral communication. Multiple independent variables may include ‘different levels of English proficiency,’ which may be determined by such standardized tests as TOEFL (Test of English as a Foreign Language) or OPI (The Oral Proficiency Interview), ‘different genders,’ ‘different ages,’ and ‘the application of electronic discussion over a period of time.’ The multiple independent variables may have interactions with the formats of discussion and thus may result in different outcomes.

The main frame of this study was a quantitative investigation which involved an experiment and statistical analyses. However, further research may consider qualitative approaches such as discourse analysis in electronic language compared to language generated by face-to-face communication. Qualitative studies will also contribute to the knowledge of the electronic language and its effects in foreign language teaching and learning.

5.6 Conclusion

In this chapter, summary of findings, pedagogical implications, limitations and recommendations for future research were presented. The results showed that NNSEs had more opportunities to contribute to discussion in the electronic mode. Unlike traditional oral discussions where a few students verbally dominate the discussion, a
networked environment tends to be an equalizer or democratizer of participation in which opportunities of sharing one’s ideas are more equally distributed. Also, the networked computer provides language learners with a vehicle to interact meaningfully with others. The pattern of meaning negotiation during electronic discussions involved a number of interactive features that resemble oral communication. Not only does the networked computer serve as a useful medium for enhancing students’ interactive competence, it also plays a positive role in increasing students’ attention to grammatical forms. Hence, networked computers can be utilized for both meaning-focused and form-focused instruction.

Although this study has provided some valuable observations, it also has a number of limitations. Thus, generalization to other populations should be made cautiously. Limitations of this study provide insights for further investigation in this area. Continued assessment and observation of electronic communication can provide more in-depth knowledge about network-based foreign language teaching and learning.
REFERENCES


ETS (Educational Testing Service) (1999), TOEFL Booklet


APPENDICES

APPENDIX A

FLYERS
Looking for Nonnative Speakers of English with Korean Nationality

$10 Reward for Research Participation

I am a graduate student at the Ohio State University, College of Education. I am looking for Non-native speakers of English who can voluntarily participate in my study. The study is to compare online talk with face-to-face talk. What you will be doing is to talk once online and once face-to-face with a native speaker of English that I will arrange for you to meet. You will not be asked to talk about any topics that are of a personal or sensitive nature. The procedure will take about one and a half hours or less.

In order to participate in this study, you have to be:

1. Non-native Speakers of English
2. An OSU student or recent graduate of OSU (no more than two quarters past after graduation)
3. Korean nationality
4. An Adult (older than 18)
5. English typing skill of at least 30 words a minute
6. Recent TOEFL (Test of English as a Foreign Language) score falls in between 520-559 (for computerized test, 190-219)
7. Your stay in the U.S. is less than two years.

If you meet all the criteria above and are interested and would like to know further about it, please call or email me. Your participation will contribute to the practice and development of foreign/second language learning. I will appreciate your time and help very much.

Phone: (614) 937-8048 (My name is ooyoung)
Email: oycbe@yahoo.com
Looking for Native Speakers of English

$ 10 Reward for Research Participation

I am a graduate student at the Ohio State University, College of Education. I am looking for 10 Native speakers of English who can voluntarily participate in my study. The study is to compare online talk with face-to-face talk. What you will be doing is to talk once online and once face-to-face with a nonnative speaker of English that I will arrange for you to meet. You will not be asked to talk about any topics that are of a personal or sensitive nature. The procedure will take about one and a half hours or less.

In order to participate in this study, you have to be:

(1) An OSU student or recent graduate of OSU (no more than two quarters past after graduation) who are willing to participate in my study.

(2) An adult (older than 18)

(3) Typing skill of at least 30 words a minute

If you meet all the criteria above and are interested and would like to know further about it, please call or email me. Your participation will contribute to the practice and development of foreign/second language learning. I will appreciate your time and help very much.

Phone: (614) 937-8048 (My name is ooyoung)
Email: oycye@yahoo.com
APPENDIX B

DEMOGRAPHIC INFORMATION QUESTIONNAIRE
Demographic Information Questionnaire

First, before you fill out the questionnaire, here is the written description of the research for your information:

My study is to examine the effects of networked computers in foreign language learning by comparing online talk with face-to-face talk. I will be comparing how online talk is different from face-to-face talk in terms of amount of talk, grammatical quality, and interactional features. Your participation will add knowledge to the area of second/foreign language learning.

