Assessing the impact of asynchronous computer-mediated communication environments on second language learning activities

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Assessing the impact of asynchronous computer-mediated communication environments on second language learning activities

by

Julio César Rodriguez

A thesis submitted to the graduate faculty in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Major: English (Teaching English as a Second Language / Applied Linguistics)

Major Professor: Carol A. Chapelle

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Ames, Iowa
1998

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This is to certify that the Master's thesis of

Julio César Rodriguez

has met the thesis requirements of Iowa State University

Signatures have been redacted for privacy
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ABSTRACT

This study describes and evaluates two asynchronous computer-mediated communication environments (e-mail and e-forum) in terms of their usefulness for the achievement of second language learning goals. The language produced in both environments was analyzed from a quantitative and qualitative perspective. The quantitative study measured participation and the quality of the language produced in the two electronic environments.

The results from the analysis of participation indicated that the learners participated equally on the tasks and that women contributed proportionally more than men. However, the asynchronous environments presented important differences which affected the patterns of interactivity in the tasks.

Learners’ language was analyzed from quantitative and qualitative perspectives. The quantitative approach included measures of lexical and syntactic complexity and of the degree of discursive management that the learners exhibited in the two environments. The results of these analyses suggested that the use language produced in the electronic forum environment was more complex overall compared with e-mail, but the language quality in the e-mail responses was higher in all measures. The qualitative analysis highlighted salient features of the language produced in asynchronous CMC, such as the recurrent use of conditional sentences and the occurrence of rhetorical patterns in less proficient learners’ texts which seem to emulate their more proficient peers’.

This study concludes that the two asynchronous environments presented important differences which can impact the achievement of instructional goals in second language learning and that the use of measures such as lexical density ratio and coordination index may be of limited use for assessing interlanguage.
CHAPTER 1
INTRODUCTION

The purpose of this study is to assess the use of two asynchronous computer-mediated communication (CMC) environments from the perspective of their adequacy to achieve language learning goals. The present research is based on the hypothesis that even though asynchronous CMC environments may share characteristics in common (e.g., the asynchronous nature of the transmission in e-mail and electronic discussion fora), the features of the software and the context of activities may present differences that could directly impact instructional goals. This chapter provides overall information about the activities analyzed in this thesis, a rationale for the use of asynchronous CMC in such activities, an introduction to the problem which this research addresses, and a general description of the organization of this thesis.

In the Fall semester of 1997 I taught a course in academic writing to ESL learners (English 101C) at Iowa State University. The goals for this course were set within the framework of the overall goals for the program, which include training learners to successfully comply with the writing requirements of mainstream unsheltered classes, among which are the required writing classes of the first-year composition program.

The instructional goals for this particular class encompassed the development of the learners’ interlanguage to a higher degree of lexical and syntactic complexity and the further development of the learners’ academic writing skills through the production of argumentative texts in the target language (i.e., the improvement of the learners’ use of rhetorical language functions associated with academic discourse such as persuasion, argumentation, description and expression of agreement and disagreement). In order to achieve these goals, it was necessary to create activities which prompted the use of the rhetorical functions mentioned above and which allowed all learners to equally participate. At the same time, it was also necessary to create a responsive and inquisitive audience that would help the learners to identify the strengths and weaknesses in their arguments.

Previous studies in the field suggested that CMC offers the possibility to shape a learning environment which could cooperate to reach these goals. Findings reported in the
literature have stressed the improvement in class participation through the use of CMC as well as the occurrence of a wide variety of language functions. In view of these encouraging results, CMC was incorporated into this class as part of the course requirements. Every week, for a period of eight weeks, students were requested to submit an electronic contribution based on topics assigned by the instructor or chosen by themselves, and to respond to at least one of those postings. The first four contributions and responses were sent to a class mailing list which was set up for this purpose. The other four were posted using the forum utility in ClassNet, a web-based class management environment developed at Iowa State University.

The use of asynchronous CMC was the most practical alternative to improve the chances of achieving the instructional goals planned for these activities. The availability of computer facilities and software at Iowa State University made it possible to incorporate asynchronous CMC into the design of the activities and envision a language learning environment which would allow (a) the publication of the learners' work for a real audience, who would react to it with different opinions which could become a source for a wealth of ideas to write their own papers for the class, (b) more equal participation than in regular class meetings; (c) the learners' exposure to different ideas, which they could use to write the papers required for this class, seemed ideal for this purpose. Other ways to provide a similar environment would have signified an enormous expenditure of resources and a higher degree of control by the instructor in order to coordinate the two weekly tasks and make sure that all participants would get their two weekly sets of 18 photocopied texts, which would have amounted to about 5,000 copies by the end of the semester.

From an interlanguage perspective, the variety of levels of proficiency made CMC even more appealing. Even though the learners had taken a test which was used for placement in this English class, the levels of language proficiency varied considerably. Different degrees of fluency seemed to be a problem during class discussions. Less proficient learners tended not to participate or limit their participation to expressing agreement with the statements uttered by more proficient peers. Through the use of CMC,
it was expected that less proficient learners would become involved in discussions more actively and also exposed to the input provided by more proficient ones, which they would have time to read and respond to at their leisure.

Asynchronous CMC appears to facilitate the creation of environments which are characterized by a variety of features that, if combined, could probably result in conditions which are considered important for language acquisition processes to take place. Some of the conditions reported in the literature include (a) opportunities for meaningful interaction and negotiation of meaning with an authentic audience (Pica, 1987; Pica, 1996); (b) “exposure to and production of varied and creative language” (Egbert & Jessup, 1996, p.3); and (c) “opportunities to formulate ideas and thoughts” and the promotion of intentional cognition (p.3).

From the instructor’s perspective, the implementation of a CMC environment additionally offered the potential to (a) expose learners to varied levels of language proficiency which would make the input available in various degrees of complexity; (b) expose the learners to a variety of registers (even though there is no consensus regarding the type of register used in CMC, findings in the literature suggest that the registers produced in these two modes may vary considerably [i.e., synchronous CMC appears to be closer to spoken language and asynchronous CMC seems to share features of written language]); (c) design activities which would focus on content (i.e., the exchange of ideas and information which would probably result in more opportunities for argumentation and thus a probable increase in the learners’ ability to manage discourse [Swaffar, 1998]); (d) provide a real audience, which would probably lead the learners to pay attention to form and develop their sense of audience awareness in their writing; and (e) foster learner-centered tasks which do not take up class time and yet provide opportunities for the learners to establish meaningful communication with their peers and, in the process, become better acquainted with their cultural background.

Previous studies in the field suggest that CMC could be useful to create the type of learning environment needed for the accomplishment of the goals foreseen for the activities described in this study. However, CMC environments can take up varied forms
which may impact the language output and thus, language learning activities in different ways. For example, CMC can be realized in synchronous and asynchronous mode. Apart from the software differences that impact the use of these two modes, they differ greatly in the way communication is established. During synchronous CMC all participants are online at the same time and messages are displayed on their computer screen only a few seconds after they have been submitted. Consequently, exchanges in synchronous mode oftentimes appear to resemble oral language in the brevity of the turns and the fast pace of the communication. On the other hand, participants do not need to be online at the same time in asynchronous mode; submitted messages are stored in the system and can be retrieved when the user signs on. This characteristic of the environment allows the participants to spend comparatively more time to read and compose messages than in synchronous mode, which results in exchanges that sometimes feature discourse which appears to be closer to written communication.

The increasing use of asynchronous CMC in second and foreign language instruction has motivated a number of studies in this area. Many of them, however, seem to be based on the same premises as L1 studies. That is, they often assess the impact of the asynchronous environments on aspects related to participation and on the discourse which the environments seem to foster, but they do not clearly state specific second or foreign language learning goals, or whether the application of CMC played an important role in accomplishing them. Furthermore, these studies seem to uphold the implicit assumption that asynchronous CMC can be defined as a category independently from the varied features that asynchronous CMC environments may present due to different software configurations. Consequently, based on the assumption that the features of asynchronous CMC software and the contexts of activities present differences that may directly impact expected instructional outcomes, this study has been designed to analyze asynchronous CMC exclusively from the perspective of its usefulness in terms of the achievement of specific goals in second language instruction.

The research reported here is organized as follows: Chapter 2 presents the findings reported in the literature concerning the use of CMC in second and foreign language
instructional contexts and a brief overview of the studies carried out by interactionist researchers in the field of second language acquisition. The final part of this chapter further discusses the problem explained above and introduces the research questions addressed by this thesis. Chapter 3 presents a detailed description of the contextual variables of the activities investigated in this research and of the methods used for the collection and analysis of the data. Based on the methodologies and context described in this chapter, Chapter 4 addresses the research questions by investigating the degree to which the apparent advantages of the two CMC activities actually delivered during instruction. The two asynchronous CMC environments are studied by describing and comparing the salient features of the software and by assessing the extent to which characteristics of the learners' language and participation indicated that instructional goals were met. Participation is analyzed using quantitative measures and the learners' language is assessed from both a quantitative and qualitative perspective. The results of these analyses are discussed in terms of the achievement of the instructional goals and the extent to which the two environments cooperated during the task processes. Finally, Chapter 5 summarizes the findings revealed by this study and presents observations related to the methodologies applied as well as implications and suggestions for further research.
CHAPTER 2
REVIEW OF THE LITERATURE

This chapter provides a summary of the findings reported in the literature concerning the use of Computer-Mediated Communication (CMC) in second and foreign language learning contexts. The last section of this chapter introduces the research questions investigated in this study.

The use of CMC for group discussions extended into the field of foreign and second language teaching and learning in the late 1980's (Warschauer, 1996). CMC has become widespread in this field ever since, probably mainly due to the fact that it offers the potential to create conditions which may result in an optimal language learning environment. Some of the positive features that CMC is claimed to provide in the literature are: (a) the possibility to foster greater learner autonomy and empowerment (Belisle, 1996; Warschauer et al., 1996); (b) the flexibility to design and implement language learning activities which “facilitate cross-cultural exchange such as penpal writing, long-distance interviews, shared research projects, joint student publications and multi-class simulations” (Warschauer et al., 1996, p.2); and (c) the possibility to create a highly interactive environment which may result in a high rate of learner participation (Chun, 1994; González-Bueno, 1998; Ho & Crookall, 1996; Kelm, 1992; Kern, 1995; Krause, 1995; Warschauer, 1996; Warschauer et al., 1996).

At a time when constructivist philosophies, which emphasize the importance of the social in the learning process (Chapelle, forthcoming; Coll Salvador, 1993; Vygotsky, 1978), are becoming more popular in language teaching, the possibilities offered by CMC to redefine language learning environments make it appealing. Constructivism theorizes that individuals learn by constructing their own knowledge through experience. From this perspective, the role of the participants as well as their interaction in the learning process is defined differently than it is in a traditional teacher centered class (Coll Salvador, 1993). In Barsons' words (1997), the instructor “assumes the role of a coach or facilitator” (p. 36) and helps to create favorable conditions (i.e., environments) for the learners to develop their ability to construct their knowledge through meaningful experiences. In
second and foreign language teaching, methodologies such as communicative approaches advocate these ideas (Debski, 1997; Barson, 1997).

CMC environments for discussion may take up two distinct forms depending on the characteristics of the communication as defined by time and speed. Recent studies have investigated the application of both subtypes of CMC in foreign and second language learning contexts. The first subtype, commonly referred to in the literature as synchronous CMC, allows the participants to communicate in real-time interactions by sending and receiving messages with a slight delay (i.e., only a few seconds).

In a preliminary report on the use of synchronous CMC in the teaching of Portuguese, Kelm (1992) observed that the role of the participants in the tasks were dramatically affected by the environment, which seemed to account for what he terms a ‘leveling effect’ (p. 442). The instructor became one more participant in the discussion, allowing for more learner interaction which in turn resulted in increased participation. Kelm noted that the patterns of interaction seemed to be reshaped; different degrees of proficiency did not seem to affect the discussion (i.e., more proficient learners could not dominate the discussion and less proficient learners took advantage of the environment to express themselves). This study also points to some of the general characteristics of the learners’ exchanges (e.g., more candidness and expression of personal feelings than in oral interaction, open-ended nature of the discussions, etc.).

In her 1994 study, Chun reported similar observations related to participation and affect but took a closer look at the type of discourse which English-speaking learners of German produced in synchronous CMC by identifying the type of interactional speech acts generated in the online discussions. Chun concludes that the use of synchronous CMC for class discussion allowed learners to use a variety of language functions in different contexts and thus “to play a greater role in managing the discourse” (p. 17). She argues that this type of environment helps the learners to develop their interactive competence through writing; a type of competence which, she contends, could “gradually be transferred to the students’ speaking competence as well” (p. 29).

The apparent similarities between spoken and synchronous CMC discourse prompted
researchers to investigate their differences. Kern (1995) compared oral classroom discussions with synchronous CMC discussions in the teaching of French as a foreign language to American English speakers and concluded that the electronic environment restructured the learners' interaction in a positive way by providing more opportunities for participation and reducing communication anxiety. He reported that the quantity of the language output in synchronous CMC, measured in number of turns and T-units, was higher in the electronic environment than in face-to-face discussions. Similarly, he noted that instructor interventions in synchronous CMC were fewer and tended to focus on content rather than form (i.e., the opposite of what was typical in oral class discussions). Kern also investigated some of the features of the type of discourse produced in both modes (i.e., electronic and face-to-face) focusing on language functions and morphosyntactic features. He noted that synchronous CMC prompted learners to use a wider variety of language functions, verb forms and clause types.

In a similar study published in 1996, Warschauer compared face-to-face with synchronous CMC discussions addressing aspects related to participation, syntactic and lexical complexity, and salient language features in those two modes. The subjects were ESL students from four nationalities who had enrolled in an advanced composition course at an American community college. Consistent with previous research (e.g., Chun, 1994; Kelm, 1992; Kern, 1995), Warschauer reported an increase in the learners' participation in the electronic mode as well as in the syntactic and lexical complexity of the language output (measured by coordination index and type-token ratio respectively). The salient language features reported in the two modes were related to quantity of language (longer turns in synchronous CMC) and register (more formal language in electronic mode).

The second subtype of CMC is generally referred to in the literature as asynchronous CMC. Like synchronous computer-mediated communication, asynchronous CMC has gradually gained popularity in the field of foreign and second language teaching. Asynchronous CMC environments can be described as those in which the participants do not necessarily have to be logged on to the network (as is the case in synchronous CMC) and thus do not expect an immediate response from their audience. The time delay factor
increases to at least 2 to 3 minutes from the time a message is sent to the time it is received (Warschauer, 1995). Once sent, messages are stored in the environment and can be retrieved by the recipient(s) when they log on to the system.

In a study published in 1996, researchers in the field observed that “so far the most popular forms of CMC for language teachers have been e-mail and asynchronous conferencing” (Warschauer et al., 1996, p.2) (i.e., e-mail discussion lists and bulletin boards). Textbooks and online resources intended for second and foreign language instructors have attempted to address the demand for assistance with the technical aspects of the environment (e.g., Warschauer, 1995) as well as methodological concerns such as the types of activities that can be implemented (e.g., Bauman, 1998; Belisle, 1996; Daly, 1996a; Kroonenberg, 1994/1995; Lally, 1997; Randell, 1998; Robb, 1996; Warschauer, 1995; Warschauer, 1997).

The increasing use of asynchronous CMC environments, mostly in the form of e-mail, prompted researches to analyze and describe the advantages that their application could offer for foreign and second language instruction. Studies in this area include discussions about the language learners produce from a genre perspective (Daly, 1996b), the ways in which CMC environments can empower learners and help to build a more equitative power structure in the classroom (Warschauer et al., 1996) or argue that the use of e-mail in second and foreign language instruction not only increases the learners’ chances for success in the future workplace, but also improves their writing (Bauman, 1998; Lally, 1997). These latter studies offer thoughtful justifications for the use of this technology providing anecdotal evidence to support their claims. Similarly, other studies additionally point out the practicalities of using this technology (e.g., the creation of a “paperless” classroom and the possibility of providing meaningful feedback [Robb, 1997; Belisle, 1996; Lally, 1997]).

Asynchronous CMC has also been described as an effective tool to develop the learners' communicative and thinking skills (Kroonenberg, 1994/1995). In her report, Kroonenberg relates her experience using synchronous and asynchronous CMC in a multinational setting in Hong Kong with 9-12 grade EFL learners and with teenage
Chinese EFL learners. She describes a progression of activities which she used to introduce learners to the environment and later on to generate discussion and concludes that these activities fostered the learners' participation, communicative and critical thinking skills. Learners who seemed to be too shy to participate in class discussion had an opportunity to express their opinion and became very expressive in the CMC environments (Kroonenberg, 1994/95).

Other reports have provided similar anecdotal accounts of the way CMC environments (including synchronous CMC [Kelm, 1992]) seem to promote candidness among the participants (Lally, 1997) and engage learners in tasks which the authors label authentic (Randell, 1998). In a recent study, González-Bueno (1998) reported some of the salient features she observed in asynchronous CMC interactions. The participants, 50 learners of Spanish as a foreign language, volunteered to take part in a project that involved writing a dialog journal in the TL to the class instructors during two semesters. The instructors responded individually to each of the students’ entries. González-Bueno concludes that the language produced in those entries was characterized by the following features: (a) greater quantity of language than in traditional paper-and-pencil assignments (these latter assignments are not described in the study); (b) more variety of language functions (e.g., learners frequently asked questions and used discourse management markers such as reformulation of information from a previous message); (c) more student-initiated interactions; and (d) more personal and expressive language use.

