INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.
Collaborative Writing Assignments and On-line Discussions in an Advanced ESL Composition Class

by

Julia V. Gousseva-Goodwin

Copyright © Julia V. Gousseva-Goodwin 2000

A Dissertation Submitted to the Faculty of the

GRADUATE INTERDISCIPLINARY PROGRAM IN SECOND LANGUAGE ACQUISITION AND TEACHING

In Partial Fulfillment of the Requirements
For the Degree of

DOCTOR OF PHILOSOPHY

In the Graduate College

THE UNIVERSITY OF ARIZONA

2000
As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Julia V. Gousseva-Goodwin entitled Collaborative writing assignments and on-line discussions in an advanced ESL composition class and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Doctor Robert Ariew 4/25/00
Date

Doctor Mary Wildner-Bassett 4/25/00
Date

Doctor Ken McAllister 4/25/00
Date

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

Robert Ariew 11/14/00
Dissertation Director
Doctor Robert Ariew

Date
STATEMENT BY AUTHOR

This dissertation has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this dissertation are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the copyright holder.

SIGNED: Julia Grueser Guttin
ACKNOWLEDGEMENTS

I would like to acknowledge and thank the people who offered their help, guidance, and support throughout the dissertation process. First, I would like to thank my advisor and mentor, Dr. Robert Ariew, for his tremendous help, encouragement, guidance, and suggestions. I would also like to thank two other members of my committee, Dr. Mary Wildner-Bassett and Dr. Ken McAllister, for their help and support throughout the dissertation process.

Special thanks are also extended to Ms. Heidi Burross for her SPSS expertise and her help with the interpretation of the statistical tests. I would also like to thank Ms. Susan Bouldin and Dr. Chris Johnson for their help with data gathering in the COHlab.

Many thanks to Betil Eroz, Sandy Rotschild, Randy Sadler, and Meena Singhal, for their help with the evaluation of students' compositions. My thanks also go to all my fellow students in the SLAT program at the University of Arizona, with whom I shared many enriching learning experiences over the past four years.

I would also like to thank my family in Moscow who were always there for me even when they were far away, as well as my family in the U.S., for their love, caring, and support. Last, but very far from least, I wish to thank my husband, Walter, who has given me his love and support throughout.
DEDICATION

To my parents, my husband, and baby Walter Alexander
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>11</td>
</tr>
</tbody>
</table>
| CHAPTER ONE: INTRODUCTION  
  Background of the study                                                  | 13|
| L2 writing: theory, research and pedagogy                                     | 14|
| Freire, Vygotsky, Piaget and the interaction theory                          | 14|
| Schumann's Acculturation/Pidginization Hypothesis                            | 16|
| Andersen's Nativization Model (1983)                                         | 18|
| Krashen's Monitor Model                                                       | 19|
| Contrastive Rhetoric                                                          | 21|
| From product-oriented to process-oriented writing: a brief historical sketch  | 22|
| Collaborative writing, computer-mediated environment and L2 writing pedagogy  | 29|
| Individual differences and personality types in writing                       | 31|
| Small group dynamics in online discussions                                   | 33|
| Purpose of the study                                                          | 34|
| Research questions and hypotheses                                             | 35|
| Research Question One                                                         | 35|
| Research Question Two                                                         | 36|
| Research Question Three                                                       | 38|
| Significance of the study                                                     | 38|
| Definitions                                                                   | 39|
| Structure and outline of the dissertation                                     | 43|
| Notes                                                                         | 45|
| CHAPTER TWO: REVIEW OF LITERATURE  
  Introduction                                                                  | 46|
| SLA view of L2 writing difficulties                                           | 46|
| Similarities and differences in L1 and L2 writing pedagogy                    | 49|
| Computer-mediated collaborative writing in an L2 classroom                    | 52|
| Computer-mediated communication as an intellectual environment                | 52|
| Brief history of collaborative writing                                         | 53|
| Effects of computer-mediated communication on L2 writing pedagogy             | 54|
| Individual differences/personality types and L2 writing                      | 55|
| Computer-mediated communication, personality types, and L2 learners          | 62|
| Small group dynamics and dynamics of discussion                               | 67|
| Computer-mediated discussions in L2 writing classes                           | 73|
| Computer-mediated communication in L2 writing classroom: research perspectives | 82|
## TABLE OF CONTENTS - Continued

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic mail in L2 writing classroom</td>
<td>52</td>
</tr>
<tr>
<td>Electronic Bulletin Board in L2 writing classroom</td>
<td>83</td>
</tr>
<tr>
<td>Internet Relay Chat in L2 writing classroom</td>
<td>84</td>
</tr>
<tr>
<td>Daedulus Interchange in L2 writing classroom</td>
<td>85</td>
</tr>
<tr>
<td>Conclusion</td>
<td>86</td>
</tr>
<tr>
<td>Notes</td>
<td>88</td>
</tr>
</tbody>
</table>

| CHAPTER THREE: METHODS AND PROCEDURES                                  | 89   |
| Introduction                                                           | 89   |
| Research questions and hypotheses                                      | 89   |
| Research context and subjects                                          | 91   |
| Data measurement                                                       | 96   |
| On-line discussion tasks of different configurations and different group sizes | 107 |
| Attitudes to collaborative assignments and to the use of computers in the course | 122 |
| Dependent variables                                                    | 129 |
| Performance measurement done by computer                               | 133 |
| Performance measurement done by ESL raters                            | 139 |
| Summary                                                                | 141 |

| CHAPTER FOUR: RESULTS AND ANALYSES                                      | 142 |
| Introduction                                                           | 142 |
| Statistical analysis                                                   | 142 |
| Communication networks                                                 | 147 |
| Interaction variables                                                  | 152 |
| Discussion content analysis                                            | 157 |
| Amount of communication analysis                                       | 160 |
| Interaction dynamics analysis: communication networks                  | 162 |
| Interaction dynamics analysis: interaction variables                   | 166 |
| Performance measurement by ESL raters                                 | 180 |
| Qualitative analysis                                                   | 185 |
| Post-semester survey: open-ended responses                             | 191 |
| Course evaluation comments                                             | 198 |
| Conclusion                                                             | 200 |