In order to compare online talk with face-to-face talk, I will need ten pairs of people, so total of 20 people. Ten of them will be ESL (English as a Second Language) learners whose nationality is Korean. The other ten people will be native speakers of English. I will pair each ESL learner with a native speaker of English and then have each pair talk online for about 15 minutes and then have the pair talk face-to-face for 15 minutes. All talk will be in English. You will be talking about topics that I will provide to you, once online and once face-to-face talk. Before the talk, I will have a short interview, about 15 minutes, with each of the participants regarding his/her perception of online talk and face-to-face talk, that is, if he/she believes that there is a certain protocol or way to follow when talking online versus when talking face-to-face. And then the online and face-to-face talk will follow. After the talk, I will have a follow-up interview with each participant about his/her experience of online and face-to-face talk. For example, I will ask what he/she liked or disliked about online or face-to-face talk and in which mode he/she felt more comfortable. This follow-up interview will take about 20 minutes. So the total time to take for each person will be less than one and a half hours. The whole process is voluntary, so if you don’t feel like continuing, you can quit at any time, even in the middle of the experiment. I will appreciate your participation very much. Out of appreciation, I will give a gift of $10 to each participant. Even though you decide to quit in the middle of this research, you can still take $10.

According to your schedule, I will arrange the time to do the experiment. So each pair may participate in the study on different days. I will randomly assign your conversation partner and then check the schedule of each pair and arrange the day of participation. The online talk will be at computer labs on Campus. One person of each pair will be placed in the computer lab #1 and the other person in the computer lab #2. You will be talking online using “Yahoo Instant Messenger.” It’s very easy to use and I will give you some time to practice the program before the actual online talk. When talking online, you can use your nickname instead of your real name. Your discussion online will be saved on a floppy diskette when you are done with the discussion. The “Yahoo Instant Messenger” program will be removed from the computer when the discussion is done. I will keep the diskette for about 2 years and then when my research is done, I will erase the content of the diskette and also shred the printed out data.

The face-to-face talk will be conducted at a conference room in the Science Engineering Library for 15 minutes. You will be talking about a topic that I will give you at the time of the experiment. I will be outside of the conference room and I will come in when the talk is over. Your face-to-face talk will be recorded with an audiotape recorder and later I will transcribe the talk. I will keep the tape and the data, for about 2 years and then when my research is done, I will erase the contents of the tape and shred the transcribed data.

In writing up my dissertation, each participant’s name will never appear. I will use nicknames or figures such as Participant A or Participant B in order to protect confidentiality. So all the data from each of you is absolutely confidential.

Now, answer the questions on the next page.
Please answer the following questions. Also place a check (√) in the appropriate place.

1. Name: ____________________

2. Male _______/Female _______

3. Major academic area: _______________________________________

4. Undergraduate _____/Graduate ______

5. Age: _________

6. If you are Non-native speakers of English:
   (1) your TOEFL score taken within the past five years:

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<thead>
<tr>
<th>Pen &amp; Pencil Test</th>
<th>OR</th>
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   (2) How long have you been in the United States? _______years_____ months

7. What speed do you think is your English language typing skill (word processing)?
   a. Fast _________ (or more than 45 words per minute)
   b. Average _________ (or 30–45 words per minute)
   c. Slow _________ (or less than 30 words per minute)

8. Are you comfortable with typing and conversing using a computer?
   a. Yes ______
   b. No ______

9. How can I contact you?
   a. By phone: _____ (phone number: ________________)
   OR/AND
   b. By e-mail: _____ (e-mail address: ________________)
   c. Otherwise, please specify ________________

   Thank you very much for your time and help.
APPENDIX C

CONSENT FORM
CONSENT FOR PARTICIPATION IN SOCIAL AND BEHAVIORAL RESEARCH

Research Title: Effects of Networked Language Learning: A Comparison between Synchronous Online Discussion and Face-to-face Discussion.

Principal Investigator: Dr. Charles R. Hancock
College of Education, the Ohio State University

Co-Investigator: Ooyoung C. Pyun
College of Education, the Ohio State University

I consent to my participation in research being conducted by Ooyoung C. Pyun of The Ohio State University.

The investigator has explained the purpose of the study, the procedures that will be followed, and the amount of time it will take. I understand the possible benefits, if any, of my participation.

I know that I can choose not to participate without penalty to me. If I agree to participate, I can (and/or my child can) withdraw from the study at any time, and there will be no penalty.