Not many studies in second and foreign language instruction address possible connections between the application of asynchronous CMC and the teaching and learning of writing skills. Murray (1988) carried out a longitudinal ethnographic study which describes the main features of computer-mediated interactions. The data for this research includes e-mail messages collected at an IBM research facility during a ten-month period, interviews and formal discussions with participants (native speakers of English), as well as e-mail messages written by college students attending a critical thinking class. The study focuses on the description of the conversational structure of the interactions, which are characterized by opening and closing elements and turn-taking features. Murray identifies
salient properties of electronic discourse such as the use of paralinguistic devices (e.g., icons, punctuation, and capitalization) and the occurrence of certain language features (e.g., syntactic simplification, abbreviations and self-correction). She contends that CMC interactants focus on meaning rather than on form and acquire the conventions of the medium through modeling rather than instruction or explanation. Murray concludes that due to the variation of modes in CMC (e.g., synchronous and asynchronous), which are comparable to the variations between a formal and an informal letter, it would be difficult to teach foreign and second language learners the specific skills needed for a particular mode. She advises that instructors should emphasize the development of learner strategies that would allow them to model their interactions in any given setting.

Also related to the use of asynchronous CMC and the development of writing skills, a case study conducted in Canada (Sanaoui & Lapkin, 1992) described asynchronous computer interactions between 12 grade Anglophone learners of French in Toronto and native French speakers in Montreal. The goals for these interactions included the development of French writing skills by exposing the learners to opportunities to experience and use the target language (French) in a wide range of communicative situations. The authors concluded that the exchange improved the learners’ computer and writing skills. With regard to the latter, learners developed a better sense of audience by having a real audience to address their writing and expanded their L2 sociocultural knowledge. The authors also report that these activities provided the learners ample opportunities to write extensively and purposefully.

Similar to this experience, a popular development in foreign language instruction has been tandem learning. Based on asynchronous CMC, tandem learning provides foreign language students with an opportunity to participate in exchanges with native speakers. Students subscribe to an e-mail list where other learners post messages requesting penpals. In this way, learners can pair up with native speakers of their L2 who also seek to practice their L1 (Robb, 1996). Tandem learning has originated a number of reports which anecdotally relate learners’ experiences and achievements. The instructional value of tandem learning activities does not appear to have been yet assessed from the point of
view of the accomplishment of instructional goals or the presence of language features that may lead to interlanguage development.

Similarly, a recent analysis of the way in which asynchronous CMC environments can probably help to develop writing skills identifies three enhancements that CMC can provide for writing classes, namely audience expansion, prompt feedback and a wider choice of lesson content (Newfields, 1997).

Although all these reports have contributed valuable information to the field, many of the asynchronous CMC studies above appear to have been triggered by the same issues which researchers have investigated in synchronous CMC (Chun, 1994; Kelm, 1992; Kern, 1995; Warschauer, 1996). They offer anecdotal evidence about the ways e-mail can improve classroom participation and facilitate dynamic interactions with real audiences (Singhal, 1997); they address differences between electronic and conversational discourse (e.g., Kern, 1995; Murray, 1988; Black, et al., 1983; Warschawer, 1997), paper-and-pencil and asynchronous CMC (e.g., González-Bueno, 1998), and synchronous and asynchronous CMC (e.g., Black et al., 1983). They have highlighted features in the mode of language (e.g., electronic vs. face-to-face discourse) and have analyzed the effect of temporal constraints on discourse (e.g., synchronous vs. asynchronous electronic environments). In sum, they have provided important data, including descriptions, accounts and insights into the application of CMC in language learning.

However, researchers have rightfully questioned their claims, which are often based on impressionistic and anecdotal accounts, and have highlighted the need for research which properly analyzes the variables that may impact instructional tasks and be responsible for the shaping of environments which create ideal conditions for achieving instructional goals (Chapelle, 1997; Ortega, 1997). The quality of the interactions in which learners engage when participating in CMC-based tasks as well as the quality of their language output in terms of the presence of features that may foster acquisition still appear to remain unaccounted for (Ortega, 1997). Questions such as “What aspects of second language competence are CALL activities intended to develop and how can effective measures be devised to assess developed competences?” (Chapelle, 1989; cited in Dunkel,
1991, p. 8) still need to be explored and properly addressed.

Reports in the literature have identified possible ways to answer these questions and have presented ideas for research and methods that could be used (Chapelle, 1990; Chapelle, 1997; Dunkel, 1991; Egbert & Jessup, 1996; Salaberry, 1997). The most common criticisms to CALL research in these studies have been its lack of systematicity and accuracy to account for variables (Chapelle, 1990), its technocentrism in effectiveness research (e.g., research which focuses on the comparison between traditional and technology enhanced environments or communication) (Dunkel, 1991) and the absence of support from SLA theory and research, which should be incorporated in the assessment of effectiveness of CALL in language learning environments (Chapelle, 1997; Chapelle, 1996; Dunkel, 1991; Ortega, 1997; Salaberry, 1997).

Studies in the literature of second language acquisition have indeed provided methods and outcomes which could be used to support and move CALL research out of its technocentric approach. Chapelle (1997), for instance, has advocated the support of interactionist and systemic linguistics theories as a background for CALL studies. Interactionist research has focused on the identification of language features and processes which have been hypothesized to foster second language acquisition (Doughty & Pica, 1986; Pica, 1994; Pica, Kanagy, & Falodun, 1993; Pica, 1996). This line of research has focused on the investigation of interactional features present in the learners' language use and has argued that negotiation of meaning is conducive to second language acquisition (Ellis, 1994). Despite the evidence that seems to support this claim, there is no CALL research up to the present which investigates whether this type of interaction can be achieved through CMC activities.

Asynchronous CMC studies in second and foreign language learning seem to incorporate the same perspectives used in synchronous CMC (discussed above) and articulate the same claims that have been made in L1 research. Although L1 research can be a valuable source of reference, replications of these studies do not directly address second and foreign language learning concerns as they would if they were informed by SLA theory.
Asynchronous CMC studies in both L1 and foreign and second language research, regardless of the instructional goals that motivate the application of technology, seem to uphold the implicit assumption that all asynchronous CMC environments have the same impact on instructional tasks and the language output (cf. Murray, 1988), an assumption that needs to be revised in light of the different features that asynchronous environments may contain and the many different variables that interact during the execution of any given language task (Chapelle, 1997; Chapelle & Green, 1992; Egbert & Jessup, 1996; Ortega, 1997; Pica, 1987).

Even though asynchronous CMC environments may look similar and appear to perform a “neutral” function in an instructional context (i.e., that of facilitating communication through the medium), they may display features that could impact instructional goals. Likewise, the instructor’s activity plan for language teaching may vary considerably from its realization (i.e., the task processes the learners are engaged in). These differences as well as the language learners produce in asynchronous CMC need to be better described and assessed in order to optimize the application of asynchronous CMC in second and foreign language composition classes.

The present research is intended to address this issue by describing a series of asynchronous CMC activities which were carried out in two different asynchronous environments focusing on the differences between the two environments and their impact on the learners’ language output. It should be noted that none of these activities was originally set up for research.

The first series of activities was developed using a class mailing list set up by the instructor to which 18 ESL learners posted messages and responses for a period of four weeks. The second series of activities, carried out during the following four weeks, was implemented using the forum facility of ClassNet, a classroom management environment developed at Iowa State University (Van Gorp, 1997). The postings sent by the learners to both environments and the activity plans prepared by the instructor make up the data which will be analyzed in this study.
Research Questions

The following are the research questions which this thesis addresses:

Main Research Questions

1) What are the differences between the two asynchronous CMC environments?
2) Which of the two CMC environments was more suitable to achieve the instructional goals in terms of the learners’ participation and the quality of the language output?

Supporting Research Questions

The following supporting research questions, which address issues related to the learners’ participation and the quality of language output, are used to answer the second main question.

Participation

Linguistic Level. Two research questions are intended to address the linguistic aspects of the activities, namely (a) Did both electronic environments have the same impact on the activities in terms of the learners’ participation and the quantity of language produced?; and (b) Did both environments equally promote interactivity?

Extralinguistic Level. In view of the findings in previous research which seem to indicate that CMC use for class discussions enhances participation and acts as an equalizer against social context cues, the following question will be addressed in order to verify this hypothesis: (c) Did both CMC environments equally reduce social context cues related to gender?

Interlanguage Development

A problem has been the little evidence so far gathered to account for the quality of the language produced in CMC within second and foreign language instruction. In order to start bridging this apparent gap in asynchronous CMC research in the field, the following question will be addressed: (d) Was the quality of the language produced in the two environments similar in terms of lexical and syntactic complexity, strategic control of
discourse, and the use of language features which are hypothesized to enhance second language acquisition?
CHAPTER 3
METHODS

The research questions that motivate this study are intended to explore the differences between the two asynchronous environments and, specifically, to assess whether either was more suitable to achieve the instructional goals set for the tasks. The first part of this chapter presents the methods to collect the data as well as a contextual framework necessary to understand the variables which were present in all the activities. This description is based on a model developed by Chapelle (forthcoming).

The second part of this chapter describes the methods used to analyze the data and answer the research questions proposed for this study. The comparison between the two asynchronous environments proposed in the first research question is described on the basis of observations made by the researcher during his monitoring of the tasks. The second research question will be answered with the results obtained from supporting questions. Supporting questions related to the learners’ participation in both environments are addressed using quantitative measures. Supporting questions addressing the characteristics of the learners’ interlanguage are answered using quantitative measures and qualitative observations. Quantitative measures are used to analyze the learners’ language output in terms of its lexical and syntactic complexity and the degree of discursive control exhibited in the tasks. The qualitative analysis further investigates language features that occurred in the environments, especially those which may be relevant for second language acquisition processes to take place.

Data Collection and Coding

In the Fall semester of 1997 I taught a course in academic writing to ESL learners at Iowa State University (English 101C). The instructional goals for this particular class encompassed the development of the learners’ interlanguage to a higher degree of lexical and syntactical complexity and the further development of the learners’ ability to manage discourse. In order to achieve these goals, it was necessary to create activities which prompted the use of complex language (e.g., varied rhetorical functions and patterns) and
which allowed all learners to participate equally.

Learners had been assigned to this class (English 101C) after taking the test administered by the English Department for nonnative speakers of English. Iowa State University regulations require that all international students take this test except those coming from Australia, New Zealand, the British Isles and the English-speaking Canadian Provinces. Puerto Rican students are exempt even though their native language is not English, but they are strongly encouraged to take this exam and attend the recommended ESL classes if needed. The placement test includes a written composition which is intended to assess the learners' academic writing ability. Depending on their proficiency, learners are either mainstreamed with native speakers of English into the first-year composition program or assigned to one of the classes offered in the sheltered academic writing program (English 101B, C or D). Apart from these placement procedures, learners are asked to write a short essay during the first class which is used as a diagnostic to consider changes in the syllabus and better tailor instruction to the learners' needs. In this particular class, as a result of this second assessment one learner was placed in the unsheltered first-year composition program.

Since asynchronous CMC (computer-mediated communication) seemed to offer the possibility to shape a learning environment which could help to reach these goals, a series of CMC activities was implemented as part of the requirements for the course. Every week, for a period of eight weeks, learners were requested to submit an electronic contribution based on topics assigned by the instructor or chosen by themselves, and to respond to at least one of those postings. The first four contributions and responses (at the beginning of the semester) were sent to a class mailing list which was set up for this purpose by the instructor. The other four were posted using the forum utility in ClassNet, a web-based class management environment available at Iowa State University.

The data gathered for this study include the instructors' notes detailing the activity plans and the features of the environments, and the texts produced by the learners in the two asynchronous CMC environments (CALL text). All the postings (i.e., contributions and responses) were saved in diskettes and formatted in different ways to facilitate the
analyses. A code was given to each contribution in order to identify participants (first two letters of the code), their gender (third letter), the type of environment in which the text appeared (fourth letter), the type of activity (fifth letter) and its chronological sequence (number). Sometimes learners submitted more than one contribution or response. When that is the case, a lower case letter is added at the end of the code indicating the chronological sequencing of the texts (e.g., b, c, d, e, etc.) In order to simplify this code, first submissions do not add an “a” in this position (see Table 1).

Table 1. CALL Text Coding

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Environment</th>
<th>Activity Type</th>
<th>Sequence</th>
<th>Message</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR</td>
<td>F</td>
<td>E</td>
<td>C</td>
<td>2</td>
<td>a</td>
<td>GRFEC2</td>
</tr>
<tr>
<td>WI</td>
<td>M</td>
<td>F</td>
<td>R</td>
<td>6</td>
<td>b</td>
<td>WIMFR6b</td>
</tr>
</tbody>
</table>

Environments
E = E-mail
F = ClassNet Forum
Activity Types
C = Contribution
R = Response

Context Framework

This description, which is based on the notes the instructor wrote before the activities were carried out (i.e., the instructor’s plan and expectations regarding the task processes), is intended to provide the reader with the necessary background information to understand this study. The primary goal of this analysis is to contextualize a set of asynchronous CMC activities from the perspective of their application in second language instruction and their usefulness to create environments that are considered optimal for interlanguage development processes (Chapelle, forthcoming; Egbert & Jessup, 1996; Ellis, 1994; Larsen-Freeman & Long, 1991; Pica et al., 1993). Based on a comprehensive theoretical framework based on principles of systemic linguistics (Chapelle, forthcoming), this description includes an array of descriptors, many of which could probably impact the task processes in unexpected ways. Chapelle (forthcoming) contends that activities carried out in computer assisted language learning (CALL) environments need to be distinguished
according to their important features (i.e., contextual features that can significantly affect language performance and that may contribute to create environments conducive to interlanguage development). The analyses presented in this study are intended to identify those features and assess the impact which the two asynchronous CMC environments may have had on the task process.

The framework identifies three main contextual categories: frame, participants and mode. Each of these categories includes a set of descriptors which clearly define the settings and outcomes expected (activity plan). The variables included in the frame are intended to describe the kind of situation the learners are experiencing (e.g., type of activity, topics, location and duration) and the reasons why the activity is carried out (e.g., activity goals). The description of the participants includes the learners’ and instructor’s background and their roles. Finally, the mode accounts for the role that language will play during the development of the activities, the medium in which it will be realized (e.g., oral or written), and the time constraints under which language will be produced.

As mentioned earlier in this study, each of the contributions and responses sent to the asynchronous CMC environments could be considered an activity in and of itself. However, for the sake of brevity, the descriptors that are supposed to remain fairly constant along the process are described in the section below. Descriptors which vary from one activity to the other are accounted for under Specifics.

Frame

Goals

Following Chapelle’s idea about defining and specifying activity goals, I describe the goals from process and outcome perspectives. One common process goal for the three asynchronous CMC activities was to provide the learners with opportunities to use language in pragmatic and communicative ways to present their views on different topics to an audience broader than just the instructor, as well as to react to their peers’ writing with arguments that support or reject those views. In the process, learners are supposed to develop their ability to manage their discursive strategies. It is also intended that the
learners would participate equally (i.e., without replicating the pattern the instructor had observed in class, where females tended to remain silent during class and group discussions) and by doing so, it was also anticipated that they would become exposed to a wider variety of ideas that they could later use in their papers.

The goals for these activities also encompassed the learners’ further development of their interlanguage to a higher degree of lexical and syntactic complexity. By becoming involved in situations where they would need to use a high degree of discursive management to explain their views and react to their peers’, it was also expected that learners would engage in language use which may be beneficial for acquisition, and that they would gain more confidence in their writing by being exposed to a real audience on a regular basis. An additional process-oriented goal common to all activities was then to increase the learners’ sense of audience in their writing, a type of knowledge that may transfer to their overall language competence (Chun, 1994).

Product-oriented goals refer to the specific features of the learners’ language ability that the instructor seeks to improve through a particular activity, e.g., through the use of asynchronous CMC (Chapelle, forthcoming). In the case of this activity, the product oriented goals were to further develop the learners’ interlanguage by providing opportunities to apply sophisticated language features in their writing and to create an environment to establish more frequent communication among the participants in order for them to get better acquainted with each other and thus better relate as a group. The construct of language ability used as background, which further specifies these features is based on Bachman & Palmer’s (1996) theory of communicative language ability (see description of language use, topical knowledge and strategic competence in Appendix A).

**Type of activity**

This activity is planned as a series of whole-class asynchronous CMC exchanges.

**Topics**

Many of the topics which the learners were supposed to write about were included in the class syllabus. Most of these had been taken from the suggested journal entries
included in the class textbook and in the instructor’s manual which accompanies the text. Some of the criteria proposed by Hafnerik (1995) to promote cultural sensitivity among students were included in the selection, e.g., topics intended to get learners’ acquainted with other peers’ cultural backgrounds and insights about different issues and topics which raise the learners’ awareness about the similarities and differences between American culture and their own (see Appendix B).

**Location**

Since this was an out-of-class activity, the location in which learners will write their texts and from which they will send them will vary. Some students may choose to write on-line while others would probably write their texts on a word processor and then paste them on their message. Messages will be sent from the computer terminals the learners have access to. Some learners have computers in their rooms or live in dorms where there are computer facilities whereas others will use the campus labs.