<p>| CHAPTER FIVE: DISCUSSION AND CONCLUSION                                 | 204 |
| Introduction                                                           | 204 |
| Student participation in on-line discussions of different configurations | 205 |
| Writing performance in collaborative and independent tasks             | 209 |
| Students' attitudes to collaborative assignments and to the use of computers in class | 212 |</p>
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS - Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitations of the study ............................................................. 214</td>
</tr>
<tr>
<td>Implications for future research and for L2 pedagogy .......................... 216</td>
</tr>
<tr>
<td>APPENDIX A: English 107 course syllabus .......................................... 225</td>
</tr>
<tr>
<td>APPENDIX B: COHlab Student Survey -- Pre-survey, Spring 1999 .............. 232</td>
</tr>
<tr>
<td>APPENDIX C: COHlab Student Survey -- Post-survey, Spring 1999 .......... 237</td>
</tr>
<tr>
<td>APPENDIX D: Assignments for On-line Discussions ................................ 240</td>
</tr>
<tr>
<td>APPENDIX E: Independent analysis of an essay from &quot;Conversations&quot; assignment 247</td>
</tr>
<tr>
<td>APPENDIX F: Collaborative analysis of an essay assignment .................. 248</td>
</tr>
<tr>
<td>APPENDIX G: COHlab Student Survey -- Post-survey, take-home part ........ 249</td>
</tr>
<tr>
<td>APPENDIX H: Evaluation form for ESL raters ..................................... 250</td>
</tr>
<tr>
<td>APPENDIX I: Interest questionnaire ................................................ 251</td>
</tr>
<tr>
<td>APPENDIX J: Thinking Styles Survey ............................................. 252</td>
</tr>
<tr>
<td>APPENDIX K: Grammatical error categories used by Grammatik .............. 257</td>
</tr>
<tr>
<td>APPENDIX L: List of function words in English .................................. 259</td>
</tr>
<tr>
<td>APPENDIX M: List of coordinating and subordinating conjunctions in English 260</td>
</tr>
<tr>
<td>APPENDIX N: List of cohesive conjunctions in English .......................... 261</td>
</tr>
<tr>
<td>REFERENCES .................................................................................... 262</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 2.1 Interaction Process Analysis categories defined and grouped by types ......................................................... 72
Table 3.1 Subjects' basic demographic data ................................................. 96
Table 3.2 Sternberg's score interpretation table ............................................. 103
Table 3.3a Research question one: methodology ........................................... 104
Table 3.3b Research question one: encounters ............................................. 107
Table 3.4 Scores of students' interest in discussion topics ................................ 121
Table 3.5 Self-reported data on computer access/use ..................................... 124
Table 3.6 Self-reported typing skills ............................................................ 125
Table 3.7a Research question three: methodology ........................................... 128
Table 3.7b Research question three: encounters ............................................. 129
Table 3.8a Research question two: methodology ........................................... 130
Table 3.8b Research question two: encounters ............................................. 132
Table 4.1 Discussion content variables: means and standard deviations ......... 144
Table 4.2 Amount of communication variables: means and standard deviations ............................................................. 146
Table 4.3a Recitative patterns .................................................................... 148
Table 4.3b On-line dialogs data ................................................................. 150
Table 4.3c On-line dialogs data: t-tests results ............................................. 151
Table 4.4a Summary of interaction variables .............................................. 152
Table 4.4b Summary of interaction variables: t-tests results ......................... 154
Table 4.5a Subjects' thinking styles and discussion content ......................... 158
Table 4.5b Subjects' thinking styles and discussion content: correlations ........ 159
Table 4.6a Subjects' thinking styles and amount of communication ............... 161
Table 4.6b Subjects' thinking styles and amount of communication: correlations ........................................................................ 162
Table 4.7a Students' thinking styles and communication networks ............... 163
Table 4.7b Students' thinking styles and communication networks: correlations ........................................................................ 165
Table 4.8a Students' thinking styles and interaction variables ..................... 166
Table 4.8b Students' thinking styles and interaction variables: correlations .... 167
Table 4.8c External thinking styles and interaction variables: correlation trends ........................................................................ 168
Table 4.8d Internal thinking styles and interaction variables: correlation trends ........................................................................ 168
Table 4.9a Lexical diversity: independent measures MANOVA .................... 171
Table 4.9b Lexical diversity: repeated measures MANOVA ......................... 172
Table 4.10a Lexical density: independent measures MANOVA .................... 173
Table 4.10b Lexical density: repeated measures MANOVA ......................... 174
Table 4.11a Grammatical accuracy: independent measures MANOVA .......... 175
Table 4.11b Grammatical accuracy: repeated measures MANOVA ............... 176
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.12a</td>
<td>Syntactic complexity: independent measures MANOVA</td>
<td>177</td>
</tr>
<tr>
<td>4.12b</td>
<td>Syntactic complexity: repeated measures MANOVA</td>
<td>179</td>
</tr>
<tr>
<td>4.13</td>
<td>ESL raters' writing performance evaluation results</td>
<td>182</td>
</tr>
<tr>
<td>4.14</td>
<td>Correlations between ESL raters' and computer evaluations</td>
<td>183</td>
</tr>
<tr>
<td>4.15a</td>
<td>Attitudes to the use of computers for writing</td>
<td>187</td>
</tr>
<tr>
<td>4.15b</td>
<td>Attitudes to the use of computers for communication</td>
<td>188</td>
</tr>
<tr>
<td>4.15c</td>
<td>General attitudes to computers</td>
<td>189</td>
</tr>
<tr>
<td>4.15d</td>
<td>Attitudes to collaboration</td>
<td>190</td>
</tr>
<tr>
<td>4.16</td>
<td>Responses to the open-ended part of the post-survey</td>
<td>192</td>
</tr>
<tr>
<td>4.17</td>
<td>Course evaluation comments</td>
<td>198</td>
</tr>
<tr>
<td>5.1</td>
<td>Summary of pre-semester and post-semester survey results</td>
<td>213</td>
</tr>
</tbody>
</table>
ABSTRACT

The purpose of this study was to evaluate the effects of collaborative computer-mediated projects on students' writing performance. The subjects of the study were 20 advanced English as a Second Language (ESL) composition students enrolled in an English 107 course at the University of Arizona in the Spring 1999 semester. The class met twice a week: once in a regular classroom, once in the College of Humanities Collaborative Learning Laboratory (COHlab). The study addressed three main research questions: (1) Does student participation in on-line synchronous discussions vary in different configurations of discussions and for different thinking styles? (2) Does writing performance vary between collaborative and independent tasks? (3) Is there a change in students' attitudes to collaborative assignments and to the use of computers in class from the beginning to the end of the semester?

To answer the first question, the researcher analyzed the transcripts of on-line discussions and essays written collaboratively and independently. Discussions were conducted in different configurations (whole class vs. small group and anonymous vs. non-anonymous). To collect discussion data, an archive feature was used that provided complete transcripts of discussions, including students' names (or random numbers in anonymous discussions) and time when each comment was written. Repeated measures MANOVA and qualitative analyses were used to examine the data.

The second question, investigating the difference in writing performance between independent and collaborative academic writing tasks, was addressed by (1) examining
the results of textual analysis performed by the computer, and (2) examining the results of holistic evaluation conducted by ESL raters. Repeated measures MANOVA was used to analyze the data.

To answer the third question, pre-semester and post-semester student surveys were used, as well as course evaluations. The students' thinking styles were measured using Sternberg's Thinking Styles Questionnaire. Qualitative analysis was used to examine the data.

The results of the study indicated no difference in the discussion content, amount of communication, or interaction dynamics between the discussions of different configurations, or between the students with internal and external thinking styles. In terms of differences in writing performance between collaborative and independent essays, no difference was found by discrete-point computerized text analysis. However, ESL raters evaluated collaborative essays higher than independent ones.

Finally, the results of the analysis of the students' attitudes indicated that, in general, the students' attitudes to the use of computers have improved over the course of the semester. This finding is important, as previous research (Gardner, 1988; Oxford and Shearin, 1994) has shown that positive attitudes lead to increased motivation, and increased motivation, in its turn, leads to more favorable learning outcomes in an L2 classroom.
CHAPTER ONE
INTRODUCTION

BACKGROUND OF THE STUDY

I've got two pieces of bad news about the experimental English composition course where students used computer conferencing. The first bad news is that, over the course of the semester, the experimental group showed no progress in their ability to compose an essay. The second piece of bad news is that the control group, taught by traditional methods, showed no progress either.

Stephen C. Ehrmann
(Ehrmann & Zuniga, 1997, p.2-1).

The above quote from a talk by Stephen Ehrmann reporting on a study of the use of information technology in a writing classroom is important in that it addresses a number of crucial issues related to writing performance, classroom processes and outcomes, and evaluation and assessment strategies. As computers are gaining increased attention in today's educational environments, the need to evaluate the pedagogical and methodological uses of information technology is becoming more acute. The results described in the quote are not unique: most teachers and researchers (Hawisher and Selfe, 1992) agree that one semester is too short a time to develop and/or observe better writing performance, whether technology is used for teaching or not. At the same time, it is important to critically evaluate the introduction of technology in the classroom, to describe ways in which it can reshape the classroom dynamics and help us create a more collaborative student-centered environment. A good place to start such evaluation could be to design questions that focus on the teaching and learning processes in the classroom,
not only the products. The present study analyzes both the products of collaborative and independent writing, and the processes -- online discussions the students engage in to develop their critical thinking skills and improve their English writing abilities.

This first chapter provides a brief outline of the theoretical underpinnings relevant to the study to establish the general context, and to present the interrelationship between second language acquisition and writing theories and their practical classroom application. First, an overview of the historical shift from product-oriented to process-oriented writing is discussed, as well as the role and place of collaboration in the process writing paradigm. Second, the chapter addresses some of the pedagogical uses of computer-mediated writing in an L2 classroom, and the effects of students' individual differences on their writing processes. Third, the purpose, brief rationale and a general plan of the study is presented.

L2 WRITING: THEORY, RESEARCH AND PEDAGOGY

Freire, Vygotsky, Piaget and the interaction theory

The theoretical principles underlying the pedagogical approach focusing on learning as a collaborative co-construction of knowledge are found in the work of the Brazilian educator Paulo Freire, Russian psychologist Lev Vygotsky, and the French natural scientist Jean Piaget. Freire, Piaget and Vygotsky all assign language a central role in transforming people's consciousness through interaction. Collaborative writing and revising is one of the central concepts of the present study, as the study aims to examine both the process of collaboration, as seen through on-line discussions, and its product, as seen in collaboratively written essays.
In studying the mental development of children, Jean Piaget (1932) and Lev Vygotsky (1962) both observed a mode of speech that seemed to have little social or communicative function. Absorbed in play, children would be engaged in monologues, the structure and style of which did not try to accommodate the listener. According to Vygotsky (1962), in such inner speech the child takes no interest in the other people, and focuses solely on him/herself; this type of speech does not have an explicit communicative function. Piaget (1932) explains that such egocentric or non-communicative speech is a reflection of the child's limited ability to assume the point of view of the listener, as the child's cognitive capacity has locked the child in his/her own speech.