- I consent to the use of audiotapes to record the content of face-to-face discussion. I understand how the tapes will be used for this study.
- I consent to the use of floppy diskette to save the content of online discussion. I understand how the saved document of online discussion will be used for this study.
- I was informed that my real-name will not appear in the analysis and writing of the research and the data will be discarded after 2 years.

I have had a chance to ask questions and to obtain answers to my questions. I can contact the investigators, Dr. Charles R. Hancock at (614) 292-8047 or Ooyoung C. Pyun at (614) 937-8048. If I have questions about my rights as a research participant, I can call the Office of Research Risks Protection at (614) 688-4792.

I have read this form or I have had it read to me. I sign it freely and voluntarily. A copy has been given to me.

Print the name of the participant: ____________________________________________

Date: ___________________________  Signed: ___________________________

Signed: ____________________________  Witness: ___________________________

( the Investigator )  (Participant)
APPENDIX D

CLASSIFICATION OF GRAMMATICAL ERRORS
Classification of Grammatical Errors

Grammatical errors in this study were divided into morphological errors, syntactic errors, and lexical errors. These three kinds of errors were classified as follows:\(^2\):

Morphological Errors

1. Incorrect use of indefinite article:
   Use of ‘a’ before vowels or use of ‘an’ before consonants.
2. Incorrect use of possessive case:
   e.g., the man house (for the man’s house)
3. Incorrect use of third-person singular verb
   e.g., He go to college
4. Incorrect use of simple past tense
   e.g., I holded the first door; They usually laugh and asked me follow their custom
5. Incorrect use of comparative adjective/adverb
   e.g., I like it more better

Syntactic Errors

1. Incorrect use of Noun Phrase
   (a) Determiners: The omission of the article (definite or indefinite)
      e.g. I came to U.S. six months ago; Do you have job?
      (b) Nominalization
      e.g., I enjoyed to talk with you.
      (c) Number (singulars/plurals) confusion
      e.g., I have a few episode
      (d) Use of pronouns
      e.g., I helped my Mom when he was busy.
      (e) Use of prepositions: the misuses, omission, confusion of prepositions
      e.g., I am trying to adjust myself on here in the United States; He goes ___ college;
      I was surprised in the news

2. Verb Phrase
   (a) Omission of verb.
      e.g., When I ___ sick
      (b) Use of progressive tense
      e.g., We were all sing together
      (c) Agreement of subject and verb: Disagreement of subject and verb in terms of
      number, person, or tense.
      e.g., That person were not there; I didn’t know what that is.
      (e) Omission of ‘to’ in the verb-and-verb construction.
      e.g., I wanted __ go too.

---

\(^2\) The errors were classified based on the Politzer and Ramirez’s (1973) error categorization.
(f) Use of Infinitive verb  
e.g., We could smiled with different custom like that way; I want to knowing different cultures

3. Word Order  
e.g., I went two times there

4. Sentence Transformations: errors connected with sentence constructions such as the passive, the negative and questions constructions.  
e.g., I got first called (for was called); I don’t do it no more; What he likes?

Lexical Errors

1. Inappropriate use of vocabulary for grammatical construction  
e.g., Did you get many information? (for much); They won’t help together (for each other)
2. Word confusion  
e.g., She came home (for went)
A. Analysis of T-unit
T-unit is defined as an independent clause and its accompanying modifiers. An example of the T-unit analysis of student utterances is as follows:
[“Yes, I have.”] [“I like it very much because I didn’t have to worry about clothes every morning.”]
The above utterances were coded as two separate T-unit, as indicated by [   ]

Example from the data
(T-units are marked in brackets and dependent clauses are shown in bold type)

S: NNSE, K: NSE <Pair 7 Face-to-Face discussion>
a T-unit is marked by [   ]

S: [Have you ever worn, worn high school like
K: Uniform?
S: A uniform in your high school?]
K: [No…I didn’t have to..] [But when I was in high school, I really wanted to, because if you have a school uniform, then you wear the same thing every single day]
S: Easy
K: [Yeah..so it’s really easy especially for girls cause you don’t have to think about what you are gonna wear every single day] and.
S: Right right. [I wore right wear…wore…
K: you wore..
S: I wear uniform when I was high school and middle school not elementary school]
[and.. for six years I wore] [and there’s… some properties about wearing high school…
ah.. wearing school uniforms]
K: uh-huh.. [why did you like wearing uniforms?]
S: like to..
K: [Or did you like or did you not like?]
S: Appearance? Uh..
K: The high school uniform..
S: [Yes, I like] [and …I both disagree and agree….]
K: Why?
S: What?
K:[Why did you agree?]