**Duration**

These activities extend for a period of eight weeks, starting two weeks after the first class. Every week learners will send one contribution to all the other participants. The time they devote to this task will depend on their language skills, their background knowledge of the topic, and their interest.

**Participants**

**Description**

The participants in this series of activities are 18 ESL learners (7 females and 11 males) and the instructor (male). The participants will meet regularly three times a week for a period of fifteen weeks. Some of them know each other well. They have varied linguistic and cultural backgrounds (coming from Argentina, China, Colombia, Hong Kong, India, Indonesia, Japan, Jordan, Malaysia, Puerto Rico, South Korea, and Taiwan). They are fluent in English but none of the participants is a native English speaker. The participants’ age ranges from 18 to 34.
Learners' Background

The linguistic and cultural backgrounds of English 101 students is usually eclectic, although in the last few years Asian students have accounted for the majority of the participants, as was the case in this class. The learners’ experience and expertise with computers is expected to vary highly, including their keyboarding proficiency. Some learners are computer science majors, whereas others have probably never been exposed to this technology. However, this should not considerably affect the development of this activity since learners will be able to spend as much time as they need to complete the assignments.

Learners' Role

The learners’ main role is to write texts based on the topics presented by the instructor and the replies sent by their peers and post them in the indicated environment. Learners will participate using their real names and are expected to have relatively high interest in this activity, at least at the beginning, since this is the first time for many of them to participate in a class exchange of this nature. As mentioned above, the learners’ language proficiency varies.

Instructor’s Background

The instructor is a graduate teaching assistant pursuing a degree in TESL Applied Linguistics at Iowa State University. He is a native speaker of Spanish and this is his first time teaching academic writing to undergraduate ESL students. The instructor’s has been exposed to CALL for about one year. He can use word processors, internet applications and his interest in hyper-text environments lead him to learn basic HTML to create webpages to supplement his classes. At the beginning of the course, the instructor created a webpage which contained a detailed class syllabus and policies. The instructor’s knowledge of asynchronous CMC environments is fairly limited to e-mail and some practice using the forum facility available in a university class management tool (ClassNet).
Instructor’s Role

The main role of the instructor is to provide topics for discussion and monitor the learners’ participation since this series of contributions constitute a class requirement. Additionally, the instructor will help with technical support when learners request it. The instructor controls some of the elements in this frame, i.e., goals, type of activity and topics.

Mode

Role of Language

The language is used communicatively, with a high emphasis on the content of what is written rather than its form. Learners are expected to resort to their repertoire of language functions and strategies to express their ideas and stance regarding the issues being discussed (see Appendix A for a full description of the constructs language use and strategic competence).

Medium of Language

Written on computer screen or printed text. Learners receive or have access to electronic mail and printing facilities. They can compose their messages on- or off-line depending on their familiarity with the asynchronous CMC environment they are using. Messages identify the sender and display the time they were sent. Postings may be received with some delay (Warschauer et al., 1996) but it rarely exceeds a few minutes.

Time Constraints

No significant time constraints are anticipated except the weekly deadline to comply with the task. Learners can freely manage their time to compose and read messages.

Specifics

Each week the learners were requested to submit a contribution and a response to an asynchronous CMC environment. During the first four weeks, messages were sent to an e-mail list owned by the instructor (Contributions and Responses 1 through 4). During the following four weeks, messages were submitted to the ClassNet forum environment.
(Contributions 5 through 8, and Responses 5, 6 and 8). No response was required for contribution 7; learners were requested to submit two responses for Contribution 8 instead. The descriptors which specifically apply to those activities are summarized in Table 2.

<table>
<thead>
<tr>
<th>Contributions 1 through 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Mode</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Responses 1 through 6 and 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Mode</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contribution 7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame</strong></td>
</tr>
<tr>
<td><strong>Mode</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contribution 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frame</strong></td>
</tr>
<tr>
<td><strong>Type of Activity</strong></td>
</tr>
</tbody>
</table>
Table 2. (continued)

<table>
<thead>
<tr>
<th>Topics: submitted by learners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
</tr>
<tr>
<td>Instructor's Role: instructor does not control topic</td>
</tr>
<tr>
<td>Learner's Role: learners are responsible for posting a motivating discussion topic</td>
</tr>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Role of Language: communicative</td>
</tr>
</tbody>
</table>

The second part of this chapter analyzes the asynchronous CMC activities which have been described focusing on the process outcomes of the tasks and the research questions proposed for this study. As stated before, the purpose of this study is to assess two asynchronous CMC environments in terms of their usefulness to achieve the goals defined in the activity plan. The texts which the learners' submitted to the two environments will be analyzed to determine whether expectations regarding participation and language quality were met and whether any whether the two asynchronous CMC environments presented differences which affected the task processes and outcomes.

**Analysis of the Data**

The first research question proposed for this study is intended to highlight the features of the software used to carry out the activities described above. This analysis is based on the instructor's observations while he monitored the activities in both environments. The second research question addresses the differences observed in the two asynchronous CMC environments in terms of the learners' participation and the quality of the language output, and how those differences affected the instructional goals. Supporting questions are intended to investigate two main aspects of the task which were considered important to achieve the instructional goals, namely the learners' participation and the quality of the language. The degree of participation is analyzed from a linguistic and extralinguistic perspective. Within the linguistic domain, two main related aspects were addressed, namely the quantity of language produced and the learners' degree of interactivity in both environments. At the extralinguistic level, a quantitative analysis addresses the presence or reduction of social context cues related to gender. Finally, language quality is assessed on
measures of lexical and syntactic complexity and the learners’ degree of control of discourse. A qualitative analysis is intended to additionally describe salient language features in both environments.

**Features of the Software**

The analysis of the differences in the software is intended to highlight the constraints that both environments present, which may impact the interaction and ultimately the instructional goals that had been foreseen for the asynchronous CMC tasks. Inspired on a recent article by Robb (1997), this description will present a brief analysis of the trade-offs between the e-mail and forum environments.

**Participation**

**Quantity of Language**

Measurements related to the quantity of language produced in different modes are common in the literature (Chun, 1994; Ellis, 1994; Kelm, 1992; Kern, 1995; Larsen-Freeman & Long, 1991; Ortega, 1997; Peyton, Staton, Richardson, & Wolfram, 1990; Warschauer, 1996; Warschauer et al., 1996). Likewise, features of learners’ participation such as accounts of the characteristics of the interaction and anecdotal evidence of how computers redefine patterns of interaction are usually present in CMC studies (Chun, 1994; Ferrara, Brunner, & Whittemore, 1991; Ho & Crookall, 1996; Kelm, 1992; Kern, 1995; Robb, 1997; Warschauer, 1996; Warschauer et al., 1996). There has been, however, due criticism to the sometimes implicit assumption that increased language production is beneficial for second language learning independently from the quality of the language output (Chapelle, 1996; Chapelle, forthcoming; Ortega, 1997). The quantity of language alone then does not constitute an indication that a particular activity works or that a particular mode or environment for communication is more effective unless the sole goal for the activity is plain language production, which is not the case in this study. However, quantity of language, when combined with measures of language quality, may help support evidence that the increased language output corresponds, for example, with increased
interactivity in the environment or with an increase in the learners' ability to manage discourse.

The measurements for quantity of language output used in this study are the number of words, calculated on simple counts from the original CALL text, and the number of clauses (the criteria to identify clauses are defined below). The results of these calculations are related to the characteristics of the interactivity in both environments and to the quality of the language output.

**Interactivity**

In this study, interactivity is defined as the degree to which learners are responsive to other learners participating in the task (cf. Krause, 1995). Although interactivity is included as a descriptor for participation, unlike language quantity, differences in the patterns of interaction and degrees of interactivity may indicate that a particular activity is more suitable to engage learners in types of interaction that will enhance the occurrence of language features which are hypothesized to enhance second language acquisition (Ellis, 1994; Larsen-Freeman & Long, 1991; Long, 1990; Pica, 1987).

As mentioned before, the two CMC environments analyzed in this study present differences in the software which could result in different types of interaction between participants. For example, when participants send an e-mail message to a class mailing list, they know that the recipients are all other class members, including themselves. On the other hand, the ClassNet forum is a much more organized environment. Postings in discussion threads (i.e., replies to messages) are more likely to be targeted to a specific individual.

In establishing criteria to assess the degree of interactivity in the two environments it will be necessary to refer to the goals envisioned for the tasks. As discussed above, one indicator of higher involvement can be the quantity of the language output (i.e., the number of words and clauses in the replies which the postings triggered). However, this measurement alone does not necessarily indicate higher interactivity amongst participants and disregards the pragmatic use of language envisioned for the task goals.
A second indicator of interactivity which could be commensurate with language use is then necessary, such as the occurrence of references to other contributions and replies. Replies which include quotes or paraphrases of what other participants contributed not only imply that the author read the posting, but also a potential to engage in language features that may enhance acquisition (e.g., negotiation of meaning) or that may require the use of higher level cognitive skills (e.g., summarizing information or stating implied meaning or the writer’s stance). Since these were language features expected to occur along the development of the task process, quantifying the extent to which they occur in postings would provide some indication that the learners were fulfilling the instructional goals. Since the ultimate goal of this study is to find out whether these language features are present in both asynchronous CMC environments in a similar fashion, it is also necessary to account for the number of trigger messages that originate a particular reply. Messages which originate as a reply to one trigger and messages whose triggers are multiple postings need to be distinguished since the latter type may indicate that it is more likely that the learner is engaging in the kind of language use described above.

The degree of interactivity in the two environments is assessed on two measures: a tabulation of the number of replies and a tabulation of the number of messages that triggered those replies. Replies and referent clauses are calculated on simple counts.

**Criteria to Identify Referent Clauses**

Referent clauses are considered those that contain one or more of the following referents: (a) indication that the learner is responding to a specific message (e.g., the writer mentions the name or names of the author of the posting(s) she is replying to or, in the case of ClassNet, the learner uses the second person pronoun to refer to the person whose message she is responding to); (b) the learner indicates her stance to the ideas presented in the trigger message(s) (clauses that further elaborate on her stance are not counted); (c) the learner quotes what another learner stated or paraphrases information from another posting; (d) the learner poses or answers a question related to a previous posting; and (e) the learner restates an idea or concept that she mentioned in a previous posting (see example in Table 3).
Table 3. Identification of Referent Clauses

<table>
<thead>
<tr>
<th>Score</th>
<th>CALL Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>From: YVFECl</td>
<td></td>
</tr>
<tr>
<td>Subject: e-mail response</td>
<td></td>
</tr>
<tr>
<td>Date: Mon, 08 Sep 1997 14:43:38 -0500</td>
<td></td>
</tr>
</tbody>
</table>

1a   || After i've read SEMEC1's,im so surprise that they are running the chinese culture too. ||
1b   || All of this while,i thought the korean are running their own culture. ||
1c   || Ya, the "pong-soo" is very important in chinese culture,although some of them disbelieve it. ||
    || Well,although i'm not really belief the "pong-soo",but i'm still keep avoid from doing the prohibitan.:) ||
1d   || I like his article very much,now i've a little more idea about Korea which use to be so strange for me. ||
1e   || Besides,i also agree with what GRFEC01 saying. ||
1f   || many people thought that we,Malaysian still living in jungle,leaving behind,it's wrong. |
    || I confess that if compare to u.s,our technology is left behind, ||
    || but it doesn't mean that we don't have the talent. ||
    || Our country is keep on developing,i belief that our effort will bring us to succeed one day. ||

Social Context Cues

In much of the literature it has been stated or suggested that CMC acts as an important equalizer by reducing social context cues, particularly related to gender (Chun, 1994; González-Bueno, 1998; Ho & Crookall, 1996; Kelm, 1992; Kern, 1995; Krause, 1995; Warschauer et al., 1996). In order to further investigate this issue, the rate of female-male participation in both asynchronous environments will be analyzed from a quantitative perspective. The analysis will focus on the female-male rate of participation as indicated by the number of messages and words posted in the two asynchronous environments.
Language Quality

The instructional goals for the tasks analyzed in this study encompassed the development of the learners’ interlanguage to a higher degree of lexical and syntactical complexity and the further development of the learners’ academic writing skills. In this study, language quality is analyzed from two quantitative perspectives, namely the degree of language complexity and the degree of discursive management, and from a qualitative approach intended to shed light into the cognitive processes in which the learners’ might be engaging while working on the tasks.

Three measures of language complexity are used to identify differences in two asynchronous CMC environments: (a) lexical density ratio, which provides a means to assess the register of the language output (i.e., closer to spoken or written discourse); (b) coordination index, a measure of syntactic complexity; and (c) type-token ratio, a measure of lexical complexity.

Lexical Density Ratio

As defined by Halliday (1990), lexical density is “the number of lexical items as a ratio of the number of clauses” (p. 67). Halliday (1990) contends that lexical density is one of the variables that can be used to distinguish between the spoken and written end of the language continuum, since it is a measure of how tightly the information is “packed” (p. 66). In written discourse, the information is typically more tightly packed than in spoken language.

Lexical density can be described as an indicator of the proportion of lexical and grammatical items in discourse (Halliday, 1990). From a systemic perspective, grammatical items (also referred to as ‘function words’) are the ones which make up closed categories, (i.e., categories which do not readily incorporate new items [Celce-Murcia & Larsen-Freeman, 1983]). According to Halliday (1990) these include “determiners, pronouns, most prepositions, conjunctions, some classes of adverb, and finite verbs” (p. 61). Lexical items or ‘content words’ include all other items not listed in the grammatical category. They can be described as those which make up open categories
of items (i.e., categories which are constantly incorporating new items). The example below illustrates the criterion to identify lexical items (shown in bold):

| Beside that, Indonesian food is rather strange to the stranger who is visiting Indonesia | (MEFEC1) |

A further distinction between lexical and grammatical items is based on their frequency in the use of language. Grammatical items tend to occur at a significantly higher frequency than lexical ones. However, some lexical items (e.g., get, make, etc.) may also occur frequently, especially in informal writing, which blurs the distinction between the two categories. Consequently, grammatical and lexical items can perhaps be best understood as falling at a certain point between two extremes of a continuum. Halliday (1990) proposes a continuum including grammatical items, high-frequency lexical items and low-frequency lexical items (p. 65).

Different from Halliday’s idea, which is to measure “the average amount of lexical information per clause” (p. 67), the purpose of this analysis is to determine the second language learners’ degree of lexical management and observe the differences that might occur in the two asynchronous CMC environments previously described. Within the context of this study, it seems then reasonable to extend this continuum to include two categories of grammatical items as well, in order to account for distinctions between high-frequency grammatical items (e.g., and, or, so, but, etc.) and low-frequency grammatical items (e.g., hence, nonetheless, thus, etc.). The continuum is set as: high-frequency grammatical items, high-frequency lexical items (e.g., auxiliary verbs, modal verbs and verbs such as “to get” and “to make”, also referred to as “lexically ‘empty’ verbs” [Halliday, 1990, p. 95]), low-frequency grammatical items, and low-frequency lexical items. The two latter categories are considered lexical items in the calculation of the lexical density ratio (see Figure 1).

For the calculation of lexical density, students’ contributions and responses in asynchronous CMC were saved in individual text files using codes to identify learners as well as the type and number of activity the text belonged to. Text files were included in subdirectories for each activity and were then parsed and run through a lexical density
program. Within each file, clausal boundaries were marked with slanted lines (/).

A few changes had to be made to the texts: (a) misspelled grammatical items were replaced with the correct form so that they would not be counted as lexical items; (b) introductory and final formulaic clauses addressing the audience were not included in the analysis (e.g., Hi all!, Take it easy!, etc.); and (c) interjections were deleted.

Figure 1. High and Low Frequency Items

**Criteria to Identify Clauses**

The criteria used to mark clauses were based on the ones proposed in Halliday (1990) (see example in Table 4):

1) Supplemental and embedded clauses (shown between []) were counted as part of the main clause. For example, the following constitutes a single clause:

```
[] Is there any rules [which say [that we can’t see pornography in campus]] [] (GRFFC6)
```

2) Parenthetical information was included as part of the clause:

```
[] The magazines I choose are for anybody who is interested in all the items mentioned above (but mostly for teenagers and working women) [] (GRFEC2)
```

```
[] Indonesia shares land border with Malaysia (the northern part of Kalimantan), Brunei Darussalam (the northern part of Kalimantan) and Papua New Guinea and sea border with Singapore, Thailand, Vietnam, Philippines and Australia [] (TEMEC1)
```

However, when parenthetical information constituted a whole clause by itself, the position of the information had to be changed for the program to count two clauses as in the example below:

```
"For my side of view (I’m from Japan) I say China is very near but far." (TAMER1)
```
I'm from Japan. For my side of view I say China is very near but far. (TAMER1)

3) The first subordinator (shown in bold) was taken into account to separate clauses if an ungrammatical combination was used.