All three scholars state that it is only through interaction with peers or adults that a learner's speech can be developed. Vygotsky refers to this phenomenon as achieving the "zone of proximal development" -- a level of cognitive and speech development that a learner is not able to achieve on his/her own but can achieve with the help of more capable peers or teachers. The idea that underlies the present study is similar: by engaging in on-line discussions with peers, students can better develop their ESL writing and reading proficiency than they could have done working alone; they can also get feedback on their views on the subject being discussed. Freire (Collignon, 1993) advocates co-intentional learning, where participants and their words are subjects of each other's learning. Piaget asserts that the learner must be active and ready to acquire knowledge. Piaget's concept of readiness emphasizes that children's ability to learn is linked to their cognitive development stage, and they cannot learn something until they
reach that stage. Even though Piaget's readiness approach conflicts with Vygotsky's zone of proximal development, both of these scholars see interaction, collaboration and active involvement as integral to learning process. The principal argument of the discourse interaction theory is that language development and social development are associated and interrelated. The proponents of the interactionist approach to SLA believe in the importance of the social context of language development, and in the crucial role of interaction with others for language acquisition. This theoretical position is central to the present study, as the study focuses on analyzing the on-line environment as a specific context for L2 written language development, as well as the role that interaction with others plays in such development.

Interactionists also believe that negotiations for meaning result in interlanguage modifications that are crucial to language development. This section of the chapter will focus on theories that emphasize the importance of socio-cultural factors and interaction for language acquisition, namely: Schumann's Acculturation/Pidginization Hypothesis, Andersen's Nativization Model, Krashen's Monitor Model, and the Contrastive Rhetoric Approach.

**Schumann's Acculturation/Pidginization Hypothesis**

Schumann's theory focuses on the role of socio-cultural factors on acquisition. Schumann (1978) refers to Smith's (1972) three developmental stages of language, which are also language functions: the communicative stage, in which the focus of the learner is solely on communication (conveying and receiving messages); the integrative stage, in which the learner uses the L2 to mark the learner as a member of the L2 group; and the
expressive stage, in which the learner uses the language for creative self-expression, reflection, and learning. The fossilization hypothesis suggests that, for example, some learners may fossilize at the communicative stage, and, therefore, be "limited in their ability to use writing as a tool for learning" (Leki, 1992, p.20), and may perceive writing as alien, thus, preventing themselves from making the connection between thought and writing that permit reflection and learning.

Schumann's model (1978) views writing students from the perspective of their initiation into academic discourse communities. As is the case with the L2 students' perceptions of and reactions to a larger L2 community, when the academy appears too distant, and too unwelcoming, both ESL and native writing students may resist the kind of acculturation or "initiation into the academic discourse community which is expected of them in their writing classes" (Leki, 1992, p. 21). Such acculturation, or initiation, may be perceived differently by students when it is conducted in an on-line environment and among their peers. This study, although not focusing explicitly on the issue of L2 students' acculturation/initiation into academic discourse communities, touches upon the issue of students' perceptions of the use of computers and on-line discussions for learning and for future success in the academy. Some students may feel more at ease in a computer-mediated classroom and offer less resistance to learning to write academic discourse. Others, however, may feel an additional threat posed by the computerized environments themselves due to a wide range of factors, from a low typing proficiency to general dislike of (or inability to use) computers.
Andersen's Nativization Model (1983)

Taking Schumann's work a step further, Andersen suggests that in less developed stages of acculturation, L2 speakers/writers use their own internalized perception of L2 as a basis for processing new language input. But instead of accepting the reality of the L2 as an external norm, these learners assimilate (nativize) the new input into their individually developed L2s. In this case, if learners are faced with new language input that does not agree with their idiosyncratic version of L2, they change the input to fit their perception of the language. Under good learning conditions, learners de-nativize (adjust their own model of the L2 to fit the new input). In this model, only a change in the socio-psychological conditions for L2 learning/writing could change the learners' intake processes. In other words, this model also postulates that if the L2 learners are unconsciously forcing input to fit their internalized model of L2, error correction may be of limited value to them.

Addressing the issue of errors in L2, McLaughlin (1987) postulates that in an attempt to hold down the cognitive work-load, learners simplify, overgeneralize, regularize irregular forms, and reduce language redundancy. In the writing classroom, this idea of backsliding, due to cognitive overload, may help explain the process ESL students go through when learning to write in L2: the students may be making progress even when surface evidence of improvement is not obvious. Lightbown (1985) notes that L2 acquisition does not progress linearly but is characterized by backsliding on linguistic forms that had seemed mastered already; such backsliding may be due to learning overload.
The issue of error correction is virtually non-existent in the on-line environment described in this study, as the main focus of writing is on conveying the meaning, not producing grammatically accurate forms. In on-line interactions the teacher's role is usually limited to that of a participant in the discussion, therefore, the teacher is not in a position to correct errors. On the other hand, some error correction may be done by other students, usually in the form of clarifying questions. In this case the focus, once again, is on the meaning. L2 students' reactions can be quite varied to such interaction: some may perceive this situation as liberating and encouraging uninhibited interaction, while others may feel that they are not learning enough, as their grammar is not improving.

Krashen's Monitor Model

Krashen's L2 acquisition theory states that language is acquired through comprehensible input, namely "when we understand messages in the L2, when we understand what is said or written rather than how it is expressed, and when we focus on meaning and not form" (Scott, 1996, p.21). Krashen also postulates that his second language acquisition theory applies to the development of writing ability. Krashen (1984) defines writing competence as "the abstract knowledge the proficient writer has about writing" (Krashen, 1984, p. 30), and proposes that a writer's abstract knowledge is mainly the result of reading for interest or pleasure: "It is reading that gives the writer the 'feel' for the look and texture of reader-based prose" (Scott, 1996, p.20).

Based on this theory, Krashen suggests that writing ability in any language is acquired through extensive reading, with the reader's focus being on the message and not on the form. Even though Krashen's theory has intuitive appeal, his (1984) claim that for
L2 learners writing competence derives from large amounts of self-motivated reading for interest and/or pleasure remains largely untested and unsubstantiated. On the other hand, reading input presumably affects the development of reading and writing abilities, and it is difficult to imagine that L2 input would not be significant in developing literacy skills in L2. For L2 learners, the literacy development situation is very complex due to the possibility of interaction of L1 literacy skills with L2 input (Carson, Carrell, Silberstein, Kroll, Kuehn, 1990). However, Krashen does admit that there is no "perfect correlation between the amount of pleasure reading done and writing quality" (Scott, 1996, p.21).

The Monitor Model raises questions about the usefulness of error correction during the acquisition of writing ability, and suggests that the focus on student writing errors, like the focus on the errors of children learning their first language, has no effect on the acquisition process. According to Krashen, comprehensible input in the form of reading promotes acquisition of written language, whereas memorizing rules serves as a monitor, to help edit writing. Different learners (writers) use the monitor differently (underuse or overuse), and such differences may affect the writing process. Jones (1985) suggests that overuse of the monitor can be an important source of nonlinguistic difficulty due to the writer's extensive reliance on conscious knowledge to evaluate the grammatical correctness of produced sentences that can lead to focus on form prevailing over content. Underuse of this monitor may also affect composing processes, as writers who do not use the monitor as much are more likely to engage in a different process, writing longer pieces of text, revising later (Jones, 1985). In other words, writers who
underuse the monitor will tend to focus on content more than form, and will postpone the process of revision until later in the composing process.

The issues raised both by Krashen's Monitor Model and its critics come to the fore in the present study as they pertain to the on-line environment used in the study. More specifically, the study touches upon the role of reading for writing development, and the issue of focus on content over form. On-line discussions create an environment that encourages the students to read and understand their peers' comments and focus on the message conveyed, not on the form used to convey it. Additional opportunities to read in English are beneficial, as they allow the students to be exposed to authentic English. The advantages of focus only on the message can be debated, however, as some students may feel that such focus does not prepare them adequately for further academic work that demands both a clear message and an adequate form.