B. T-unit Containing dependent clauses
A dependent clause can be introduced either by subordinators such as since, because, when, where, after although, while, as if; even though, despite, so that, in order that, so as, in order, so (that), as (many) as and than, or by the complementizer, that. Examples of sentences containing dependent clauses are: (a) “Since each one has different
preference, we should leave it up to individual’s choice.” (b) “I think (that) keeping one’s customs is also important.”

Example from the data:
A T-unit containing dependent clause is indicated by < >

S: Have you ever worn worn, worn high school like
K: Uniform?
S: A uniform in your high school?
K: No…I didn’t have to.. <But when I was in high school, I really wanted to, because if you have a school uniform, then you wear the same thing every single day>
S: Easy
K: <Yeah..so it’s really easy especially for girls cause you don’t have to think about what you are gonna wear every single day> and.
S: Right right. <I wore right wear…wore…
K: you wore..
S: I wear uniform when I was high school and middle school not elementary school> and..
for six years I wore and there’s… some properties about wearing high school… ah..
wearing school uniforms
K: uh-huh.. why did you like wearing uniforms?
S: like to..
K: Or did you like or did you not like?
S: Appearance? Uh..
K: The high school uniform..
S: Yes, I like and …I both disagree and agree…
K: Why?
S: What?
K:Why did you agree?

C. Error Classification
Types of errors (Morphological/ Syntactic/Lexical)
S: Have you ever worn worn, worn high school like
K: Uniform?
S: A uniform in your high school?
K: No…I didn’t have to.. But when I was in high school, I really wanted to, because if you have a school uniform, then you wear the same thing every single day
S: Easy
K: Yeah..so it’s really easy especially for girls cause you don’t have to think about what you are gonna wear every single day and.
S: Right right. I wore right wear…wore…
K: you wore..
S: I wear uniform when I was ___ high school and middle school not elementary school and..
(I wear uniform → I wore a uniform, *syntactic error*) (*‘in’ missing, *syntactic error*)
for six years I wore and there’s… some properties about wearing high school… ah..
wearing school uniforms (properties→ benefit / advantage, *lexical error*)
K: uh-huh.. why did you like wearing uniforms?
S: like to..
K: Or did you like or did you not like?
S: Appearance? Uh..
K: The high school uniform..
S: Yes, I like and … I both disagree and agree….
K: Why?
S: What?
K: Why did you agree?

**D. Interactional features**
*(Initiatives, Questions/Answers, Statements, Requests, Feedback)*

**Example**

S: [Have you ever worn worn, worn high school like
K: Uniform?
S: A uniform in your high school?] *Initiative*
K: [No… I didn’t have to.] *Answer* [But when I was in high school, I really wanted to,
because if you have a school uniform, then you wear the same thing every single day]
*Statement*
S: Easy
K: [Yeah.. so it’s really easy especially for girls cause you don’t have to think about what
you are gonna wear every single day] *Statement* and.
S: Right right. [I wore right wear… wore…
K: you wore..
S: I wear uniform when I was high school and middle school not elementary school]
*Statement* and.. [for six years I wore] *Statement* [and there’s… some properties about
wearing high school… ah.. wearing school uniforms] *Statement*
K: uh-huh.. [why did you like wearing uniforms?] *Request*
S: like to..
K: [Or did you like or did you not like?] *Question*
S: Appearance? Uh..
K: The high school uniform..
S: [Yes, I like] *Answer* [and … I both disagree and agree….] *Statement*
K: Why?
S: What?
K: [Why did you agree?] *Request*
APPENDIX F

DATA FOR RESEARCH QUESTIONS 1 THROUGH 4
Data for Research Question 1: Linguistic Quantity

a. Ratio of NNSE’s turn-taking vs. NSE’s turn-taking (NNSE+NSE=1)