... which means although we are separate by islands, dialects and cultures but* we are one country, Indonesia. (TEMEC1)

Since there are different races and cultures in Malaysia, therefore*, there are also a lot of different food. (GRFFR8)

4) Fragments (bold) were counted as one clause:

I know this is really fresh food but I don’t like. (SOFEC1)

At first, American like speak loudly, and listen music loudly. Especially their laughing. (SOFFC6)

5) Elliptical questions (bold) were counted as a clause:

Whatever that is messy about it will have to wait till the next day to clean up. Why? Well, it is believe that those rubbish represents the fortune of yours. (AYFEC1)

6) Formulaic openings and endings were not included in the calculation:

“Thanks for reading.” (TAMEC2)
“Wish you all the best.” (YFEC4b)

Table 4. Criteria to Identify Clauses

1 Languages is human means of communication and thus no one can afford not to learn it. 3 Advantages are to those who knows more than one languages and I personally believe that almost everybody in this world know how to speak more than one language. 5 Besides, to me it's fun learning another new language. 6 though it's tough most of the time but it does bring satisfaction after you master it. 8 Agree? 9 I wonder how many languages are there in this world that we live in. 10 It should be over thousand or maybe even more. 11 who knows. 12 I do agree with NAFFC8 too that we are born with some innate ability as to how many languages we can learn and keep for our whole lifetime. 13 Believe it or not is up to you. 14 maybe you guys can check it out. 15 Have fun learning how to speak. (AYFFR8b)
Coordination Index

Coordination index (CI) is a measure of syntactic complexity. It is calculated by dividing the total number of independent clausal coordinations by the sum of independent clausal coordinations and dependent subordination. The resulting number indicates the proportion of coordinated clauses in a text. For example, a coordination index of 0.17 indicates that 17% of the clauses counted in the text are connected using coordinators. The rationale for using this measure is that more proficient writers would use a higher proportion of subordination, which would result in a lower coordination index if compared with texts written by less proficient writers, who would tend to rely more on simple coordinations to connect their ideas (Warschauer, 1996). CI is then inversely proportional to complexity (i.e., a higher CI indicates lower complexity).

For the sake of consistency with the other clausal analyses in this study, the criteria to identify clauses for the calculation of the coordination index was the same as for the calculation of lexical density. The subordinations counted for the calculation did not include supplemental clauses introduced by "that" (e.g., I think that..., I believe that..., etc.), subordinate clauses that function as subject or predicate (e.g., What I believe is..., This is what I meant., etc.), or quotes from sources other than messages sent to the environment by the other participants. Likewise, prepositional and participial clauses were not counted, the only exception being "to" infinitive clauses of purpose. The results obtained from the calculation of CI in the two asynchronous environments are compared and related to the other measures of language complexity.

Type-Token Ratio

Type-Token Ratio (TTR) is a measure of lexical complexity calculated by dividing the number of different words by the total number of words in a text (Warschauer, 1996). In this study, TTR was calculated on the same CALL texts that were used for the calculation of lexical density. The results obtained from this calculation are related to the other measures of language complexity described above.
Discursive Management

The purpose of measuring discourse management is to assess the degree of the learners' control of discourse in activities that require the production of well supported arguments. Since one of the instructional goals for the activities analyzed in this study was to develop the learners' academic discursive management, it is important to assess the extent to which the two asynchronous CMC environments seemed to cooperate to achieve this goal. In order to do this, a recent model for the assessment of second and foreign language learners' discursive strategies will be applied.

Drawing from language theorists such as Wittgenstein, Swaffar (1997) developed a strategy coding technique based on the idea that "meaningful writing consists of statements whose messages are created by their relationships to one another" (p. 162). From this perspective, meaning in a text depends on "text-internal" context (application of discursive or ideational knowledge) rather than "text-external" context (sociolinguistic knowledge). Her proposed strategy coding is then set to identify: (a) discrete strategy types (e.g., express an opinion, agreement, disagreement, or evaluate a previously stated claim); (b) syntactic and semantic features that reflect the relationships between surface language and its ideational intent; and (c) ideational relationships at the intersentential level. Based on these characteristics, she distinguishes between language features which are rhetorically open-ended (i.e., not bound to the text) such as a general claims or unsupported assertions or opinions, and language features which are rhetorically bound to the text, such as evaluative and causal assertions. This type of coding then hierarchically arranges language features according to their dependency on the context created by the writer. Rhetorically open-ended clauses are assigned a lower value than clauses whose meaning depend on other propositions in the text (see chart in Appendix C).

Swaffar (1998) contended that due to the fluctuations typical of the learners' interlanguage, there are no measures that could be safely used to obtain an indication of the learners' improvement in their ability to manage discourse within short periods of time (e.g., one semester). She claims that her model overcomes this problem.

The calculation of the degree of discourse management is done at the clausal level.
Each clause is rated on a 0-4 scale and then the average for the whole posting is calculated. The resulting number gives an indication of the degree of discourse management, which in this study is referred to as discursive management score (DMS). DMS is directly proportional to the degree of discourse management present in the text (i.e., a higher DMS indicates a higher degree of discourse management).

Although DMS is a promising standard measure, a previous pilot study carried out by the author revealed that, when summarized, the criteria established in Swaffar’s article may lead to inconsistent scoring and result in unreliable judgments. In this pilot study, some problems with the rating system were identified and suggestions to improve a scoring chart designed for the pilot study were made.

A new chart incorporating some of the modifications suggested in this pilot study was used in the scoring of a sample of twenty-eight randomly selected postings, including contributions and responses, by three raters. The raters were fellow graduate students in the TESL Program at Iowa State University. Two of them had participated in the first scoring, so in order to make the new scoring easier for them and to achieve results which could be comparable to the ones obtained before, the scoring range used in the rating scale was not modified as it had been suggested in the pilot study. However, all other considerations to simplify the content of the chart were taken into account (see Appendix C). The clauses in this sample as well as in all the other texts used for this type of rating were identified following the same criteria applied as for the calculation of lexical density.

Before rating the sample, raters were given a copy of the chart (in Appendix C) to read and an example to rate (see Table 5). After grading the example, the raters discussed their judgments until they agreed on the value given to every clause. It became clear during this session that there was much more agreement when the highest possible score was given to each clause. Disagreements amongst raters were often traced back to the same source: judgments made without considering the context in which the clause appeared. To keep context in mind is a crucial aspect to give an adequate rating to each clause. Raters were then reminded of this and of the fact that clausal length and
Table 5. Sample Text for Rating DMS

In my opinion, practical science and theoretical science always work together. Without any of them, things won't work out. But I agree with the practical science is more important than theoretical science because theoretical is so abstract and only practical can make us have an idea on it. For example, you know the theory of driving a car, but only practical you will learn how to control a car, like how to control the throttle and clutch. On the other hand, I think practical will give us a profound impression. Finally, I think if no practical science, some of the theory won't come out. Theory plays an important role in our lives. In my opinion, it's like a guideline. We'll do most of the thing based the theory. I think if we live without theory, our lives seem no direction and meaningless.

grammatical accuracy were irrelevant as long as the message was clearly understood.

After this rating session, the score for each posting was calculated by averaging the values assigned to each clause. The three resulting sets of scores were correlated with the scores given to each posting by the researcher (Rater 4) using the Spearman rho formula. This correctional analysis is used to compare two different sets of rankings (Brown, 1993; Larsen-Freeman & Long, 1991, p. 144). The closer the rho is to one, the more consistent

Table 6. Raters' Scores

<table>
<thead>
<tr>
<th>Posting</th>
<th>Rater 1a</th>
<th>Rater 4a</th>
<th>Rater 2b</th>
<th>Rater 4b</th>
<th>Rater 3c</th>
<th>Rater 4c</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMFC5</td>
<td>2.07</td>
<td>2.20</td>
<td>2.71</td>
<td>2.57</td>
<td>MAFFC7</td>
<td>3.17</td>
</tr>
<tr>
<td>TAMFC6b</td>
<td>2.05</td>
<td>2.11</td>
<td>WIMFC5</td>
<td>3.14</td>
<td>3.14</td>
<td>MAFC4</td>
</tr>
<tr>
<td>SEMER3</td>
<td>2.50</td>
<td>2.80</td>
<td>GRFER2b</td>
<td>2.85</td>
<td>2.92</td>
<td>LUMFC7</td>
</tr>
<tr>
<td>NAFEC1</td>
<td>2.15</td>
<td>2.15</td>
<td>JWMFC5</td>
<td>2.76</td>
<td>2.76</td>
<td>KOMEC2</td>
</tr>
<tr>
<td>MEFEC3</td>
<td>2.00</td>
<td>2.08</td>
<td>MAFC3</td>
<td>2.85</td>
<td>2.62</td>
<td>JWMER3</td>
</tr>
<tr>
<td>KOMEC4</td>
<td>1.47</td>
<td>1.61</td>
<td>MEFRR6</td>
<td>2.90</td>
<td>2.80</td>
<td>GRFFC6</td>
</tr>
<tr>
<td>GRFFR8d</td>
<td>1.50</td>
<td>1.67</td>
<td>SEMFC6</td>
<td>3.00</td>
<td>2.90</td>
<td>WIMFC6</td>
</tr>
<tr>
<td>WIMFR8</td>
<td>2.31</td>
<td>2.23</td>
<td>SUMER4</td>
<td>2.00</td>
<td>1.83</td>
<td>AYFFC5</td>
</tr>
<tr>
<td>TEMER1</td>
<td>2.14</td>
<td>2.14</td>
<td>SOFEC4</td>
<td>2.28</td>
<td>2.16</td>
<td>TEMFC5</td>
</tr>
</tbody>
</table>

* Significant at p<.01
is the ranking between the sets of scores. Spearman rho was calculated separately on the three sets of scores and on the combination of all three sets (see Table 6). The latter calculation yielded a value of 0.92 on 28 postings (significant at p<0.1). It should be noted that the highest correlations were obtained with the two raters who had previously done this type of analysis (i.e., raters 1 and 3).

In this study, DMS is calculated for all the postings. The results obtained in the two asynchronous CMC environments are compared and analyzed in terms of the achievement of the activity goals and their relationship to other descriptors in the contextual framework.

Qualitative Analysis

This analysis is intended to provide further insights into the quality of the language produced in the asynchronous environments and the processes that the learners might be engaging in as they complete the task. Its main purpose is to identify and describe language features which in the literature are hypothesized to enhance L2 acquisition (Celce-Murcia, 1991; Chapelle, forthcoming; Egbert & Jessup, 1996; Ellis, 1994; Ortega, 1997; Pica, 1987; Pica et al., 1993; Swaffar, 1998). Three salient language features observed in the two environments will be discussed and related to some of the descriptors of the contextual framework, namely the learners’ emulation of rhetorical patterns found in more proficient peers’ postings, the occurrence of language features that are hypothesized to be conducive to second language acquisition, and the frequent use of conditional sentences. These features were identified by carefully reading and comparing the texts sent to the environments in the chronological order they were submitted.
CHAPTER 4
RESULTS AND DISCUSSION

The present study is intended to focus on the description of two asynchronous CMC environments in terms of their characteristics and their usefulness for the achievement of language learning goals. This analysis consists of two main parts: the first one analyzes the features of the software. The second focuses on aspects of the learners’ participation and the language output in both environments. The impact of the two asynchronous CMC environments is evaluated on the basis of quantitative and qualitative observations. The results are compared to some of the findings reported in the literature.

Features of the Software

In much of the literature, asynchronous CMC environments are often analyzed separately (e.g., studies which report findings about the application of e-mail in instructional contexts) or in combination (e.g., reports about the use of e-mail and bulletin boards, such as Kroonenberg’s [1994/95]). Although asynchronous CMC environments share features in common, the impact of the software in the creation of asynchronous environments should not be underestimated. As Chapelle (forthcoming) clearly states, “the view of software as a versatile resource is only half of the picture; the whole picture must include the constraints that software resources place on L2 activities.” This analysis is thus intended to highlight the constraints that the software presents, which may impact the interaction and ultimately the instructional goals that had been foreseen for the asynchronous CMC activities.

In a recent article, Robb (1997) presents a brief comparative analysis of the trade-offs between traditional paper-and-pencil and electronic management of students’ work emphasizing methods of submission (e.g., floppies, e-mail, FTP submissions, etc.) and methods of providing feedback (e.g., insertion of comments, use of different font styles to identify problem areas, etc.). In a similar fashion, the features of the two asynchronous CMC environments were analyzed during the course of their use over the semester. The analysis resulted in four categories of features which described important differences
between the two types of software, namely message handling, organization of content, instructor control, and operation.

The category message handling includes two types of messages: (a) postings, which in this study are referred to as “contributions”; and (b) responses, which are identified as “replies” in ClassNet forum (see Table 7). Three main features were identified for each type of message, namely destination, identification of new messages and retrieval. When using the e-mail list, postings and responses were handled in the same way. Submitted postings and responses were stored in the learners’ personal e-mail inbox. The learners had access to these messages every time they logged on to the system to check their e-mail. New messages were identified as “unread” and could be retrieved for instant reading or kept in storage, still as “unread”, until the learner decided to read them.

In the forum environment, however, postings and replies are handled differently. All messages posted in this environment appear in a webpage which the system automatically generates in its forum section. Learners have access to this section once they have logged on to the system and selected the “discuss” button from their menu. After clicking on this button, a webpage is loaded which contains headlines identifying the topics available for discussion. Immediately below the headline appears a paragraph describing the topic (e.g., containing the questions related to that topic or any background information that defines the topic for discussion). Postings appear as links in an indented column below each headline and are listed in chronological order (i.e., most recent postings are listed first). When the learners submit responses, they appear listed below the corresponding posting, identified by the word “reply” followed by the message title and further indentation from the title of the posting. Like postings, responses are listed in chronological order (i.e., the most recent response is listed immediately after the posting). Unread postings and responses can be easily identified if the learner is using her own computer (i.e., since they become links, if the browser is set to distinguish between visited and not visited links, visited links should appear in a different color). However, if many learners have access to the same browser and visit different links, this distinction is lost.
Table 7. Salient Features of the Software (Message Handling and Organization)

<table>
<thead>
<tr>
<th>Features</th>
<th>E-mail List</th>
<th>ClassNet Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Message Handling</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ posting destination</td>
<td>learner’s personal e-mail</td>
<td>automatically generated webpage</td>
</tr>
<tr>
<td>→ new posting identification</td>
<td>new postings appear as unread in the learner’s inbox</td>
<td>new postings are automatically added to any given discussion thread; a number indicates the amount of postings stored</td>
</tr>
<tr>
<td>→ posting retrieval</td>
<td>learner signs on and reads new posting</td>
<td>learner has to log on to the corresponding class, select the discussion option, and click on the posting or response to be read</td>
</tr>
<tr>
<td>→ response destination</td>
<td>other list members’ inbox</td>
<td>response is automatically added to the selected thread</td>
</tr>
<tr>
<td>→ new response identification</td>
<td>new responses appear as unread in the learner’s inbox</td>
<td>new replies are automatically added to any given discussion thread; a number indicates the amount of replies stored</td>
</tr>
<tr>
<td>→ response retrieval</td>
<td>learner signs on and reads new responses</td>
<td>learner needs to go through the log-on process described above to verify if responses have been submitted</td>
</tr>
<tr>
<td><strong>Organization of Content</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>→ topic identification</td>
<td>subject line may or may not explicitly identify the message</td>
<td>new topic becomes a link leading to stored messages and responses</td>
</tr>
<tr>
<td>→ organization of discussion threads</td>
<td>chronological ordering of messages</td>
<td>topical ordering of messages and chronological subordering</td>
</tr>
<tr>
<td>→ information storage</td>
<td>learners may choose to store or delete messages; organization of stored info is personal</td>
<td>all submitted messages are stored and available at any time until class expires; organization of stored info is dictated by the system and partly managed by the instructor</td>
</tr>
</tbody>
</table>
The retrieval of postings and response from ClassNet forum is also substantially different from an e-mail list. In the forum environment postings appear below the topic headline and description, and responses appear below their corresponding posting. At this point, only the information describing the topic and the titles of postings and responses are visible. When the learners click on a posting to read the content of the message, a new webpage is loaded containing the description of the topic (i.e., a topic headline and a descriptive paragraph), followed by the title and content of the posting, a list of the replies that the posting has generated (only the titles of the replies are visible at this point), and a menu. This menu allows learners to (a) return to the topic page (i.e., the first page that opens when learners gain access to the forum); (b) compose a reply to the displayed posting; or (c) see the responses originated by the displayed message. Learners may or may not choose to read the replies before composing theirs.

These asynchronous CMC environments also present substantial differences in the way they internally organize the submitted information. Within this category, three distinctive features have been identified: topic identification, organization of discussion threads, and information storage.

In the e-mail environment, the identification of the topic of contributions and responses mostly depended on how descriptive the subject line of the message was. In most cases, subject lines gave little indication about the topic which the message was addressing (e.g., a typical subject line for contributions was “my contribution 3”) or the posting to which a response was referring (e.g., a typical subject line for responses was “response 2”). Consequently, discussion threads could only be identified by reading the messages and mentally organizing them first into topics (i.e., when contributions were submitted) and later on into coherent discussions (i.e., when responses were sent). Learners then needed to decide which discussion thread a given message belonged to, and whether they agreed or not with the content expressed in order to supply a proper response. Although all new messages were stored in the participants’ inboxes, learners could decide which messages they wanted to save and which ones they wanted to delete. The e-mail software allowed learners to organize their messages as they saw fit (e.g., they
could leave messages in their inbox or store them in folders within the environment).