Contrastive Rhetoric

The impetus of the contrastive rhetoric studies approach to composition has been provided by the desire to understand how L2 writing is affected by the cultural and linguistic conventions of the writer's L1. Kaplan's (Kaplan, 1966; Kaplan, 1972; Grabe and Kaplan, 1989) contrastive rhetoric studies are based on the premise that different languages have different organizational preferences reflected in "syntactic and other textual differences" (Grabe & Kaplan, 1989, p. 264). From his study (Kaplan, 1966) of over 600 L2 students' essays, Kaplan concluded that L2 students from various language backgrounds present their ideas in writing "in patterns different from those that would appear natural in English" (Leki, 1992, p. 88). Contrastive rhetoric studies postulate that
differences in composing strategies need to be addressed in teaching composition, as
there is no automatic transfer of writing skills. According to Grabe and Kaplan (1989),
the practical objective of this approach is searching for contrastive rhetoric evidence to
facilitate instruction in L2 writing" (Grabe & Kaplan, 1989, p. 163). A common criticism
of Kaplan's work (Leki, 1992) is that his simplified approach and diagramming of
rhetorical patterns of different languages led some teachers and students to believe that
such patterns reveal innate mental processes. However, as Leki (1992) points out,
Kaplan's work was meant to be exploratory, indicating that the teaching of writing
patterns reflects "social, economic, and political realities, not natural mental processes or
psychological capacities" (Leki, 1992, p.90).

FROM PRODUCT-ORIENTED TO PROCESS-ORIENTED WRITING: A BRIEF
HISTORICAL SKETCH

The beginning of the modern era of second language teaching in the United States
in the middle 1940s also marks the beginning of ESL composition teaching. The time
from the mid-40s to the present can be seen as a succession of approaches to L2 writing
(Silva, 1990). The following two decades "brought an increased awareness of ESL
students' needs with regard to producing extended written discourse" (Silva, 1990). At
that time, some of the dominant approaches in writing were stage process models that
viewed writing as a succession of separate stages (planning, writing, and revision), and
focused on the final product of writing as opposed the process of writing. Process-
oriented models are more concerned with the mental processes the writers go through
during the composing process and views writing as a recursive process.
As the process movement began, the current-traditional view of text as a stable object gave way as researchers began to focus their attention on more dynamic qualities of texts, and elements of rhetorical situations. The proponents of the expressivist approach to writing believe in the existence of truths in private experience, and emphasize interaction between writer and reader. In terms of its view of the audience, expressivism contends that writing is an individual act, and it is the competent writer who establishes purpose, meaning, and form. In so doing, the writer "creates" an audience that conforms to the writer's text and purposes (Nystrand 1986, p. 61). Ede and Lunsford (1984) developed the concept of "audience invoked," in which "the audience in written discourse is a construction of the writer, a created fiction" (p.160). Peter Elbow emphasized that the goal of writing should be "to move toward a condition in which we don't necessarily need an audience to write and speak well" (Elbow 1994, p.190).

Expressivism reached the peak of its development in the late 60s and early 70s, when the individual expression of honest and personal thought became a popular trend in teaching writing. Leaders of the expressivist movement -- Donald Murray, Ken Macrorie, William Coles, Peter Elbow and others -- advocated teaching methods that encouraged students to take power in their own prose, and express themselves through journal writing and personal essays.

One of the first process movement research studies that focused on a dynamic view of writing was Janet Emig's (1971) *The Composing Processes of Twelfth Graders* -- one of the first works to shift attention to the writers and ask the question, "What do writers do when they compose?" Emig was interested in finding out about the processes
that writers go through to compose their texts. Donald Graves (1975), also focusing his attention on writers in his study of the writing processes of 7-year old children, noted that "the writing process is as variable and unique as the individual's personality" (Graves, 1975, p.230), and divided writers into two categories: reflective and reactive. Both Emig's and Graves' studies were important for the development of the process movement, as they initiated a new line of research in composition.

One of the main proponents of the process movement, Murray (1980), defines writing as a dynamic process, a process of active interaction between the writer and the text, as "discovery." Murray states that "writing is a significant kind of thinking in which the symbols of language assume a purpose of their own and instruct the writer during the composing process" (Murray, 1984, p.3). Murray stresses the importance of the individual in the writing process, and views the individual as the starting point for writing: "Most of the time . . . writing is a private act with a public result. We write alone to discover meaning. But once the meaning is discovered, once we understand what we have to say, then we want or need to share it with other people" (Murray, 1984, p. 4). This latter point implies an on-going conversation in which "the student increasingly adopts the conventions, assumptions, and voice of a particular discourse community" (Adamson, 1993, p. 57).

For some students it may be difficult to develop a voice that would be appropriate and acceptable in the academic discourse community. One of the techniques used by the proponents of the process movement to ease the transition to academic writing, is that of free-writing. Kenneth Macrorie was one of the first scholars to use freewriting in his
classes in 1964. On the first day of class he would read an example of "academicism," (the term he coined for it was 'Engfish') and tell the students to "forget for the moment grammar, spelling, and punctuation" (Macroire, 1991, p.188) and focus on the ideas expressed in an essay written in a previous group by one of their peers. For Macrorie, the value of free-writing is in the opportunity it provides for the students for self-expression and development of critical thinking skills (Macrorie, 1991).

Another proponent of the process movement and free-writing as a way to develop writing skills is Peter Elbow, who believes that freewriting and personal expressive writing encourage critical thinking by offering a larger view on a given topic than what is offered by academic writing (Elbow, 1990, p. 8-9). Elbow states, "personal expressive writing is often more clearly attentive to an audience and its views than we see in much academic writing -- where writers often slide into a glassy-eyed stance of talking to everyone but not really connecting to anyone" (Elbow, 1990, p.10). Such gradual development of academic English may help the students adjust to the writing style accepted by the academy without being constrained by form from the very beginning.

The second phase of the process movement, the cognitivist approach, was developed in late 70s. It views writing as a problem-solving, goal-oriented activity. The writer's mental processes are of central importance to cognitivists. Cognitivists focus on the writer's cognitive structures and the processes used to create text and develop a sense of audience. Both expressivists and cognitivists view the language of a composition as the writer's own, "stemming from prior experience and creative urge" (Silva, 1990, p. 19).
Flower and Hayes describe writing as a goal-directed thinking process, guided by the writer's own growing network of goals that are created in two key ways, "by generating both high-level goals and supporting sub-goals which embody the writer's developing sense of purpose" (Flower & Hayes, 1980, p. 43). These goals can be altered in the process of writing, based on what the writer learns while composing.

Flower and Hayes' theory is based largely on Anderson's cognitive psychology view of language generation. Describing the cognitive psychology view on language generation, Anderson (1980) discusses three stages of language generation (construction, transformation, and execution) that can be paralleled to the three traditionally identified main stages of the writing process: idea generation, writing, and rewriting. Although Anderson provides a cognitive perspective and analysis of each of these three stages separately, he emphasizes that the stages overlap in the process of language generation -- whether oral or written -- and that the major cognitive problem in writing is the "coordinating of multiple information-processing demands" (Anderson, 1980, p. 437). Such view of writing is at the basis of the Flower and Hayes' cognitive theory.

Anderson describes the pre-writing stages as a problem-solving, goal-directed activity that proceeds from more global goals to specific goals that can direct the writing process, employing a means-ends analysis that helps the writer identify goals and subgoals and solve them in the writing process (Anderson, 1980). Cognitive psychology defines problem solving as any "goal-directed sequence of cognitive operations. Problem solving that requires the development of new procedures is called
creative problem-solving; problem-solving that uses existing procedures is called routine problem-solving" (Anderson, 1980, p.257).

Flower and Hayes take this discussion a step further and discuss the specific constraints that are involved in transforming verbal thought into written text. Not only must writers learn conventions peculiar to written speech, they must handle the long and complicated process of composing itself. Another point that needs to be addressed in the discussion of Flower and Hayes' theory is their view of writing as an act of juggling constraints (Flower and Hayes, 1980). Flower and Hayes (1980) emphasize that (academic) writing competence is not equivalent to linguistic competence, and involves more competencies and skills that just the ability to use the language correctly. Flower and Hayes (1980) specify the following major constraints on the writer during the composing process: the rhetorical problem, knowledge, and written speech.

The demands of the rhetorical problem are a constraint present during the whole writing process. The writers' expression must conform to the structures posed by their purpose in writing, their sense of the audience, and their projected selves. In other words, the writers must apply both knowledge and written speech to resolve the rhetorical problem. Clearly, there cannot be successful writing without knowledge, therefore, knowledge is a resource for writing. However, knowledge can become a constraint if its form is not adequate. From the perspective of knowledge as a constraint, writing can be seen as a process of organizing and transforming "incoherent thought and loosely related pockets of information" (Flower & Hayes, 1980, p. 35) into a tightly organized and structured essay. In their discussion of written discourse, Flower and Hayes (1980)
emphasize its dual role as constraint on writers, stating that the writers must not only
"learn many conventions peculiar to written speech, they must learn how to handle the
rather long and complicated process of composing itself" (Flower & Hayes, 1980, p. 34).
On-line discussions examined in this study may be a way to alleviate the burden of the
dual constraint presented by written discourse, as well as the knowledge constraint, as
such discussions may help the students organize and sort out information in preparation
for essay writing, as well as practice some conventions of written discourse.