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<th>ELECTRONIC</th>
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</thead>
<tbody>
<tr>
<td>Pair 1 (NNSE: NSE)</td>
<td>0.49: 0.5</td>
<td>0.55: 0.45</td>
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<tr>
<td>Pair 2 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.55: 0.45</td>
</tr>
<tr>
<td>Pair 3 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.56: 0.44</td>
</tr>
<tr>
<td>Pair 4 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.5: 0.5</td>
</tr>
<tr>
<td>Pair 5 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.65: 0.35</td>
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<tr>
<td>Pair 6 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.61: 0.39</td>
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<td>Pair 7 (NNSE: NSE)</td>
<td>0.51: 0.49</td>
<td>0.72: 0.28</td>
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<tr>
<td>Pair 8 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.48: 0.52</td>
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<tr>
<td>Pair 9 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.5: 0.5</td>
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<tr>
<td>Pair 10 (NNSE: NSE)</td>
<td>0.5: 0.5</td>
<td>0.59: 0.41</td>
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b. Ratio of the Amount of words (NNSE vs. NSE) (NNSE+NSE=1)

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<td>0.23: 0.77</td>
<td>0.39: 0.61</td>
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<tr>
<td>Pair 3 (NNSE: NSE)</td>
<td>0.53: 0.47</td>
<td>0.36: 0.64</td>
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<tr>
<td>Pair 4 (NNSE: NSE)</td>
<td>0.51: 0.49</td>
<td>0.30: 0.70</td>
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<td>Pair 5 (NNSE: NSE)</td>
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<td>0.68: 0.32</td>
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<tr>
<td>Pair 6 (NNSE: NSE)</td>
<td>0.17: 0.83</td>
<td>0.28: 0.72</td>
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<tr>
<td>Pair 7 (NNSE: NSE)</td>
<td>0.65: 0.35</td>
<td>0.70: 0.30</td>
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<tr>
<td>Pair 8 (NNSE: NSE)</td>
<td>0.16: 0.84</td>
<td>0.57: 0.43</td>
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<tr>
<td>Pair 9 (NNSE: NSE)</td>
<td>0.16: 0.84</td>
<td>0.27: 0.73</td>
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<tr>
<td>Pair 10 (NNSE: NSE)</td>
<td>0.56: 0.44</td>
<td>0.65: 0.35</td>
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</table>

c. Average Number of Words per turn

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<td>12.29: 42.21</td>
<td>7.14: 8.26</td>
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<td>Pair 2 (NNSE: NSE)</td>
<td>18.67: 62.26</td>
<td>4.64: 8.91</td>
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<td>Pair 3 (NNSE: NSE)</td>
<td>10.35: 8.89</td>
<td>2.67: 6.03</td>
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<td>Pair 5 (NNSE: NSE)</td>
<td>16.23: 24.53</td>
<td>6.41: 5.58</td>
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<td>Pair 6 (NNSE: NSE)</td>
<td>5.87: 27.63</td>
<td>4.26: 17.00</td>
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<tr>
<td>Pair 7 (NNSE: NSE)</td>
<td>14.50: 8.05</td>
<td>4.14: 4.73</td>
</tr>
<tr>
<td>Pair 8 (NNSE: NSE)</td>
<td>5.33: 26.56</td>
<td>3.28: 5.92</td>
</tr>
<tr>
<td>Pair 9 (NNSE: NSE)</td>
<td>8.38: 45.40</td>
<td>4.02: 11.35</td>
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Data for Research Question 2: Syntactic Complexity

a. Number of T-unit

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<tr>
<td>Pair10</td>
<td>124</td>
<td>73</td>
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b. Average length of T-unit

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<td>10.11</td>
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<td>8.31</td>
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<tr>
<td>Pair10</td>
<td>10.58</td>
<td>8.70</td>
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</table>

c. Percentage of T-units containing dependent clauses

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<td>Pair10</td>
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Data for Research Question 3: Grammatical Accuracy in the NNSE’s utterances

a. Percentage of Error-free T-unit

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<td>50%</td>
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<td>NNSE 3</td>
<td>38.89%</td>
<td>50%</td>
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<td>NNSE 5</td>
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<td>NNSE 10</td>
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b. Among the errors, the percentage of Morphological errors

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<td>9.09%</td>
<td>9.09%</td>
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<td>NNSE 10</td>
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c. Among the errors, the percentage of Syntactic errors

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<td>83.64%</td>
<td>90.91%</td>
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<td>80.48%</td>
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<td>NNSE 10</td>
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<td>90.91%</td>
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d. Among the errors, the percentage of Lexical errors

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Data for Research Question 4: Interactional features

a. Percentage of T-units containing Initiatives

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b. Percentage of T-units containing Questions/Answers

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c. Percentage of T-units containing Statements

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d. Percentage of T-units containing Requests

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### e. Percentage of T-units containing Feedback

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