In the forum environment the organization of content is systematic. Topics appear on
the first page which is loaded when the learners click on the “discuss” button in their menu
(topics were usually posted by the instructor except for one activity that required learners
to supply their own [Contribution 8]). Similar to the e-mail environment, the titles of the
learners’ postings and responses were not very descriptive (i.e., the identifiers for
contributions and responses which appeared immediately below the topic description).
However, as noted above, the system provided a clear hierarchical and chronological
organization for topics, postings and responses. Even though the titles were not
descriptive, learners could visually distinguish and easily locate the messages that a given
topic had originated, and the category to which those messages belonged (i.e.,
contribution or response). All submitted messages were stored in the system and available
to the participants once they had logged on. Although the instructor could relocate
misplaced messages, the way in which they were organized and displayed was dictated by
the system.

The degree of control which the instructor can exercise in these two asynchronous
environments was distinguished on the basis of two main features: instructor’s privileges
and censorship (see Table 8). In the e-mail environment, any of the participants may
become the owner of the e-mail list. In the case of this study, the instructor set up the list
in his personal account and kept ownership rights, which were limited to the addition or
exclusion of list members. This feature of the software allows some flexibility in the way
discussions can be organized. For example, different lists can be created for the same class
for various purposes. A whole class list may serve the purpose of communicating
important announcements to the class members, whereas a different class list may include
only some of the members of the class who are participating in a project. For the activities
described in this study, a whole class list including all participants was set up (i.e., all
participants received copies of all postings, including their own, in their e-mail inboxes).
Besides ownership rights, the instructor has little control over the submission and content
of the messages posted in the environment. Once messages are sent, all participants have
<table>
<thead>
<tr>
<th>Features</th>
<th>E-mail List</th>
<th>ClassNet Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>instructor privileges</td>
<td>list owner: instructor may add or exclude list members</td>
<td>instructor has control of the environment including membership and content</td>
</tr>
<tr>
<td></td>
<td></td>
<td>published therein; instructor may relocate messages which are</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mistakenly assigned to the wrong topic or do not match the hierarchical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>structure, e.g., message appears as a contribution rather than a response</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to a previous one</td>
</tr>
<tr>
<td>censorship</td>
<td>instructor may censor messages post-factum, i.e., cannot prevent messages</td>
<td>instructor may edit or remove undesired messages from the forum</td>
</tr>
<tr>
<td></td>
<td>from reaching their destination; once messages are sent there is no</td>
<td></td>
</tr>
<tr>
<td></td>
<td>possibility to revert the process</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ease of operation</td>
<td>requires knowledge of sign-on procedure and simple read, compose and</td>
<td>requires knowledge of sign-on procedure and web navigation;</td>
</tr>
<tr>
<td></td>
<td>send commands; requires understanding of computer logic to organize info</td>
<td>requires understanding of the hierarchical organization of the environment</td>
</tr>
<tr>
<td></td>
<td>into directories, subdirectories and folders</td>
<td></td>
</tr>
<tr>
<td>editing properties</td>
<td>limited to the use of arrow and backspace keys in Easy Vincent; does not</td>
<td>supports mouse clicks to highlight, delete, move or insert text; supports a</td>
</tr>
<tr>
<td></td>
<td>support mouse clicks</td>
<td>few HTML tags to format text</td>
</tr>
<tr>
<td>compatibility with other</td>
<td>none in UNIX based systems</td>
<td>allows inclusion of hyperlinks to mail, websites and a variety of files</td>
</tr>
<tr>
<td>internet applications</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

access to their content. The instructor may censor inappropriate messages post-factum (e.g., when flaming occurs), but the submission cannot be reversed.

Different from the e-mail environment, ClassNet is a more sophisticated class management utility which includes a number of facilities (e.g., grade management, e-mail,
discussion forum and synchronous CMC among others). Classes in this environment are usually created by the instructors, who are given more privileges than the students who enroll in them. The instructor can manage enrollment and also modify content in the case of the forum utility. Inappropriate messages, for instance, can be edited or altogether removed from the forum discussion before all the participants view them. Similarly, the instructor can reorganize discussion threads (e.g., if a student mistakenly submits a message as a contribution rather than as a response to a given posting). It is interesting to note that during the development of the forum activity, some learners identified this type of misplacements and immediately communicated this “irregularity” to the instructor. Although these learners had tolerated much more ambiguity in the e-mail environment, where this type of organization was unavailable, they were upset by disruptions in the organizational patterns of the forum environment.

The last category of features relates to the operation of both asynchronous CMC environments. Within this category, three distinctive features were identified, namely ease of operation, editing properties and compatibility with other internet applications.

The e-mail environment used for the activities described in this study was based on a UNIX system. The participants could gain access to their accounts by opening a TELNET connection to the university server. The e-mail software could be operated by calling a simple program named Easy Vincent or directly by issuing UNIX commands. With Easy Vincent the user can set his or her preferences (e.g., whether the user wants the program to confirm a course of action before carrying out an operation). The participants in these activities could have configured their environments in many different ways according to their expertise with the software. However, some characteristics of the software remained constant for all participants. For example, the UNIX based system does not accommodate for the use of a mouse. Selections have to be made by pressing a key. While composing messages directly in the environment, for instance, the participants did not have many possibilities for editing other than using the backspace key to delete characters one by one, or the arrow keys to insert text. The system does however support the “paste” function. That is, participants could have composed their messages using a different application.
(e.g., a word processor), and then copied and pasted the text on the TELNET screen. Nevertheless, this possibility is limited to simple text. The software does not support the incorporation of files from other applications (e.g., a picture or formatted text incorporated as an attachment to an e-mail message).

Different from the e-mail environment, ClassNet is a web-based utility. The participants access this system through a web-browser such as Internet Explorer or Netscape. Once the learners log on to the system, they can easily access the forum environment by clicking on the “discuss” button in their menu. The forum section displays different submenus which give learners control over the next course of action (e.g., read a posting, compose a reply, browse replies etc.). At the same time, submitted postings and their replies are displayed as links. Learners can therefore access any of those messages by simply double-clicking on them. In order to compose a message in this environment, learners need to select the appropriate button from the submenu. After the selection is made, a new page is loaded containing the message the learner is responding to, blank fields requesting information such as the title of the posting and the learner’s e-mail, and a box in which the learner can type the message. While working on their messages, learners can easily edit text using the mouse (i.e., highlight and delete text or insert text anywhere within the text of the message). Composed messages can be previewed and edited several times before they are submitted. As in the e-mail environment, learners may use a different application to compose their messages and then paste them on to the composing window. However, the forum environment additionally allows the use of some HTML tags, which gives the learners some control over the way their messages are displayed (e.g., text can be italicized or hyperlinks can be included in the messages). This property makes the ClassNet forum much more versatile than the e-mail environment since it allows the user to create links to files stored in the user’s space in the public university server. Such files may cover a wide range of possibilities (e.g., HTML files, audio files, video files, etc.). However, the efficient use of all these features highly depends on the participants’ expertise. During the development of the activities described in this study, the participants did not make use of these additional features.
The source for the differences in characteristics of the two asynchronous environments explained above can probably be traced back to the purpose their designers had in mind when the environments were created. The forum facility, for example, is only one of the many other features that ClassNet offers. Since ClassNet was primarily conceived as a classroom management tool, the environment allows the execution of a series of administrative classroom procedures, such as online management of grades, assignments and tests (see Van Gorp [1997] for a more detailed description of ClassNet). The classroom hierarchy is clearly replicated in the software (e.g., the instructor has privileges in the environment which give her a higher degree of control than the rest of the participants). On the other hand, the purpose of the e-mail program was probably mainly to distribute information among different users. An e-mail list simply allows the distribution of messages to the participants. Instructor privileges in this environment are reduced to the inclusion or removal of participants. Different from the forum facility, the instructor has no means to change the content of what is published.

The ClassNet discussion forum is also a highly organized environment compared to e-mail. Posted topics are listed on a webpage generated by the software with a clear visual hierarchy indicating discussion threads (i.e., topics appear in bold headings, messages are chronologically listed underneath and indented, and the replies to those messages are listed below them in chronological order and further indented from the message they address). In this environment, the learners’ contributions to any given topic were labeled as messages below the topic heading, and their responses appeared as replies below the other participants’ messages. This arrangement allowed for easy identification of popular topics according to the number of messages that had been posted, as well as popular messages according to the number of replies they received.

This type of organization was not supported by the e-mail software. Compared with ClassNet, the e-mail environment can be best described as rather chaotic due to the following characteristics: (a) messages sent by the participants were stored in the recipients’ inbox together with other personal messages; (b) the topics of the messages were not included in the environment (i.e., learners had to refer to the class syllabus); (c)
contributions and responses were sometimes identified in the subject line, but often with very little descriptive headings (e.g., "Response #2"), so it was necessary to read the text in order to know which discussion thread they were addressing.

Even though both asynchronous environments would be described in the literature as "asynchronous CMC", it is clear that they present distinctive features which could probably impact instructional goals. For example, the availability of topics in ClassNet while composing messages or contributions can probably make it easier for the learners to incorporate the vocabulary and structures used in the description of the topic into their messages. The description of the topics can then become a potential source of input readily available to the participants. On the other hand, the lack of readily available topical descriptions and hierarchical organization within discussion threads in e-mail may demand a sophisticated use of memory and metacognitive skills to keep track of different discussion threads in order to decide which one to address.

Participation

Participation was assessed from a linguistic and extralinguistic perspective. In both cases, quantitative measures were applied. From the linguistic perspective, the analysis focused on quantity of the learners' language and the degree of interactivity fostered by both CMC environments. The extralinguistic perspective was intended to reveal the presence of social cues related to gender which might have affected the learners' participation in either environment.

Quantity

Much of the literature suggests that synchronous CMC fosters students participation (Kelm, 1992; Kern, 1995; Lally, 1997; Murray, 1988; Warschauer, 1996). The findings in this study seem to support this assumption: most of the 17 learners actively participated in the activities carried out in both asynchronous environments (see Appendix D). Compared with the interaction observed by the instructor in regular class meetings, asynchronous CMC did seem to foster far more participation.

Nevertheless, the two asynchronous environments seemed to present a few
differences as far as the number of postings, clauses and words. The ratio of contributions
and responses in e-mail is inversely proportional to the discussion forum. Judging by the
number of postings in both environments, it appears that e-mail originated the type of
results expected by the instructor, that is, a type of involvement in the task that would
prompt a number of responses higher than the number of contributions (see Figure 2).

It is interesting to note that in the forum environment the number of postings, clauses
and words is always proportional (compare forum results in Figures 2, 3 and 4). In e-mail,
however, the number of postings is inversely proportional to the number of clauses and
words. This suggests that although the number of responses in e-mail was higher, their
length, measured by the number of words and clauses, was comparatively shorter than in
the forum environment (an average of 138 words per response in e-mail vs. 165 in forum).
Conversely, contributions in e-mail appeared to have been longer than in the forum
environment (an average of 257 words per contribution in e-mail versus 222 in forum).

Despite this overall finding, two learners, both of them males (SHM and MUM),
failed to comply with the submission of contributions and responses in the e-mail
environment. One of them (SHM) started to participate in the forum but not on a regular
basis; he would send three contributions at the time in an effort to “catch up.” The other
learner (MUM) reported trouble with the software after the second week the e-mail
activity had started. After a meeting with the instructor to learn how to operate the software, he sent only one contribution and one response to the e-mail environment.

Technical problems seemed to be more common in the forum environment. Even though learners were given instructions in class to operate the software, several learners had trouble understanding ClassNet icons and most of the few replies were posted as "new messages" and had to relocated in the environment by the instructor. Some learners had tried the help section available at that time but could not find the help topics they were looking for. As a result, a low number of postings was submitted for the first response in the forum environment (Forum Response 5). This shortcoming was solved by giving the

![Figure 3. Number of Clauses](image)

![Figure 4. Number of Words](image)
learners one more week at the end of the activity during which they could send as many postings as they needed to comply with the task. This accounts for the higher number of postings in Forum Contribution and Response 8 (see Appendix D).

Even though the previous literature has not distinguished among different types of asynchronous CMC, the features of the software seem to have impacted the development and outcome of the activities described in this study.

Interactivity

In this study, interactivity is defined as the degree to which learners are responsive to other peers participating in the task. The degree of interactivity in the two environments was calculated by counting the responses which contained a referent to a previous message (trigger) and tabulating them according to the number of trigger messages (contributions or responses) that originated them (see Appendix E).

Both environments fostered a similar degree but different patterns of interactivity (see figures 5 and 6). The e-mail environment seemed to favor the type of interactivity envisioned in the activity plan (i.e., more sophisticated use of language involving responses which addressed and paraphrased content from other postings). As Figure 5 illustrates, e-mail responses included a higher number of messages referring back to two, three and more triggers. Since these messages contained more than one referent, they required a more complex use of language and strategic competence on part of the learner to incorporate or reference ideas from different messages in her own. This type of interactivity is probably very important to foster interlanguage development.

If this assumption is right, the e-mail environment can be said to have better accomplished the instructional goals. However, this discussion would not be complete without accounting for the salient features of the software that may have contributed to obtain the results presented in this analysis. Probably one of the factors that contributed to these results was the different organizational features of both environments. As previously mentioned in this chapter, ClassNet forum presents discussion threads in a chronological and hierarchical order. Although it is possible to incorporate arguments from any given discussion thread into a different one, learners tend to follow the linear organizational
pattern of the environment and limit their responses to the postings they see. Similarly, they do not need to read the replies that any given message originated. This seems to be completely different in e-mail. Since discussion threads are not explicitly marked, it is necessary to make an extra effort to mentally classify the bulk of mail into threads that make sense. This probably prompts the learners to read more messages than they would in the forum environment and to become more mindful of other peers’ opinions and more responsive to them when expressing their own.
Social Context Cues

As previously mentioned in this chapter, social context cues are addressed in this study from a quantitative perspective. This analysis focused on the female-male rate of participation as indicated by the number of messages and words each group posted in the two asynchronous environments (see Appendix F). The results obtained were checked for significance with a chi square test. Expectations were set according to the female-male ratio of the group (i.e., 40% females and 60% males). The results from this calculation indicate that there were no significant differences regarding the total percentage of postings contributed by female and male participants in each environment (E-mail: $\chi^2 = 1.5 \ [p < .05] \; \text{Forum: } \chi^2 = 0.2 \ [p < .05]$)

In the e-mail environment female learners, who made up 40% of the participants in the group, in most instances contributed more than expected (i.e., more than 40%) (see Figure 7). Female students posted about 45% of the total number of messages in the e-mail environment (Appendix F). The rate of female-male participation then seems to support previous findings. Female learners participated equally and sometimes even more than their male peers.

![Figure 7. Participation in E-mail](image-url)
Figure 8. Participation in ClassNet Forum

It should be noted that this type of participation had not been observed by the instructor in class, where it was always the males who tended to dominate the discussions, even when there was only one in a group of four participants. From this perspective, both environments, e-mail and forum, seemed to foster equal participation and fulfill the instructional goals of achieving a fluid exchange of ideas among participants in an environment which could neutralize social context cues related to gender.

A chi square test applied to the totals (shown in Appendix F) revealed that there were no significant differences between the number of postings and words sent by females and males. The expectations in these tests were established according to the percentage of participants (i.e., 40% females and 60% males).

**Language Quality**

**Lexical Density Ratio**

Halliday (1990) contends that lexical density is one of the variables that can be used to distinguish between the spoken and written end of the language continuum, since it gives and indication of how tightly the information is "packed" (p. 66). In written discourse, information is typically more tightly packed than in spoken language. In this study, the lexical density ratio of a clause was calculated by dividing the total number of
lexical items by the sum of the total number of lexical and grammatical items. The lexical density ratio for each posting was obtained by averaging the clausal ratios.

In L2 texts, although the lexical density ratio can offer some insights into the kind of language the learners are producing, it needs to be cautiously approached. ESL learners often produce language whose lexical density ratio may be high due to the lack of grammatical items such as articles, prepositions and pronouns to name a few. However, the lexical density ratio may give one approximate indication of register variation.

The results of the calculation of the lexical density ratio for all the postings in each environment seem to indicate that there are only small differences between them. The overall tendency is for the responses to be slightly lower than the contributions (see Table 9).