The main researchers of the cognitivist approach, Flower and Hayes, developed
their theory on the basis of a cognitive psychology approach to writing (described above).
The technique of protocol analysis, used by Flower and Hayes as the main technique for
conducting research on writing, is also derived from cognitive psychology. The term
"protocol analysis" refers to the subject's account of his or her thoughts and ideas while
performing a task. In cognitive psychology, the technique of protocol analysis is used as a
tool for the identification of psychological processes that a subject uses to perform a task.

Even though protocol analysis can be used to help understand a wide variety of
tasks, typically, protocols are incomplete, as a number of unreported processes occur
during the subject's completion of a task. It is up to the researcher who is analyzing a
protocol to use this incomplete record, and with his/her knowledge of the nature of the
task, develop an interpretation of "the underlying psychological processes by which the
subject performs the task" (Flower & Hayes, 1980, p. 26). Flower and Hayes claim that a
model of the writing process, derived through protocol analysis, provides a "specific
description of the nature of the individual processes" (Hayes & Flower, 1980, p. 29) and
a specific description of the organization of these processes, serving as "a guide to the
diagnosis of writing difficulties as a guide to further research on writing" (Hayes &

COLLABORATIVE WRITING, COMPUTER-MEDIATED ENVIRONMENT AND L2
WRITING PEDAGOGY

Writing fits in the sphere of collaborative learning well, because writing involves
a dialogue between writer and context, during which the audience is defined and the
purpose is established. The act of writing is usually perceived as successful when it
complies with the conventions of discourse accepted by a given community. To learn
about these conventions and the acceptable discourse, writers need to use them in the
kinds of conversations that occur in collaborative learning. Writing groups help the
writers view their writing from the perspective of the audience, as, to an extent,
collaborative writing blurs the distinctions between the writer and the audience, and
forces the writer to think more consciously about his/her purpose and context. The
present study aims to investigate the effects of a collaborative environment, created in a
freshman composition class, on the ESL students' writing performance.

The social nature of writing and the social genesis of language have been argued
for by language development theorists such as Lev Vygotsky. For Vygotsky, the source
of language lies outside the individual, and instead of being a transition from asocial to
social language, egocentric or inner speech is a continuation of socially and
environmentally oriented language development: "Development in thinking is not from
the individual to the socialized, but from the social to the individual" (Vygotsky, 1962, p.
In Vygotsky's view, language follows a similar pattern of development; its origins are social, and "internalization depends upon the interaction of small groups of individuals engaged in concrete social interaction, explainable in terms of small group dynamics and communicative practices" (Gere, 1978, p. 83). Trent Batson, the director of the ENFI (English Networks for Interaction), argues that computer networks can promote the current process-oriented, student-centered approaches to teaching writing as: (1) a social act, rather than a solitary act, (2) a process rather than a product, and (3) a collaborative effort among students and the teacher. This claim needs to be analyzed in the context of the interactive environment for which it was made. In other words, this claim does not imply that effective writing cannot be achieved by an individual working alone, or that only collaboration can lead to good writing processes or products. What it does state is that computer networks can help teachers and students establish a collaborative, student-oriented writing environment. As the current study is also based on a process-oriented, collaborative approach to writing, these three aspects are relevant to it. On-line synchronous discussions provide the students with an opportunity to practice writing together with their peers, by giving and receiving feedback on ideas presented in the discussion. Also, since there is no product of the discussion per se, the students can focus on the process of written interaction with their peers, the goal of such a process being an exchange of opinions through writing.

Synchronous written interaction in writing classrooms has been used at least since 1985, when the first major effort to implement synchronous communication in a composition classroom was undertaken at Gallaudet University. The importance of
authentic communication in L2 writing classes is becoming a widely accepted concept, promoting the development of interactive, collaborative approaches. In an L2 writing class, computer-mediated communication (CMC) may be helpful in shifting the focus from form to function and helping us reshape our concepts of the L2 composing processes.

Computer-mediated communication can have a profound influence on L2 learning and writing in terms of its ability to help accommodate various personality types and corresponding motivational and affective factors (Meunier, 1996), if individual differences are taken into account in a CMC writing class. CMC provides opportunities for intercultural communication and acquiring knowledge about other cultures (Ma, 1996; Meagher & Castanos, 1996), as well as opportunities for work in what Vygotsky calls the zone of proximal development, at "the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

INDIVIDUAL DIFFERENCES AND PERSONALITY TYPES IN WRITING

Interest in personality types and different ways to learn is not a new concern. The first ideas about learning in the West came from philosophers of ancient Greece and Rome and have influenced educators for centuries. Aristotle's mnemonic techniques of association and visual imagery are still employed today. The classification of temperaments into sanguine, choleric, melancholic, and phlegmatic (originated in ancient Greece) motivated a number of studies on personality types over the past 50-60 years.
(Comett, 1983). However, it was not until the early 1970s that a more systematic investigation of individual differences in composition began.

In their research on the effects of personality types on the composing process, Jensen and DiTiberio (1989) use a model of personality that unifies and extends the work of Emig (1971), Britton and colleagues (1975), Graves (1975), Perl (1979), Hairston (1984) and others. This model of personality can explain, not only many of the variables in writing processes and products, but can also help the teacher to "make some general predictions about how an individual student will write best and develop into a mature, productive writer" (Jensen & DiTiberio, 1989, p.2). Jensen and DiTiberio (1989) use the Myers Briggs Type Indicator (MBTI) as the personality type assessment instrument and as a broad indicator of learning style or cognitive style.

The issue of personality types and individual differences in an L2 writing classroom is a complicated one, due to a great diversity of L2 writers. As Krapels (1990) notes, the L2 writing class "may represent at least half a dozen strikingly different cultures, very different educational backgrounds, ages ranging from sixteen to sixty, and very different needs for being able to write in a foreign language" (Krapels, 1990, p. 45). L2 writers differ in the amount of training they received in L1, and in L1 writing experience, the effects of which can be positive or negative. Kaplan's study (1966) illustrates that students from different cultures and different language backgrounds systematically develop their ideas in writing in patterns different from those of native English speakers/writers, and construe their rhetorical role differently. Research (Prothro, 1995) has shown that, for example, what is taken to be exaggeration by one culture may
be viewed by another as neutral, and what may be regarded as neutral by one culture may seem understated by another. Thus, ESL writing may appear overly emphatic or overly demure. Another cultural difference that can find its way into an individual's writing style is the issue of what constitutes proof. In some cultures, personal experience counts; in other cultures, personal experience carries little authority, and quotations from famous or prestigious writers are required to support a point. A familiarity with contrastive rhetoric studies will help writing teachers understand the difficulties ESL students may have with writing, and the origin of these difficulties. Leki (1982) believes that an understanding of the rhetorical patterns of our own and other cultures may help us avoid "stereotypes caused by failing to recognize different culturally preferred writing styles and help us remain aware that all these systems are conventions" (Leki, 1992, p. 19).

SMALL GROUP DYNAMICS IN ONLINE DISCUSSIONS

At every stage of our lives, we function as participants in small groups: as part of a family, students in the classroom, team members in the workplace, participants in social and sports clubs. In all of these groups, we interact with others, expressing our needs and striving to achieve our personal goals, as well as the goals of the group. Even though all these groups have distinct purposes and functions, one aspect of their functioning that is similar, is verbal interaction, or discussion, as the means of communication among group members. It is through discussion that opinions are voiced, concerns are expressed and conflicts arise and get solved. In the case of small group work in the classroom, participation in discussion "seems not only to increase a student's interest in learning but also to enable the student to assimilate material more thoroughly" (Jones, Barnlund, and
Haiman, 1980, p. 5). In a face-to-face discussion group, speech is the dominant form of interaction, supplemented by non-verbal communicative signals that carry part of the meaning. In an on-line classroom discussion group, written interaction is the main form of communication, and, therefore, more opportunities for written language practice in the classroom are created. Online environments can also be used to increase participation and improve the quality of discourse of students of various personality types and learning styles.