Table 9. Mean Lexical Density Ratio

<table>
<thead>
<tr>
<th>Participants</th>
<th>E-mail Contributions</th>
<th>Responses</th>
<th>Forum Contributions</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AYF</td>
<td>0.54</td>
<td>0.56</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td>GRF</td>
<td>0.59</td>
<td>0.62</td>
<td>0.55</td>
<td>0.60</td>
</tr>
<tr>
<td>JWM</td>
<td>0.61</td>
<td>0.58</td>
<td>0.62</td>
<td>0.57</td>
</tr>
<tr>
<td>KOM</td>
<td>0.62</td>
<td>0.58</td>
<td>0.56</td>
<td>0.58</td>
</tr>
<tr>
<td>LUM</td>
<td>0.61</td>
<td>0.62</td>
<td>0.58</td>
<td>0.51</td>
</tr>
<tr>
<td>MAF</td>
<td>0.56</td>
<td>0.53</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>MEF</td>
<td>0.58</td>
<td>0.55</td>
<td>0.59</td>
<td>0.56</td>
</tr>
<tr>
<td>MUM</td>
<td>0.57</td>
<td>0.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAF</td>
<td>0.57</td>
<td>0.55</td>
<td>0.59</td>
<td>0.59</td>
</tr>
<tr>
<td>SEM</td>
<td>0.58</td>
<td>0.58</td>
<td>0.57</td>
<td>0.55</td>
</tr>
<tr>
<td>SHM</td>
<td>0.59</td>
<td>0.59</td>
<td>0.61</td>
<td>0.56</td>
</tr>
<tr>
<td>SOF</td>
<td>0.62</td>
<td>0.58</td>
<td>0.61</td>
<td>0.55</td>
</tr>
<tr>
<td>SUM</td>
<td>0.50</td>
<td>0.61</td>
<td>0.56</td>
<td>0.62</td>
</tr>
<tr>
<td>TAM</td>
<td>0.58</td>
<td>0.57</td>
<td>0.57</td>
<td>0.58</td>
</tr>
<tr>
<td>TEM</td>
<td>0.70</td>
<td>0.54</td>
<td>0.59</td>
<td>0.51</td>
</tr>
<tr>
<td>WEM</td>
<td>0.57</td>
<td>0.55</td>
<td>0.59</td>
<td>0.57</td>
</tr>
<tr>
<td>WIM</td>
<td>0.61</td>
<td>0.60</td>
<td>0.59</td>
<td>0.60</td>
</tr>
<tr>
<td>YVF</td>
<td>0.60</td>
<td>0.59</td>
<td>0.59</td>
<td>0.60</td>
</tr>
</tbody>
</table>
However, there were cases in which the lexical density ratio range for the same learner in the same environment was pronounced. The following two excerpts from postings contributed by the same learner exemplify this point and offer the reader some indication of the language differences that this measure identifies.

NAFECl (Lexical Density Ratio = 0.62)
Indonesia is a democratic country, but on the matter about religion, the policy is quite strict. Not like in US where we can choose where we want to have a religion or not and can choose any religion which is exist in the world as we want, in Indonesia we have to choose one religion from those which goverment admit. They are Moslem, Catholic, Christian Protestant, Hindu, and Buddist. The majority religion in Indonesia is Moslem (95%) and most of them are the residence of Java and Sumatra island especially on Aceh and Yogyakarta province, the rest are Catholic and Protestant in North Sumatra and Lombok island, Hindu in Bali island, and Buddhist as the minority...

NAFER2 - Lexical Density Ratio = 0.44
related to the email contribution from JWMEC2 (sorry if i spell your name incorrectly) i think that ofcourse that in every magazines there will be an advertisement whatever the news are, because that are where the magazines live from aren't there?!
so i think the advertisement have nothing to do with the news on the magazines...'cause the ad is just a media where people can know what other people sell and the buyer know that there is someone produce what he or she wanna buy...what do you think?

From these examples it is clear that the registers produced in asynchronous CMC environments may cover a wide range of possibilities, even though the mean values of the lexical density ratio per activity do not seem to reflect this fact (see Table 10). In a recent study, Johanyak (1997) challenged the views that CMC discourse constitutes a hybrid and concluded that "language users approach new and possibly unfamiliar communication technologies in different yet familiar ways as they seek to negotiate and establish new discourse genres through their own cognitive, social and contextual experiences, experiences constructed at least partially by culture." (p. 106) These findings seem to be supported by some of the data obtained in this study. When writing responses, some participants seemed to identify the medium with a formal writing environment whereas others tended to use very informal language. However, this observation would not appear to be supported by the lexical density ratio analysis. As mentioned before, the variations in the range seem to suggest that generalizations of that kind need to be carefully revised. In an instructional context like the one in which these texts originated, variables such as the
type of topics the learners are writing about and the input they receive may also account for the diversity of registers.

However, contrary to previous findings related to the use of asynchronous CMC in L1 (Murray, 1988) and L2 (González-Bueno, 1998), most of the contributions in both environments seemed to be written in rather formal language. This was probably due to the fact that the exchanges did not take place spontaneously but within the context of a task performed for an academic writing class.

Table 10. Summary of Lexical Density Ratio

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>LD Ratio</th>
<th>Type of Activity</th>
<th>LD Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution 1</td>
<td>0.59</td>
<td>Response 1</td>
<td>0.60</td>
</tr>
<tr>
<td>Contribution 2</td>
<td>0.60</td>
<td>Response 2</td>
<td>0.58</td>
</tr>
<tr>
<td>Contribution 3</td>
<td>0.58</td>
<td>Response 3</td>
<td>0.57</td>
</tr>
<tr>
<td>Contribution 4</td>
<td>0.57</td>
<td>Response 4</td>
<td>0.57</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>0.58</strong></td>
<td><strong>Mean</strong></td>
<td><strong>0.58</strong></td>
</tr>
<tr>
<td>Forum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contribution 5</td>
<td>0.58</td>
<td>Response 5</td>
<td>0.57</td>
</tr>
<tr>
<td>Contribution 6</td>
<td>0.59</td>
<td>Response 6</td>
<td>0.56</td>
</tr>
<tr>
<td>Contribution 7</td>
<td>0.58</td>
<td>Response 7</td>
<td>-</td>
</tr>
<tr>
<td>Contribution 8</td>
<td>0.58</td>
<td>Response 8</td>
<td>0.58</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td><strong>0.58</strong></td>
<td><strong>Mean</strong></td>
<td><strong>0.57</strong></td>
</tr>
</tbody>
</table>

The responses, however, did seem to be characterized by a more informal style. One of the reasons for this variation may have been the high demand of metacognitive strategies that writing a response involved. If learners concentrated on selecting the postings they wanted to reply to and made an effort to recall what the postings were about, what the stance of the writer was, and how that information could coherently fit in their message, they probably resorted to the use of less complex language and relied more on its pragmatic use in an attempt to get their ideas across. The trade-off seems to be
justified if the electronic environments offer opportunities for both, which seemed to be the case in this research.

It is interesting to note that other markers of more informal CMC registers such as paralinguistic devices (e.g., emoticons such as :) ) or the use of capitals to express emphasis or multiple question marks or phatic discourse markers intended to ensure that communication is taking place (e.g., “Don’t you think?” or “...right?”) (González-Bueno, 1998) did not occur with much frequency. When they did, they seemed to be used by less proficient learners (see examples below).

Just i know foods in your country almost spicy.right? (SOFER1)
I think there are many colors in their products. It is their characters. Don’t you think? (SOFER3)
In American they like to use several colors mixed. I think it is a very good way, right? (SOFER3)

Note that all the examples were found in responses. This particular learner did not use these markers in her contributions, which tended to be written in a more formal and assertive way. In her responses, however, her use of language was more tentative, as in the examples above. A possible explanation for this could be that the learner was addressing contributions written by other peers in her replies. Aware that her audience could question her assumptions, she probably tried to make her opinions sound more tentative by using these devices.

Coordinating Index

As explained in the previous chapter, the coordination index (CI) is a measure of syntactic complexity (i.e., it indicates the proportion of coordination used in a text). A coordination index of 0.17 indicates that 17% of the clauses counted in the text are connected using coordinators. The rationale for using this measure is that more proficient writers will use a higher proportion of subordination, which results in a lower coordination index if compared with texts written by less proficient writers, who will tend to rely more on simple clausal coordinations to connect their ideas (Warschauer, 1996). The coordination index (CI) is supposed to be inversely proportional to language complexity (i.e., the lower the CI value, the higher the use of subordination).
The total mean values obtained from the contributions and responses submitted to the two environments did not seem to vary considerably. However, as it was the case with the lexical density ratio, the range of the coordination index values was very high in most instances (see Table 11).

Contrary to the case with the lexical density ratio, coordination index values tended to be slightly lower in the responses in both environments, which may indicate that a higher degree of subordination was used.

Table 11. Coordination Index

<table>
<thead>
<tr>
<th>Environment</th>
<th>Type of Activity</th>
<th>Mean</th>
<th>Total Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail</td>
<td>Contribution 1</td>
<td>0.23</td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Contribution 2</td>
<td>0.20</td>
<td></td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>Contribution 3</td>
<td>0.32</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Contribution 4</td>
<td>0.28</td>
<td>0.26</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Response 1</td>
<td>0.31</td>
<td></td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>Response 2</td>
<td>0.34</td>
<td></td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Response 3</td>
<td>0.29</td>
<td></td>
<td>0.67</td>
</tr>
<tr>
<td></td>
<td>Response 4</td>
<td>0.30</td>
<td>0.31</td>
<td>0.78</td>
</tr>
<tr>
<td>Forum</td>
<td>Contribution 5</td>
<td>0.20</td>
<td></td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Contribution 6</td>
<td>0.28</td>
<td></td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>Contribution 7</td>
<td>0.29</td>
<td>0.26</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>Response 5</td>
<td>0.25</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Response 6</td>
<td>0.29</td>
<td></td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Response 8</td>
<td>0.25</td>
<td>0.26</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Type-Token Ratio

This measure is intended to give an indication of the lexical complexity of the text. The type-token ratio (TTR) is calculated by dividing the number of different words by the total number of words in a text. The resulting value gives an indication of the lexical
variety used in the text. A higher TTR is associated with higher lexical complexity. In interlanguage studies, TTR is probably a more reliable measure than the lexical density ratio because it is not affected by the variable that could affect the LDR calculation (i.e., omission of grammatical items).

For this study, the average for the TTR in contributions and responses per participant in both environments was calculated. The results indicate a marked tendency for TTR to be higher in the responses in both environments (see Appendix G). A paired t-test between the mean TTR of e-mail contributions and responses indicated that there were significant differences between these two (t[16]=5.63; p<.01). Likewise, the same statistical test applied to the mean TTR of the forum contributions and responses revealed significant differences (t[14]=3.54; p<.01). These findings support the idea that language complexity in the contributions and responses is not balanced (i.e., a higher lexical demand to respond to other participants’ ideas, combined with the necessity to use more subordination to connect ideas and a probably more demanding use of metacognitive strategies make up for the apparent decrease of lexical density).

The type-token ratio in forum contributions was higher than in e-mail. Significant differences were also observed in a comparison between the contributions posted to the two environments (t[16]=2.60; p<.05) (see Appendix G).

It is interesting to note that the type-token ratio in contribution 8 (forum environment) seemed to be consistently higher for all participants. This can be result of the variety of topics posted for this activity. For this activity, the learners were requested to submit a topic of their choice to the environment. Some language constraints disappeared, such as the necessity to write about a topic selected by the instructor with which the learners may or may not be acquainted and which they may or may not find interesting enough to write about. This idea could also hold true to partially account for the differences described between contributions and responses in both environments. Learners were free to choose which contributions to address, which probably increased their chances of finding topics they were eager to write and discuss about.

A further possible factor accounting for the higher type-token ratio observed in forum
contributions can probably be explained in terms of the differences of the software. In the case of e-mail, the topics assigned for the contributions were available in the class syllabus and in the class textbook. In the forum environment, however, topics were posted and remained visible while the learners were writing their contributions, so they may have been more likely to use this input as they wrote. Unfortunately, this speculation cannot be confirmed with the type of data gathered for this study, since the researcher was not present at the moment the learners composed their texts.

As mentioned before, the e-mail environment registered lower type-token ratio values than the forum. Although this would probably lead us to expect lower values in both contributions and responses, there were no significant differences in the type-token ratio values between the responses in the two environments ($t[14]=1.99; p<.05$). This again can probably be attributed to the differences between the environments. The software may have posed different constraints in the task process. In the forum, learners can read the message they are responding to as they write. As it was observed in the analysis of interactivity, learners tend to concentrate on only one message (trigger) to write their response. Since the discussion is organized in threads, learners cannot incorporate ideas from messages that have not been listed under that thread unless they “leave” that discussion. Although this study did not include data to support this assumption, it is probably safe to assume that it is rather unlikely that learners will take the trouble. On the contrary, the e-mail environment is in a sense more chaotic. Messages get delivered to the learners’ inboxes with usually little or no descriptive information (e.g., in most messages learners would simply ignore the subject line or a few words, such as “contribution 1” or “assignment 1”). Although learners had the option to delete messages without actually reading them, and probably did so sometimes, they seemed to have been more likely to direct their attention to more than one message (trigger). In order to respond to these messages, it must have been necessary to incorporate some of the vocabulary the writer used. Software constraints therefore seem to have had an unexpected impact on the task process.
Discursive Management

The values obtained through the calculation of the discourse management scores on each contribution and response were averaged in order to obtain a mean score for each student in each environment. This calculation resulted in higher scores in the forum facility, which the learners used during the second part of the semester. A paired t-test applied to the scores of learners who participated contributing more than one posting to each environment indicated that the scores in forum texts were significantly higher than those registered in e-mail (t[14]=3.86; p<.001).

If the assumptions made for Swaffar’s model are supported, this should be expected to happen since the scoring is supposed to reflect the learner’s progress in short periods of time. Swaffar contends that holistic measures used in longitudinal studies rarely reflect improvement in the learners’ use of metacognitive strategies to “change sentence units so that they present content more convincingly or develop clearer organizational links between ideas.” For example, cohesion studies quantify the occurrence of cohesive ties, which may go beyond the sentence level, but do not account for the learners’ management of higher order metacognitive strategies. Hence, assuming that this discursive strategy model works as its author claims, the scores should reflect the learners’ progress at this level along a semester’s work. Indeed, the average score for each learner in each environment, including contributions and responses, was higher in the tasks which were developed later in the semester, which were carried in the forum environment.

However, a similar calculation including only the responses submitted to both environments seems to indicate that discursive management scores on responses in the e-mail environment are significantly higher than those posted in the forum (t[13]=2.88; p<0.01) (see Table 12). This difference can probably be attributed to the combined effect of the variations in the activity descriptors and the constraints of the software. As the activity plan indicates, in an attempt to stimulate discussion in the forum environment, learners were allowed to post their own topics (contribution 8). The wide variety of topics posted during this week, combined with the characteristics of the software which imposes a hierarchical organization to the discussion threads, resulted in an dispersed on-line
Table 12. Discourse Management Scores in Responses

<table>
<thead>
<tr>
<th>Participant</th>
<th>E-mail</th>
<th>Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td>AYF</td>
<td>2.53</td>
<td>1.76</td>
</tr>
<tr>
<td>GRF</td>
<td>2.57</td>
<td>1.98</td>
</tr>
<tr>
<td>JWM</td>
<td>1.87</td>
<td>2.21</td>
</tr>
<tr>
<td>KOM</td>
<td>2.42</td>
<td>2.73</td>
</tr>
<tr>
<td>LUM</td>
<td>1.70</td>
<td>1.75</td>
</tr>
<tr>
<td>MEF</td>
<td>2.38</td>
<td>2.90</td>
</tr>
<tr>
<td>NAF</td>
<td>2.44</td>
<td>2.32</td>
</tr>
<tr>
<td>SEM</td>
<td>2.71</td>
<td>1.98</td>
</tr>
<tr>
<td>SOF</td>
<td>2.17</td>
<td>1.98</td>
</tr>
<tr>
<td>SUM</td>
<td>2.02</td>
<td>1.97</td>
</tr>
<tr>
<td>TAM</td>
<td>2.37</td>
<td>2.05</td>
</tr>
<tr>
<td>WEM</td>
<td>2.02</td>
<td>1.97</td>
</tr>
<tr>
<td>WIM</td>
<td>2.62</td>
<td>2.64</td>
</tr>
<tr>
<td>YVF</td>
<td>2.32</td>
<td>2.07</td>
</tr>
</tbody>
</table>

*t(13) = 2.88 (p < 0.01)

discussion. However, the environment did seem to support the task goals for contribution.
7. As explained earlier in this chapter, his contribution was intended to give learners a
chance to practice for a final essay examination. They were requested to write a mini-essay
expressing and supporting their views. Discursive management scores seem to reflect the
learners’ endeavor to meet the goals set for this task by producing texts which featured
complex discursive functions such as argumentation and elaboration of stated or implied
ideas.

Qualitative Analysis

The CALL texts in the two asynchronous environments seemed to present some
differences in the kind of language features that were perceived as more recurrent. In the
discussion about participation, it was noted that both environments fostered a similar
degree but different patterns of interactivity. The e-mail environment seemed to favor
more sophisticated use of language probably by prompting the learners to react to more
than one of the opinions posted in the list, even though the environment was not as
organized as the forum. Connected with these may be the findings reported by Black et al. (1993) who concluded that sequentiality is not an inherent property of human communication because the characteristics of some media, such as e-mail, allow participants to get involved in multiple threads of discourse. From this perspective, probably the e-mail environment reproduces an apparently disorganized discussion with ample opportunities for the participants to perform a number of language moves (e.g., interrupt, make comments, agree or disagree with what is being said, etc.).

In the discussion about participation it was also noted that messages which contained more than one referent require a more complex use of language and strategic competence, since the learner is incorporating or referencing ideas from two different messages in her own. This type of interactivity is probably very important to foster interlanguage development. If the learner is compelled to restate or paraphrase the ideas in the trigger message and make them work in hers as part of a cohesive whole, she may not only be engaging in higher order metacognitive process but also acquiring rhetorical knowledge through the emulation of the features present in other postings. The example below shows how one of the less proficient learners in the class engaged in this type of interaction in the e-mail environment.