PURPOSE OF THE STUDY

The general purpose of this study is to examine the use of network communication in an advanced ESL composition class, and to evaluate the effects of collaborative computer-mediated projects on the students' writing performance. This study analyzes the students' performance in formal (essays) and informal (online discussions) writing tasks. More specifically, the study compares writing performance in collaborative and independent essay assignments. The study also investigates the patterns of students' participation in anonymous vs. non-anonymous, and whole class vs. small group online discussions, and to what extent such participation is related to affective variables and personality types. Another purpose of this study is to explore pedagogical implications of the use of network communication and collaborative writing to improve ESL students' academic writing skills.
RESEARCH QUESTIONS AND HYPOTHESES

Research Question One

Does student participation in online synchronous discussions vary (a) in different configurations of discussions, and (b) for students of internal and external thinking styles?

(a) $H_0$: There is no difference in student participation among discussions of different configurations.

(b) $H_0$: There is no difference in participation in discussions among students of internal and external thinking styles.

To answer this research question, eight in-class writing tasks were designed, each being an online synchronous discussion on a topic based on class-related readings. In this question, the term "different configurations of discussions" refers to whether a discussion was anonymous or non-anonymous and whether a discussion was conducted in a whole class or a small group set-up. Internal and external thinking styles were defined on the basis of Sternberg's (1997) Thinking Styles Questionnaire. Altogether, there were two small group anonymous discussions, two small group non-anonymous discussions, two whole class anonymous discussions, and two whole class non-anonymous discussions. To collect discussion data, an archive feature was used to access complete transcripts of discussions, including students' names (or ID numbers in anonymous discussions), and time when each comment was written. All discussions were assignment-specific, allowing for convenient retrieval of data.
To answer the general research question for the different discussion modes and configurations, it was divided into the following four sub-questions:

(1A) Is there a difference in discussion content between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1B) Is there a difference in the amount of communication between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1C) Is there a difference in the interaction dynamics between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1D) Is there a difference in discussion content, amount of communication and interaction dynamics between students of internal and external thinking styles?

**Research Question Two**

Does writing performance vary between collaborative and independent tasks?

H₀: There is no difference in writing performance between collaborative and independent tasks.

In order to investigate the difference in writing performance between independent and collaborative academic writing tasks, the following four sub-questions were examined:

(2A) Is there a difference in lexical diversity between collaborative and independent tasks?

(2B) Is there a difference in lexical density between collaborative and independent tasks?

(2C) Is there a difference in grammatical accuracy between collaborative and independent tasks?
(2D) Is there a difference in syntactic complexity between collaborative and independent tasks?

These research questions were addressed by (1) examining the results of textual analysis performed by the computer, and (2) examining the results of holistic evaluation conducted by ESL raters. Computer analysis was performed with the help of the word concordancing program WordSmith — a software package that provides the user with statistical descriptions of the text (number of words, number and length of sentences, and number and length of paragraphs). The computer concordancing program was used because it was not feasible to perform detailed analysis on all essays, due to the large amount of data. Grammatical accuracy was checked with an integrated text analysis program, Grammatik, which identifies problems in terms of grammar, style, and mechanics. Previous studies (Li, 1998) showed a high correlation between the computerized scores and ESL raters' holistic scores.

In addition to the computer evaluations of the subjects' writing, holistic evaluation by independent human raters was made. Holistic evaluation of essays is aimed at assessing the overall quality and rhetorical features of students' essays. Such an evaluation procedure asks the raters to assess their overall impression of an essay, as well as to rate its specific features, such as the extent to which the essay addresses the writing task, organization, development of ideas, sentence structure, use of vocabulary, grammar and mechanics. Experienced ESL raters were used for this task.
Research Question Three

Is there a change in students' attitudes to (a) collaborative assignments, and (b) the use of computers in class from the beginning and to the end of semester?

(a) \( H_0 \): There is no change in students' attitudes to collaborative assignments from the beginning and to the end of semester.

(b) \( H_0 \): There is no change in students' attitudes to the use of computers in class from the beginning and to the end of semester.

Students' attitudes to collaborative assignments and to the use of computers in the classroom were measured by a pre-semester and a post-semester survey (see Appendix B and C), as well as by their course evaluation comments.

SIGNIFICANCE OF THE STUDY

Several decades ago, when teachers and researchers began a serious consideration of the potential advantages and limitations of the use of computers in the classroom, a number of questions about the role of computers in the learning process came to the fore. However, these questions mostly focused on the overall effectiveness of using computers in teaching, without addressing the issues of how they would be used, for what, and why. One question facing educators today is how to take full advantage of the instructional and research opportunities offered by technology. To date, research on computer-mediated collaborative learner-centered instruction has not provided definitive results as to what the most effective applications of computer-mediated collaborative writing approaches are, therefore, further studies are required (Nunan, 1992). The present study will contribute to the research literature in L2 writing, focusing primarily on the effects of
collaborative and independent work on students' writing performance. Comparing the patterns of student participation in groups of different sizes, as well as anonymous and non-anonymous groups, the present study contributes to a better understanding of small group discussion processes in online environments.

DEFINITIONS

To facilitate the reader's understanding of the discussions to follow, the section below provides definitions of important concepts and descriptions of the tools used in this study. The definitions are included in the first chapter, as a number of technical terms are used throughout subsequent chapters of this dissertation.

Computer-mediated communication

Computer-mediated communication (CMC) is the exchange of information (e.g. text, images, audio, and video) by way of computer networks. The exchange of information can be synchronous or asynchronous. In synchronous communication, the sender and receiver of a message are communicating with each other at the same time. In asynchronous communication, the sender and receiver are communicating at different times. The types of computer-mediated communication (CMC) include newsgroups/bulletin boards, computer video conferencing, Internet Relay Chats (IRCs), MUDs/MOOs, white board environments and others.

Newsgroups/bulletin boards

These systems are public discussions on various subjects on the Internet. Single copies of articles are stored in a publicly accessible location on the network. With a newsreader program, users can read what others have written, respond publicly or
privately to the article’s author, and post new ideas, questions, or requests to the
newsgroup (Harris, 1995).

**Computer conferencing**

Computer conferencing is a system that allows a group of people to hold a
synchronous or asynchronous on-line discussion by posting messages to the whole group.
Computer conferencing can use audio or video components, as well as textual ones.
Video conferencing is real time video and audio communication between people in
different locations with the help of a video camera and a monitor.

**Internet Relay Chat (IRC)**

Internet Relay Chat (IRC) is a mode of interaction on the Internet that enables
synchronous text-based communication on different "channels" from disparate locations.
Users can join one or more "channels" and converse with others. Each channel is usually
devoted to a different topic. Conversations may be public when everyone in a channel
can see what a user is typing, or private when messages are sent between two people who
may or may not be on the same "channel."

**MUD/MOO**

MUD/MOO means Multi User Dungeons/Multi User Dungeons Object Oriented.
It is a synchronous virtual reality system in which users can interact in real time by typing
text. This system describes in text objects like rooms or buildings and users that are in
the same place that you are. The users become characters in this environment and can
control their characters' actions by typing commands like "walk," "whisper," "kick," and
others.
Whiteboard environments

Whiteboard environments are virtual meetings where each participant can use the mouse to draw sketches on the whiteboard. As each user is drawing, every other user sees the updates almost immediately. Most whiteboard programs also have a chat window where participants can type messages to each other.

Computerized text analysis tools

Computerized text analysis tools are software packages that identify problems with grammar, style, and mechanics, as well as provide the user with statistical descriptions of the text (number of words, number and length of sentences, and number and length of paragraphs). The computer concordancing program was used because it was not feasible to perform detailed analysis on all essays, due to time constraints. Previous studies (Li, 1998) show a high correlation between the computerized scores (from WordSmith) and ESL raters' scores.

ESL raters' evaluation

Evaluation of essays by ESL raters was conducted to supplement the discrete-point analysis performed by computer programs. Such evaluation is aimed at assessing the overall writing quality and features of students' essays. Two ESL raters who are experienced ESL composition instructors were asked to perform these evaluations.

Collaborative essay vs. independent essay

In this study, a collaborative essay is an essay written by a group of 3 students, working both in and out of class, using both face-to-face and computer-mediated communication. Group membership is decided by students. All group members receive
the same grade on the essay. An independent essay is an essay written by a student independently of others.

**Small group discussion vs. whole class discussion**

A small group discussion is an in-class online synchronous discussion in a group of 4-5 students on an assigned topic where group membership is decided by the teacher. A whole class discussion is an in-class online synchronous discussion in one group (whole class) on an assigned topic.

**Anonymous discussion vs. non-anonymous discussion**

An anonymous discussion is an in-class online synchronous discussion in which students' and the teacher's names are replaced by random numbers (a function of Connect.Net software). A non-anonymous discussion is an in-class online synchronous discussion in which real students' and the teacher's names are used. At the end of the semester (and at the end of the study), the teacher/researcher was able to access the code connecting students' names to numbers in anonymous discussion. At the onset of the study the students were informed that this code would be used only after the end of the semester, and only for research purposes.
STRUCTURE AND OUTLINE OF THE DISSERTATION

This first chapter of the dissertation presented the background, purpose and potential significance of this study, addressed the theoretical underpinnings of the study, discussed the research questions and hypotheses addressed by the study, and provided the definitions of important terms to be used in further chapters. The remaining four chapters will include the following information and interpretations:

Chapter Two will address the body of research literature that deals with the issues of L2 writing, the use of computer-mediated communication in L2 writing classrooms, and the effect of individual differences and personality types on the dynamics of online interaction.

Chapter Three will provide information on the subjects and instructional context, as well as outline the data collection methods and describe the measurement of variables. It will also explain and justify the choice of methods used for quantitative and qualitative analyses, and describe the computerized text analysis software used in the study.

Chapter Four will present the findings of the study, based on the theoretical rationale and methodology outlined in preceding chapters. To provide for an easier reading and interpretation of findings, the results will be presented following the research questions. Tables, charts, samples of student writing and online discussion transcripts will supplement the discussion.

The closing chapter of the dissertation, Chapter Five, will discuss the findings of the study in their application to a broader theoretical and practical context. It will outline the limitations of the present study and discuss implications for L2 writing pedagogy. It
will also suggest possible venues for future research in the domain of computer-mediated communication in L2 writing classes.
NOTES

Chapter One

1. "Means-ends analysis is one way of guiding the search of a problem space. It involves selecting operators to reduce the differences between the current state and the goal state as well as transforming the current state so that needed operators can apply" (Anderson, p. 257).
CHAPTER TWO
REVIEW OF LITERATURE
INTRODUCTION

Developing writing competence in a second language presents numerous challenges for both students and teachers. Behind the texts produced by L2 writers are different cultural and educational backgrounds, different ages of the authors, and different needs for learning to write in L2, as well as a variety of L1 writing experiences. A better understanding of ESL students, their experiences and needs can help teachers to make informed decisions on the best way to approach an instructional task in their specific context. The purpose of this study is to investigate L2 writing processes and the writing performance of advanced ESL learners in a U.S. college environment, and to compare the quality and the quantity of writing produced during independent and collaborative work, as well as to compare the patterns of students' participation in on-line discussions of various types (whole class vs. small group discussions, and anonymous vs. non-anonymous discussions). This chapter will provide an overview of research literature pertinent to the current study. More specifically, the following issues will be addressed: (1) L2 writing theory, research, and pedagogy, (2) computer-mediated collaborative writing in an L2 classroom, (3) individual differences/personality types and L2 writing, and (4) small group dynamics and dynamics of discussion.

SLA VIEW OF L2 WRITING DIFFICULTIES
L2 learners do not bring with them a fully developed (L2) language system as the basis for decoding and encoding written language in their second language, therefore, the nature of L2 input the learner has received (formal or informal, written or oral) significantly affects the L2 writing acquisition process. Cummins (1979) distinguishes two types of language acquisition: Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). BICS proficiency can be developed by L2 students through social interaction with native speakers of English, whereas CALP proficiency can be developed through academic writing, reading, speaking, and listening experiences.

According to Leki, "surface-level errors may be the most salient feature of ESL student writing" (Leki, 1992, p.120). Teachers may not feel enthusiastic about having ESL students in their classes due to their anticipation of the extra work they will have to do to correct these students' errors. In some cases, teachers may even associate many surface-level errors with lack of education or intelligence. One common fear that teachers may experience when faced with ESL students in their classes is that of lowering standards or using double standards. These reactions arise from misperceptions about language and language learning. It is important to remember that students learn not only in the classroom, but also from exposure to English in communicative situations that help provide the students with language input which they automatically analyze and process "as they reformulate their interlanguage or mental image of the grammar of English" (Leki, 1992, p.120). This last point is especially pertinent to the current study, as it
attempts to analyze the effects of the communicative situation created by the use of the on-line environment on the development of L2 writing proficiency. As L2 students interact with each other on-line, they themselves create language input for their peers that may help them develop written English communicative skills.

In a 1982 study, Jacobs made an important point, that factors beyond linguistic competence determined the quality of students' writing (also see Hildenbrand 1985). Differentiating between writing and language abilities, Zamel (1982) emphasized that competence in the composing process was more important than linguistic competence in the ability to write proficiently in English. Zamel concluded that when students understood and experienced composing as a process, their written products would improve. In other words, as Jones (1985) noted, in some cases, L1 approaches focusing on content rather than form could be effective "in helping second language learners develop acquired linguistic competence" (Krapels, 1990, p. 41).

Other problems ESL/L2 students experience may be related to the general academic context and specific writing classroom environment. We need to give careful consideration to the selection of writing topics. We must be certain that the topics we assign do not require students to relate experiences they do not have. Another factor is the issue of placement. According to McKay (1989), we need to question whether we should "put international students in classes with immigrant students who have been here for a considerable amount of time" (McKay, 1989, p. 260), as the experiences of these two groups of students are distinctly different. While this question certainly deserves consideration, we need to be careful when making the decision to put ESL students in a
separate class; while it has its benefits, such sheltered experience may make it more difficult for the ESL students to integrate into the American (academic) community. However, the placement question is an important one. If students are placed in a writing class on the basis of overall English proficiency, such placement may not adequately indicate the level of writing proficiency" (McKay, 1989, p.260). The group of students that participated in the current study was comprised both of international and immigrant students who were placed in the same class on the basis of their placement essay test results. The rationale behind such placement is to provide both groups of ESL students with additional English writing practice and work on problem areas specific to L2 writers, as well as introduce the students to the U.S. academic environment.

SIMILARITIES AND DIFFERENCES IN LI AND L2 WRITING PEDAGOGY

Dealing effectively with L2 writers requires a clear understanding of the nature of L2 writing. The findings of empirical studies comparing L1 and L2 writing indicate a number of salient differences between L1 and L2 writing with regard to both composing processes and features of written texts. The field of ESL writing research is a relatively new one, but it has already undergone a number of changes, both in approaches to teaching, and the research focus. Early L2 studies attempt to describe all aspects of L2 composing processes, especially concerning which behaviors seem to be successful or unsuccessful in producing effective L2 compositions. Later L2 researchers focus on specific composing behaviors, specific types of L2 writers, or features unique to L2 composing. Despite these changes, the source of data remains consistent: most information about L2 writing comes from ESL, as ESL is the most developed area of
scholarship in L2 writing. The findings of ESL writing analysis will be subject to review as more data becomes available on other L2s.

There is research evidence (Zamel, 1983; Arndt, 1987) that supports the similarities between L1 and (advanced) L2 writing, therefore, some of the insight on responding to the writing of native speakers may apply to the writing of ESL students as well. For example, Zamel (1983) found that unskilled L2 writers wrote like unskilled L1 writers, and that the lack of composing competence in L1 was reflected in students' L2 writing ability. The results of Arndt's 1987 study indicated that composing strategies of each individual writer remain consistent across languages. In general, L2 composition researchers have adopted L1 writing process research designs, and more often than not, their findings have concurred with those of their L1 counterparts. Some L2 studies also use the analysis criteria of L1 studies; two frequently used L1 schemes are those developed by Perl (1979), who developed a coding scheme for categorizing writing process behaviors, and Faigley and Witte (1981), who designed a system for studying the influence of revision on meaning. Pianko's (1979) L1 study has also influenced the research designs of some L2 writing process studies, in that Pianko's writing tasks have been used in some L2 studies. According to Zamel (1983), "research into L2 composing processes seems to corroborate much of what we have learned from research in first language writing" (p. 169).

However, despite the possibility of such composing ability consistency across languages, it is important to consider that the L2 writers' population is even more diverse in terms of backgrounds, and previous writing and academic experiences. Raimes (1985)
notes that the L2 writer is no definable type, for L2 writers represent a variety of types, backgrounds and needs. The L2 composition class may represent a number of different cultures, educational backgrounds, ages and needs for being able to write in a foreign language. Other factors, such as language aptitude, cognitive style, personality and motivation, may have an important impact on how well an L2 is acquired. Therefore, L2 researchers must be careful not to let L1 studies guide or determine their investigations of second language writing processes, because the research contexts are not the same. In the present study, there is another factor that plays an important role on the process of L2 acquisition -- the presence of computers. The introduction of computers in an L2 writing classroom complicates students' learning processes even further due to the students' varied levels of familiarity with the use of technology, their comfort level with specific software applications used in class, and even their typing ability. All these factors can help or hinder students' progress in the class.