I agree with MAFEC4. I really impressed because American people can be discipline in time. After I read the e-mail contribution about that topic, there are a lot of countries can not discipline in time, including Indonesia. From my personal experience, I can make a conclusion that most of the Indonesian people not discipline in time, they are always late if they have an appointment with somebody. More over sometimes they're not feel guilty when they're late.

On the other hand I'm disagree with GRFER4. GRFER4 said that in the class American people always leave their class before the lecture is finished. I think it's not a possitive attitude, because they have to wait until the lecture is already finished, so they can leave their class.

Yah! that's all my opinion about time, maybe some of my opinion is not the same with yours. Because what I write is my personal opinion. (MEFER4)

In the example above, it is interesting to note that the learner may be using lexis and emulating rhetorical strategies applied by more proficient learners. The two excerpts below contain vocabulary and the rhetorical organization that the less proficient learner may have “borrowed” from her more proficient peers.
I am agree with GRFEC4. I am impressed with the punctuality of american people. They always arrive to class five minutes before it begins and take a sit until the teacher arrives... (MAFER4)

In my opinion, practical science and theoretical science always work together. Without any of them, things won't work out, but i agree with the practical science is more important than theoretical science because theoretical is so abstract and only practical can make us have an idea on it. For example, you know the theory of driving a car, but only practical u will learn how to control a car, like how to control the throttle and clutch.

On the other hand, I think practical will give us a profound impression. Finally, i think if no practical science, some of the theory won't come out, only practical science proves that this theory is accurate or true... (YVFEC3)

However, the kind of features that are described in the literature as probably conducive to acquisition did not occur in these environments, probably due to the fact that in much of the literature “negotiation of meaning” mostly exclusively refers to the occurrence of pragmatic acts intended to remedy a communication breakdown. Defined as such, negotiation of meaning did not occur in this asynchronous discourse, at least not in a way that was evident in the data. The learner might try to remedy the communication breakdown, but they may do so by guessing meaning through context or consulting other sources such as a dictionary, a more proficient learner or a native speaker. As Ellis (1994) notes, “the study of interlanguage pragmatic acts in L2 acquisition has focused on the spoken medium and has paid little attention to writing” (p. 187-8).

Finally, consistent with the findings reported by Black et al. (1983), a very recurrent syntactic feature in both environments was the use of conditional sentences. Black et al. conclude that this is due to the lack of context cues which are typically present in face-to-face discourse. However, in the activities described in this analyses the frequent use of conditional structures was probably also fostered by the type of topics the learners wrote about, which considered hypothetical situations and prompted the learners to express what they would do if they encountered them. The example below illustrates this point.

I have noticed that there are different attitudes in different parts of the world. In US, I found that the students and lecturers here are very punctual for their class. And they are punctual to leave the class too. If the class finished at 9.50, the Americans have already packed their bag at 9.45, they would not stay longer to waste their time. This is really impressed me because in my country, people seldom be punctual in their class, dinner, meeting.....etc.

I live in Kuala Lumpur (capital of Malaysia) which is famous with her most serious traffic jam problems. Sometimes, it will spend you few hours on the road. If I am invited to dinner at 7.30, I have to estimate half an hour to jam on the road. So, if I want to arrive at 7.20,
and it will take 30 minutes from my house to there, I must leave home before 6.20. For me, I think it is OK if I only late for 5-10 minutes. If I know I will be late for more than 30 minutes, I will feel obligated to call and tell the host. If I came at 8 o'clock, I would feel embarrassed for being late. But being late is very common in my country and people normally would not feel embarrassed because traffic jam became our good excuse... (GRFEC2)

From these examples it can be concluded that even though there might be some language features which appear to be recurrent in asynchronous CMC, the impact of the environments on instructional goals is not limited to their occurrence. Other factors associated with the features of the software can also account for important differences in the learners’ language output and consequently alter expected outcomes.

In sum, this chapter showed that although the two environments investigated seemed to enhance the learners’ participation and thus cooperated to accomplish this instructional goal, the features of the software had an unexpected impact on the levels of interactivity observed. The differences in interactivity indicate that the e-mail environment was a better choice to prompt learners to engage in the type of language use that was anticipated (Appendix A). These results also show that measures such as lexical density and coordination index are not accurate enough to be used in interlanguage studies since they may be greatly affected by the learners’ inaccurate use of language. Measures such as the type-token ratio and discursive management score are probably better suited to reflect the quality of the language produced in asynchronous CMC environments. Finally, the general differences in the quality of the language output observed in the two environments suggest that the assumption that all asynchronous CMC environments will equally cooperate in the achievement of language learning goals is wrong.
CHAPTER 5
CONCLUSION

This chapter summarizes the major findings reported in Chapter 4 of this thesis and presents observations related to the methodologies applied in this study as well as implications and suggestions for future research.

Major Findings

The most important result was the confirmation that the two asynchronous CMC environments analyzed (i.e., e-mail and ClassNet forum) presented important differences which directly affected instructional outcomes. The two asynchronous environments widely varied in their software features and impacted learners’ participation and the quality of their language output in significantly different ways.

The first research question in this work was intended to account for the software differences between the two asynchronous CMC environments. The results of this analysis indicated that the two environments differ greatly in the ways they handle messages and organize content, in the degree of control they grant the instructor and in general aspects of their operation. Of all these, organizational features played a key role in achieving desired outcomes. The fact that the e-mail environment lacked a hierarchical organization of content required learners to supply that information and in order to do so, they probably had to read more of their peers’ postings than in the forum environment. This prompted the learners to react to more than one posting at a time, which most probably demanded a sophisticated use of memory and metacognitive skills. This is especially important in situations where the use of the environments is not spontaneous but circumscribed to instructional contexts where quality pedagogic outcomes are expected.

The two environments share only a few properties that are very important for the achievement of the instructional goals planned for the activities analyzed in this research, namely their equalizing effect through the reduction of social context cues related to gender and a positive impact on the learners’ participation in terms of the quantity of the language output.
The second research question in this study was intended to investigate whether either of the two asynchronous environments was more suitable to achieve the instructional goals in terms of the learners' participation and the quality of the language output. From this perspective, the results indicate that e-mail seemed to be a better choice than the forum environment. Despite the similar results related to two aspects of participation (i.e., similar quantity of language and reduction of social context cues related to gender in both environments), e-mail prompted a higher degree of interactivity in the responses. This can probably partially account for the significantly higher lexical complexity (measured by type-token ratio) and strategic control of discourse (measured by discursive management scores) which were observed in the e-mail environment. The differences in interactivity can probably be best explained in terms of the organizational features of the software: e-mail did not provide clearly organized discussion threads, which affected the linguistic quality of the resulting interaction. That is, higher interactivity implied more responsiveness on the part of the learner to her audience, sophisticated language use (e.g., to summarize and paraphrase other peers' opinions) and strategic competence (e.g., to identify other peers' stance and plan a rebuttal or supporting argument).

Although a desired outcome would be for all activities (e-mail and forum contributions and responses) to score consistently in measures of interactivity and language quality in the two environments, the results show that that was not the case. Despite the fact that the forum environment registered higher values for type-token ratio and discursive management overall, responses in the e-mail environment showed higher values than in the forum. From the perspective of the instructional goals for these activities, the elicitation of higher language quality in the learners' responses was better than in the contributions. Responses more closely resembled the type of tasks which the learners would encounter in their future academic work (e.g., they required the learners to synthesize concepts expressed by other participants and to incorporate them in their texts in a meaningful way). Although the e-mail environment seemed not to elicit as high language quality as the forum in the contributions, it did boost a sophisticated use of lexicon and discursive management strategies, which suggests that the participants were
more carefully following the discussions originated in this environment and using language knowledge which was more evenly shared amongst them.

This study has shown that the achievement of instructional goals in asynchronous CMC is not exempt from factors such as the features of the software and the skills of the participants, including the instructor, neither of which seems to be properly accounted for in much of the literature. An example to illustrate this point is the way in which the discussion activities described in this study were set up in the ClassNet forum. The instructor approached this environment in very much the same way he had dealt with the mailing list; after all, they were both asynchronous in nature and there seemed to be no need to restructure the activity in any way. The instructor’s expertise in using the technology is then an important variable that can significantly impact the results obtained in CALL research. Previous research in L1 seems to support this claim. A study based on data obtained from a 1988 national survey in the USA revealed that exemplary users of computer technology in K-12 education had about four years of experience in its application (Becker, 1994). Likewise, Sheingold and Hadley (in Becker, 1994) concluded in their 1990 study that American teachers required a minimum of five years to become proficient technology users in instructional contexts.

It is possible that if the ClassNet forum environment had been exploited to all its potential, as the e-mail environment may have been, the learners’ interest in participating, the degree of interactivity, and the language output might have been considerably different from what was observed. For example, the forum facility in ClassNet allows the instructor to make links to other websites (i.e., the instructor’s homepage), which could contain extensive reading, listening and even video materials to provide quality language input. Also, since ClassNet restricts access to the students who are enrolled in the class, readings from the students’ textbook could have been scanned and made available for them on-line with enhanced features (e.g., with links to related sites or supplemental materials such as pictures, video- or audio-clips, etc.), which would have helped to make the task more sensitive to different learning styles (Peck, 1991) and the environment more suitable to achieve desired instructional goals. If this asynchronous environment had been exploited
to its maximum potential, it could have probably generated a type of interaction among the participants that would have been impossible to achieve in a UNIX based e-mail environment. The potential ClassNet forum offers to utilize already available sources from the world wide web combined with the instructor’s skillful operation could have helped to create a more interactive, student-centered environment (Simonson & Thomson, 1997) with ample resources for quality input. The skillful use of these features of the environment might have made up for the low interactivity rate or altogether modified the interactivity patterns observed. Likewise, it would have been possible to implement instructional goals with a higher emphasis on the use of metacognitive skills. As this example shows, the interaction between the software features of the environment and the instructor’s expertise may play a key role in the achievement of satisfactory results.

Methodological Observations

The methodologies applied in this study to assess the learners’ language quality deserve further discussion. In a recent study, Swaffar (1998) contends that “When student writing in computer classrooms reveals increasing control in persuading, arguing, or explicating writer views, then teachers can say with some assurance that time spent on computer networking is time well spent” (p. 157). Swaffar insightfully questions common discursive measures used in the literature to analyze the learners’ interlanguage and concludes that they do not “yield insights into the logical cogency of the propositional concepts that are related” (p. 160).

Swaffar’s assertion seemed to hold true for some of the quantitative language measures used in this research. The lexical density ratio and the coordination index, which were intended to address aspects of the quality of the language produced in both environments (i.e., register and syntactic complexity respectively), seemed to present some shortcomings. The lexical density ratio accounted for much variation in the density of the information contained in the postings, but the high range between different postings by the same participant and between different participants in the same activity indicate that summary statistics may not be meaningful and therefore results are inconclusive. This seems to indicate that assumptions related to the register of the language produced in
asynchronous CMC based on this measure may be difficult to define. Additionally, the lexical density ratio does not seem to be an accurate measure to apply to interlanguage studies since second and foreign language learners often have difficulties in the use of articles and prepositions in English. Because these grammatical items are sometimes omitted, the calculation developed for proficient speaker language is less informative for learner language. Therefore, a high lexical density ratio in interlanguage may as well be an indicator of the learner’s deficiencies in this area rather than the lexical density of the register she is using.

The use of the coordination index in this study posed a similar problem. Even though this index does accurately reflect the proportion of coordination present in a given text, the assumption that a lower coordination index correlates with a higher use of subordination and results in more sophisticated use of language does not seem to always hold true. For example, texts in which coordinators are omitted in places where they should be used and include only one simple form of subordination (e.g., a simple conditional sentence) are given an overrated score. It is then questionable whether this measure is reliable to assess the syntactic complexity of interlanguage texts.

On the other hand, the other two quantitative analyses applied in this study, type-token ratio and discursive management score, seemed to be well-motivated measures to reveal aspects of the quality of the interlanguage produced in the electronic environments (i.e., lexical complexity and strategic control of discourse respectively). These measures do not seem to be affected by the typical fluctuations in the learners’ interlanguage since they account for language features that are not exclusively dependent on mechanical aspects related to grammatical accuracy. If future research continues confirming that the assessment of strategy management may effectively measure improvement in the learners’ ability to manage discourse, this assessment may become a valuable tool for the research, teaching and learning of second and foreign languages. With all its limitations, this innovative assessment seems to be a good example of the type of tools that need to be developed to assess interlanguage development in writing.
Implications and Suggestions for Further Research

Perhaps the most significant contribution this study offers to the field is the finding of important differences between asynchronous CMC environments and their possible impact on instructional goals. Taking stock of these differences can probably help instructors to set realistic goals for asynchronous CMC and to design activities which will be likely to reach those goals. For example, an electronic environment which prompts a high level of interactivity among participants will be more likely to facilitate the achievement of language learning goals such as the learners' development of discursive strategies and application of important rhetorical language functions (e.g., expressions of agreement and disagreement in written discourse).

This study may also be valuable for further research on the development of asynchronous CMC learning environments which are likely to be conducive to second language acquisition. As mentioned above, the ClassNet forum facility offers the potential to develop activities which could result in high involvement on the part of the participants and interesting findings for CASLA (Computer Applications in Second Language Acquisition) (Chapelle, forthcoming). For example, the flexibility of this environment to interface with other applications allows for the inclusion of extensive input to supplement discussion prompts. By enhancing the environment in this way, learners would probably not limit their contributions and responses to their world experience. Having readily available input in different formats (e.g., video, audio, etc.) increases the possibilities of prompting interactions containing language features which are hypothesized to be conducive to second language acquisition processes.

The results of this research will also probably serve as a trigger for further investigation within the field of second language acquisition through computer-assisted language learning (CALL). Years of research have made it possible to identify and describe aspects of CALL focusing on the interests and concerns of second and foreign language teachers and researchers (Chapelle, forthcoming). However, there is still the need for research in writing as a possible source of second language acquisition and the role that CALL can play in this process. Studies which thus cover a wider spectrum than
this one are needed, such as observations including the learners' interaction with the environment as they work (Dunkel, 1991). As noted in the qualitative analysis in this study, the data gathered for this research did not contain instances of language use which is believed to trigger acquisition processes. However, it would be wrong to assume that learners did not engage in that type of language use while working on the tasks. For example, it is not clear from these data whether there were communication breakdowns when the learners read the other participants' messages and if there were, how the learners overcame them. Future research should include these issues in order to gain a better understanding of the language processes in which the learners engage while they interact with the environment.

Finally, it is hoped that the present research has made clear the need for studies which provide contextual variables and which incorporate means of assessment of the learners' language output which are commensurable with well-defined instructional goals. This study is among the first to show that even though electronic environments may share some characteristics (e.g., equalizing effect on learners' participation in the two asynchronous CMC environments investigated in this research), the variables that may influence and even condition their effective application in an instructional context cannot be ignored. In order to optimize the transfer of CALL research into the classroom, it is necessary to account for contextual variables that may significantly impact instructional goals and to further investigate and understand the effects that those variables may have in the learners' language output. Using CALL environments to achieve specific goals will help to amalgamate the application of CALL with principles from second language acquisition theory, which constitutes a desirable combination in second and foreign language learning contexts. Similarly, the application of CALL motivated by the achievement of specific goals will help to guide CALL research toward the development of measures that are well-motivated to assess outcomes.

A future research agenda should additionally address issues of quantity of language and participation in combination with well-motivated measures of language quality. The question whether increased language output corresponds, for example, with increased
interactivity in the environment or with an increment in the learners' ability to manage discourse remains to be further investigated.
APPENDIX A. LANGUAGE ABILITY

Table 13. Language Knowledge

ORGANIZATIONAL KNOWLEDGE
Grammatical Knowledge
- Knowledge of vocabulary
  Varied, determined by the topic. Increasing lexical complexity required as topics progress.
- Knowledge of morphology/syntax
  Relative depending on learners’ proficiency, but enough to produce fairly complex syntactic structures, e.g., subordinate clauses, passive voice, conditional sentences, etc. and accurate morphemes.
- Knowledge of graphology
  Minimal keyboarding skills necessary to complete the tasks.

Textual Knowledge
- Knowledge of cohesion
  Tasks demand identifying and producing cohesive ties to understand and write messages. In order to extract meaning and identify relationships between sentences, learners need to have a working knowledge of the way cohesion is established in English.
- Knowledge of rhetorical organization
  Needed to produce and understand the organizational development of the message.

PRAGMATIC KNOWLEDGE
Functional Knowledge
- Knowledge of ideational functions
  This type of knowledge is necessary to exchange information about feelings or ideas. The production or comprehension of arguments, descriptions, explanations, summaries, paraphrases etc. or messages which state or imply the writer’s stance require the use of this type of functions.
- Knowledge of manipulative functions
  In these tasks, predominantly present in the form of interpersonal functions, e.g., greetings to the audience and of instrumental functions, e.g., persuasive messages, rhetorical questions, etc.
- Knowledge of heuristic functions
  Retention of information (topical content or message content) and inferencing (to convey and understand stance, attitudes, etc.).

Sociolinguistic Knowledge
- Knowledge of dialect/variety
  US English (interlanguage)
- Knowledge of register
  Academic written language. Previous studies seem to indicate that register in CMC is subject to variation according to the way the participants’ perceive the environment (Johanyak, 1997). Register is thus negotiated and established by the participants.

(Bachman & Palmer, 1996)
Table 14. Topical Knowledge

**TOPICAL KNOWLEDGE**

Required topical knowledge varies according to the topic. In cases where topics were demanding, topical knowledge was provided as input in class activities which took place before the task. Sources of input included readings, campus lectures and videos.

Table 15. Strategic Competence

**STRATEGIC COMPETENCE**

**Goal Setting**

Learner is involved in the identification of the topic or posting on which her message will be based and in the selection of one topic or message to reply to when there are multiple options.

**Assessment**

Learners are involved in assessment strategies when they consider: the characteristics of the task, the type of topical and language knowledge needed to fulfill it and the appropriateness of their message (contribution, response or topic).

**Planning**

Learners use planning strategies when they select elements from their topical and language knowledge to apply in their language use, when they internally prioritize among a possible set of plans and when they select a particular plan as course of action.

*As defined by Bachman (1996), strategic competence can be conceived as a set of higher order cognitive strategies that serve the purpose of managing language use according to the context of the situation (p. 70).*
APPENDIX B. TOPICS

Unless otherwise specified, all these topics were taken from the class textbook (Leki, 1995) which the students used or the instructor's manual.

Table 15. Topics

Contribution 1 (as appeared in class syllabus)
Choose one of the following topics and write your response to the mailing list (Minimum 15 lines).

Topic 1: Describe three things from your culture that a stranger to your country would have difficulty understanding (don't pick something like language).
Topic 2: What kinds of misconceptions do Americans (or anyone in the world) have about your country? What kinds of misconceptions do Americans have about any foreigners?
Warning: Remember your message is sent to ALL members of the list. You will also receive all the messages sent to this list. Since you will have to respond to one of these messages, please save them in a folder.

E-mail responses 1 through 4 (as appeared in class syllabus)
Choose one of the messages sent to the list and respond to it (Minimum 10 lines).

Contribution 2 (as appeared in class syllabus)
Choose one of the following topics and write your response to the mailing list (Minimum 15 lines).

Topic: Look through magazine ads for a few minutes. What kinds of things are advertised most? What does this suggest to you about U.S. culture? What kinds of appeals are the advertisers making? That is, what are they trying to appeal to in their audience? From looking at the ads, who do you feel is the advertisers' audience? How old are they? How wealthy are they? What other assumptions did the advertisers make about their audience?

Contribution 3 (as appeared in class syllabus)
Read "From Black Holes and Baby Universes," page 318. Choose one of the following topics and send your response to the list (15 lines).

Topic 1: Sometimes common sense deceives us. What seems obviously to be true may not be true. An obvious example of this is that the earth looks flat, but very few people believe this now. Can you think of other examples where something that looks true is not and where our common sense deceives us?
Topic 2: If you are interested in the study of the universe, what is the most interesting aspect of this field for you? What is the most interesting idea you have heard about the nature of the universe? What do you know, for example, about black holes in space? Have you heard of the idea that the universe began with a "big bang"? What does it mean?
Topic 3: Some aspects of physics seem extremely theoretical. Should these aspects be taught in school if they have no practical side to them? Why or why not? What kind of people do you think are attracted to very abstract subjects like theoretical physics?
Topic 4: Some people might say that it does not matter what you think about something; what matters is what you do. In other words, practical science is more important than theoretical science. Do you agree or disagree? What role does theory play in our lives?

Contribution 4 (as appeared in class syllabus)
Choose one of the following topics and write your response to the mailing list (Minimum 15 lines).

Topic 1: Besides using spoken language, people also communicate a great deal of information through body language. Have noticed that the gestures of people from other cultures are different
Table 15. (continued)

from the gestures people in your country make? Think of hand gestures and their meanings, facial expressions, and distance maintained between people having a conversation. In your country, what movements of which parts of the body indicate the following: yes, no, I don’t know, I don’t care, Come here, Leave me alone? What gestures do you make to indicate someone making a phone call, eating, drinking? What gesture do you make when someone has made you furious? In a conversation, whom can you touch as you talk? When can you touch another person? Are there people you cannot touch? Find out how your friends and classmates answered these questions.

Topic 2: Have you noticed that there are different attitudes toward time in different parts of the world? If you are invited to dinner in your home country at seven-thirty, at what time would you probably arrive? How would your hosts react if you came at seven-fifteen? At exactly seven-thirty? At quarter to eight? At eight-thirty? At what point would you feel obligated to call and say you were going to be late? If you came at quarter to eight, would you feel embarrassed for being late? What if you came at eight thirty?

Topic 3: What specific gesture or speech patterns are used in your country to show respect for a new acquaintance, a parent, an older person, a teacher or a boss?

Topic 4: Have you felt happy, sad, embarrassed, lonely, or self-confident lately? Think of a scene you associate in your mind with that feeling and describe it in detail. In your description, try to include sights, sounds, smells, feelings, and tastes.

Topic 5: Think of places that are important to you in your home country. What places are they? Describe them in as much detail as possible. What makes these places so special?

Topic 6: What is the most important place to you here in the United States? Where do you spend the most time? Where do you have the most fun? Describe these places in as much detail as you can.

Contribution 5 (as appeared in ClassNet)

Topic Posted by: Julio (jcesar@iastate.edu)
Organization: Iowa State University
Date Posted: Sun Sep 28 11:24:09 1997

Topic Description:
Welcome to ClassNet!
We will be using this forum to post messages instead of the mailing list. Click on my name above if you want to refer to the syllabus.
Here's the topic for this week:
Think of one example of nonverbal communication in your country that could be misinterpreted here and one example of nonverbal communication here that could be misinterpreted in your country. Consider perceptions of time and space too.

Contribution 6 (as appeared in ClassNet):

Topic Posted by: Julio (jcesar@iastate.edu)
Organization: Iowa State University
Date Posted: Mon Oct 6 21:06:21 1997
Topic Description:

Topic: Student Life in the USA - Contribution 6 - Option One
What aspects of student life in the United States do you not enjoy? What do you enjoy? How is the life of a student in your country different from what it is here? Have your attitudes toward the
Topic: Comparing cultures - Contribution 6 - Option Two
Have your attitudes toward the United States or toward your own country changed since you began living here? What do you now see differently from before? Or are your attitudes basically the same but intensified?

Topic: Cultural shock - Contribution 6 - Option Three
Living in a foreign country for a long period of time is hard. Sooner or later you realize that things that didn't use to bother you when you first arrived, start to affect your life. Usually these are "little things" that seem to go unnoticed at first, but that start gaining importance after some time has elapsed. When those "little things" accumulate, you start feeling homesick and a little bit depressed. Can you identify some of those "little things"? How do you cope with such situations? What would you do if you had a friend who is going through a phase like that?

Contribution 7 (as appeared in ClassNet):
Topic Posted by: Julio (jcesar@iastate.edu)
Organization: Iowa State University
Topic: Computers and society (E-mail contribution #7)

Topic Description:
Think about the effects of computers on society. Do they have a positive or negative influence in our lives? Why? Do you think computers are culturally neutral, or do they represent Western beliefs and values? Why? Do you have a positive or negative attitude toward working with computers? Do you think your cultural background influences your attitude towards computers? How?

(Topic based on Bowers' ideas [1988])
APPENDIX C. DISCOURSE MANAGEMENT CHART
<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
<th>Markers (Stated or Implied)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Redundant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>information that does not promote idea development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Description</td>
<td>Affirmative verb “to be” and action verbs (to go, to sing, to write, etc.) Negative depends on context.</td>
<td>“I’m spending my vacation in the library.” “Contractual agreements are generally binding between two parties.” “Soap operas are a waste of time.”</td>
</tr>
<tr>
<td></td>
<td>Purely descriptive assertion of fact.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>General claim</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rhetorically open-ended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Opinion/Point of view</td>
<td>Can be preceded by dummy clause (I must say..., We believe that..., He is convinced that...) Not anchored to a specific reality.</td>
<td>“I’ve got so many papers to write that I’m spending my vacation at the library.” “I think that American housewives watch too many soap operas.”</td>
</tr>
<tr>
<td></td>
<td>Rhetorically open-ended, but presents opinion, point of view, agreement or disagreement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Evaluation (Comparisons or contrasts between two distinct entities)</td>
<td>Can be preceded by dummy clause (I must say..., We believe that..., He is convinced that...) Discursive linking: relative clauses subordinate clauses that qualify, elaborate, deny or attribute</td>
<td>“I think soap operas that deal with pseudo-social problems are a waste of time.” “I think that when people talk about soap operas, they refer to daytime serials rather than to nighttime series.” (expected follow-up or rationale) “I learned a lot about divorce law from ‘As the World Turns.’” (restricted context) “Because nighttime series present the same problems as daytime serials...”</td>
</tr>
<tr>
<td></td>
<td>• Substantiates Opinion</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Creates Expectations (reader expects follow-up or rationale)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Text-specific</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Logical Argument / Conclusion</td>
<td>therefore (might be implied) so (might be implied) if - then clauses relative clauses subordinate clauses that qualify, elaborate, deny or attribute</td>
<td>“...(so) the difference between the two is in scheduling only.” “Therefore many nighttime series are soap operas by another name.”</td>
</tr>
<tr>
<td></td>
<td>Causal conclusion or new idea that follows from or is the result of a state of affairs on which an assertion, opinion or evaluative claim is based.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Text-specific</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX D. PARTICIPATION

Table 16. Participation

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>Number of Postings</th>
<th>Number of Words</th>
<th>Number of Clauses</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail Contribution 1</td>
<td>17</td>
<td>5358</td>
<td>424</td>
</tr>
<tr>
<td>E-mail Contribution 2</td>
<td>15</td>
<td>3543</td>
<td>243</td>
</tr>
<tr>
<td>E-mail Contribution 3</td>
<td>13</td>
<td>2711</td>
<td>205</td>
</tr>
<tr>
<td>E-mail Contribution 4</td>
<td>13</td>
<td>3277</td>
<td>259</td>
</tr>
<tr>
<td><strong>Total E-mail</strong></td>
<td><strong>58</strong></td>
<td><strong>14889</strong></td>
<td><strong>1131</strong></td>
</tr>
<tr>
<td>E-mail Response 1</td>
<td>27</td>
<td>3568</td>
<td>278</td>
</tr>
<tr>
<td>E-mail Response 2</td>
<td>22</td>
<td>2774</td>
<td>217</td>
</tr>
<tr>
<td>E-mail Response 3</td>
<td>13</td>
<td>1771</td>
<td>142</td>
</tr>
<tr>
<td>E-mail Response 4</td>
<td>15</td>
<td>2543</td>
<td>207</td>
</tr>
<tr>
<td><strong>Total E-mail Responses</strong></td>
<td><strong>77</strong></td>
<td><strong>10656</strong></td>
<td><strong>844</strong></td>
</tr>
<tr>
<td><strong>Grand Total E-mail</strong></td>
<td><strong>135</strong></td>
<td><strong>25545</strong></td>
<td><strong>1975</strong></td>
</tr>
<tr>
<td>Forum Contribution 5</td>
<td>15</td>
<td>2960</td>
<td>193</td>
</tr>
<tr>
<td>Forum Contribution 6</td>
<td>17</td>
<td>4360</td>
<td>335</td>
</tr>
<tr>
<td>Forum Contribution 7</td>
<td>17</td>
<td>4063</td>
<td>299</td>
</tr>
<tr>
<td>Forum Contribution 8</td>
<td>22</td>
<td>4396</td>
<td>369</td>
</tr>
<tr>
<td><strong>Total Forum Contributions</strong></td>
<td><strong>71</strong></td>
<td><strong>15779</strong></td>
<td><strong>1196</strong></td>
</tr>
<tr>
<td>Forum Response 5</td>
<td>9</td>
<td>1216</td>
<td>81</td>
</tr>
<tr>
<td>Forum Response 6</td>
<td>17</td>
<td>3004</td>
<td>256</td>
</tr>
<tr>
<td>Forum Response 8</td>
<td>21</td>
<td>3553</td>
<td>265</td>
</tr>
<tr>
<td><strong>Total Forum Responses</strong></td>
<td><strong>47</strong></td>
<td><strong>7773</strong></td>
<td><strong>602</strong></td>
</tr>
<tr>
<td><strong>Grand Total Forum</strong></td>
<td><strong>118</strong></td>
<td><strong>23552</strong></td>
<td><strong>1798</strong></td>
</tr>
</tbody>
</table>
## Table 17. Interactivity

<table>
<thead>
<tr>
<th>Triggers</th>
<th>E-mail Responses</th>
<th>ClassNet Forum Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3+</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Responses</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX F. GENDER DIFFERENCES

Table 18. Percentage of Messages Posted by Males and Females in E-mail

<table>
<thead>
<tr>
<th>Gender</th>
<th>E-mail Contributions</th>
<th>E-mail Responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Females</td>
<td>41</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>Males</td>
<td>59</td>
<td>53</td>
<td>46</td>
</tr>
</tbody>
</table>

*$\chi^2 = 1.5$ (p < .05)

Table 19. Percentage of Messages Posted by Males and Females in ClassNet forum

<table>
<thead>
<tr>
<th>Gender</th>
<th>Forum Contributions</th>
<th>Forum Responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Females</td>
<td>40</td>
<td>41</td>
<td>47</td>
</tr>
<tr>
<td>Males</td>
<td>60</td>
<td>59</td>
<td>53</td>
</tr>
</tbody>
</table>

*$\chi^2 = 0.2$ (p < .05)

Table 20. Number of Words Posted by Males and Females Expressed in Percentages

<table>
<thead>
<tr>
<th>Gender</th>
<th>E-mail Contributions</th>
<th>E-mail Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Females</td>
<td>35</td>
<td>46</td>
</tr>
<tr>
<td>Males</td>
<td>65</td>
<td>54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Forum Contributions</th>
<th>Forum Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Females</td>
<td>42</td>
<td>38</td>
</tr>
<tr>
<td>Males</td>
<td>58</td>
<td>63</td>
</tr>
</tbody>
</table>
## APPENDIX G. TYPE-TOKEN RATIO

### Table 21. Mean Type-Token Ratio Values in E-mail and ClassNet Forum

<table>
<thead>
<tr>
<th>Participants</th>
<th>E-mail Contributions</th>
<th>E-mail Responses</th>
<th>Forum Contributions</th>
<th>Forum Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AYF</td>
<td>48.02</td>
<td>58.62</td>
<td>48.18</td>
<td>58.74</td>
</tr>
<tr>
<td>GRF</td>
<td>51.96</td>
<td>59.14</td>
<td>54.57</td>
<td>63.30</td>
</tr>
<tr>
<td>JWM</td>
<td>58.10</td>
<td>63.73</td>
<td>57.00</td>
<td>58.79</td>
</tr>
<tr>
<td>KOM</td>
<td>48.36</td>
<td>59.15</td>
<td>47.33</td>
<td>56.80</td>
</tr>
<tr>
<td>LUM</td>
<td>51.82</td>
<td>62.57</td>
<td>54.20</td>
<td>62.99</td>
</tr>
<tr>
<td>MAF</td>
<td>52.98</td>
<td>53.07</td>
<td>46.23</td>
<td></td>
</tr>
<tr>
<td>MEF</td>
<td>49.38</td>
<td>55.50</td>
<td>51.88</td>
<td>68.78</td>
</tr>
<tr>
<td>MUM</td>
<td>51.66</td>
<td>58.21</td>
<td>62.50</td>
<td></td>
</tr>
<tr>
<td>NAF</td>
<td>54.45</td>
<td>67.20</td>
<td>56.73</td>
<td>66.37</td>
</tr>
<tr>
<td>SEM</td>
<td>57.08</td>
<td>64.40</td>
<td>60.62</td>
<td>57.78</td>
</tr>
<tr>
<td>SHM</td>
<td>46.02</td>
<td>62.70</td>
<td>53.74</td>
<td>58.80</td>
</tr>
<tr>
<td>SOF</td>
<td>49.91</td>
<td>60.21</td>
<td>62.05</td>
<td>65.74</td>
</tr>
<tr>
<td>SUM</td>
<td>46.00</td>
<td>58.10</td>
<td>48.74</td>
<td>57.50</td>
</tr>
<tr>
<td>TAM</td>
<td>45.78</td>
<td>58.17</td>
<td>53.16</td>
<td>56.62</td>
</tr>
<tr>
<td>TEM</td>
<td>56.25</td>
<td>53.06</td>
<td>55.58</td>
<td>56.84</td>
</tr>
<tr>
<td>WEM</td>
<td>47.92</td>
<td>56.30</td>
<td>47.34</td>
<td>52.57</td>
</tr>
<tr>
<td>WIM</td>
<td>43.24</td>
<td>56.04</td>
<td>47.30</td>
<td>58.54</td>
</tr>
<tr>
<td>YVF</td>
<td>53.41</td>
<td>61.01</td>
<td>54.39</td>
<td>59.41</td>
</tr>
</tbody>
</table>

E-mail Contributions vs. E-mail Responses: $t(16) = 5.63 \ p<.01^*$
Forum Contributions vs. Forum Responses: $t(14) = 3.54 \ p<.01^*$
E-mail Contributions vs. Forum Contributions: $t(16) = 2.60 \ p<.05^*$
E-mail Responses vs. Forum Responses: $t(14) = 1.99 \ p<.05$

* Significant differences
REFERENCES CITED


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