Silva (1992, 1993), comparing research on L1 and L2 student writing, has argued that many text-based studies point to distinct issues which should be addressed in L2 writing instruction. Among the differences he noted for L2 students (as compared to L1 students) are:

- Different organizational preferences,
- Different approaches to argument structuring,
- Different approaches to incorporating material from text into writing (e.g. paraphrasing, quoting, style),
• Different perspectives on reader orientation, on attention-getting devices, and on estimates of reader knowledge,
• Different uses of cohesion markers, in particular markers which are less facilitative and create weaker lexical ties,
• Differences in the ways overt linguistic features of the text are used (such as less subordination, more conjunction, less passivization, fewer free modifiers, less noun modification, less specific words, less lexical variety, predictable variation in the purposes of syntactic structures, and a simpler style).

If effective writing is partially determined by cultural experience as well as social and educational policy, then composition teachers need to consider the possibility that different composing strategies may exist in different cultures, and develop ways they might address these differences in teaching composition.

COMPUTER-MEDIATED COLLABORATIVE WRITING IN AN L2 CLASSROOM

Computer-mediated communication as an intellectual environment

The idea of sharing messages and exchanges viewpoints via a public forum has been around since the times of ancient Greece, where citizens used to gather in specially allocated places for such public debates. In modern society, such implementation of this idea is no longer feasible, but a new medium of public communication has emerged with the help of technology. In its application to educational settings, computer-mediated communication (CMC) is claimed to help more students learn better by placing them in an intellectual environment that encourages active, thoughtful, and equal participation. In theory, the student-centered nature of computer-mediated communication offers learning
opportunities for the students of various learning styles. However, in order to use the possibilities of technology in the most effective way, it is important to determine the pedagogical uses of computer-mediated communication and collaborative writing.

**Brief history of collaborative writing**

Collaborative writing is not a new concept. Historically, collaborative writing groups have existed since at least 1728 and have proven to be an effective tool for improving essay quality and the intellectual level of the participants. Back in 1728, Benjamin Franklin became one of the initiators of mutual improvement societies -- "groups of people outside academic institutions who shared their interest in enhancing intellect but had to rely on themselves to create opportunities for fostering it" (Gere, 1978, p.32). Although the mutual improvement societies formed by men and women differed, they shared many common features, the main one being a considerable interest in writing (Gere, 1978).

Academically, collaborative writing groups were used at least as early as 1895, when the Knights of English Learning, a society that emphasized the discussion of students' work, was formed at the University of Minnesota (MacLean, 1895, p. 157-58). During the same period, students at the University of Illinois were allowed to submit in their required rhetoric and theme-writing classes compositions produced for "the various college societies" (Dodge, 1895, p. 73), and this extracurricular writing was taken as seriously as any produced in a class. The approach used in literary societies and writers' clubs was later adapted to and incorporated into the classroom environment. In 1870, over a century ago, "teachers struggling with large student loads turned to writing groups
to lighten the burden" (Gere, 1978, pp.14-18). Today the situation has changed, as the issue of collaborative writing in any composition class is receiving more and more attention. In the present study, collaborative writing is used in two different forms: informal and formal. Informal collaborative writing is implemented through on-line in-class synchronous discussions in which students get a chance to share their views on assigned readings; and more formal collaborative writing is implemented in the form of collaborative essays, written in groups of three students.

Effects of computer-mediated communication on L2 writing pedagogy

The importance of authentic communication in L2 writing classes is becoming a widely accepted concept, promoting the development of interactive, collaborative approaches. In an L2 writing class, CMC may be helpful in shifting the focus from form to function and in reshaping our concepts of the L2 composing processes. In the past, "we have stressed the ESL part of ESL composition at the expense of composition part" (Raimes, 1984, p.83), as it was believed that students need "mastery over the sentence before proceeding to the paragraph, and over the paragraph before proceeding to the essay" (Raimes, 1984, p.84). The students need to be made aware of the audience and purpose of their writing, and develop intellectual and emotional involvement with their writing, and not only concern for correct grammar.

Asynchronous interactive writing, in dialog journals, letters, computer conferencing (Black, Levin, Mehan and Quinn, 1983), and electronic mail has been implemented effectively in educational settings since the early 1980's (Barba, 1993; Martínez-Lage, 1993; Peyton & Reed, 1990; Peyton, Staton, Richardson, & Wolfram,
1990). This activity helps the students to "establish a written 'dialogue' with the instructor about a topic of their choice, providing a very specific audience/reader and a purpose for communication" (Gonzalez-Bueno, 1998, p. 57), thus making the assignment more meaningful for the students.

After the 1985 English Networks for Interaction (ENFI) project, a number of researchers (Sirc, 1988; Duin, Jorn & DeBower, 1989) studied a collaborative writing process conducted over a local area network (LAN). Sirc (1988) emphasizes that a LAN environment provides ample opportunities for research on the effects of computers on the behavior of people in groups. Ann Duin (Duin, Jorn & DeBower, 1989) noted that documents written collaboratively are commonplace in academe, business and industry and that academic preparation in writing should include collaborative experiences. Computer-mediated communication can aid in creating an environment for such collaboration. The research turned to the issues of organizing an environment conducive to learning "that will use what we know about learning, the social construction of texts, and technology" (Bridwell-Bowles, 1989, p.84).

INDIVIDUAL DIFFERENCES/PERSONALITY TYPES AND L2 WRITING

Personality types and composition research

One of the most important composition studies that began the shift of attention from one writing process to writing processes differing for different writers was Janet Emig's (1971) monograph The Composing Processes of Twelfth Graders that addressed the question of "what do writers do when they compose?" Emig found that some writers generate ideas out of conversations, others think alone; some outline before they start
writing, others prefer to outline afterwards. The study discovered that different writers may follow divergent processes and yet arrive at equally suitable texts.

The next important study of effects of individual differences on the writing process was that of Donald Graves (1975). The results of his investigation into the writing processes of 7-year old children indicated that paradigms of the writing process did not adequately reflect how individuals actually composed. Graves noted that "the writing process is as variable and unique as the individual's personality" (Graves, 1975, p.230), and divided writers into two categories: reflective and reactive. Graves' study was important in that it emphasized the importance of investigating the influence of personality variables on both the writing process and its end product, and initiated a line of research that was continued by other composition theorists (Britton et al, 1975; Gorrell, 1983).

These two studies raised the question of differences in the individuals' writing processes. However, they did not provide the means to explain the results. In order to explain the functioning of these different writing processes and to explain conclusions of these studies, researchers had to find an instrument that would allow valid and reliable assessment of personality types and/or individual differences in writing. One such instrument is Myers-Briggs Type Indicator (MBTI), the use of which in writing has been advocated by Jensen and DiTiberio (1989). Jensen and DiTiberio note that Jung's personality types allow research to be more specific, because we can look into the composing process of a particular type of student, and direct our attention to fundamental
psychological processes underlying the type theory and resolve apparent contradictions in research findings.

Assessing writers' personality types

In their discussion of Jung's Theory of Psychological Types, Jensen and DiTiberio (1989) note that there are four basic mental processes (sensing, intuiting, thinking and feeling) used by everyone, but not equally preferred and developed. Every type uses all four processes, but persons of each type are distinguished by their relative preferences for each of the four, and by the attitudes in which they use them. In normal development, members of each type are motivated to use the processes they are disposed to prefer; through practice, they develop expertise in the activities for which their preferred processes are particularly useful. Skills and increased interests grow from "specializing" in preferred functions and lead to characteristic habits, attitudes and traits associated with the type. It is important to note that types are not static but dynamic, and develop with experience and cognitive maturation. In early life, the best development involves discovering one's natural predispositions and developing the preferred functions through meeting challenges with purposeful effort. Early life is a period of specialization, and failure to specialize was characterized by Jung as resulting in a primitive or undifferentiated personality. The theory allows for continued growth and development throughout life, as each type comes to greater appreciation of and command over functions which in early life were less interesting and less developed.

Researching the effects of individual differences on the composing process, Jensen and DiTiberio (1989) use MBTI as the personality type assessment instrument and
as a broad indicator of learning style or cognitive style. They note that MBTI has the following advantages over other measures:

1. It is more carefully constructed than most instruments of its kind (30 years, over 100 validity studies).
2. It is more conceptually sophisticated and complex than most learning style assessments; it identifies 16 types/approaches to learning.
3. As Lawrence (1984) has documented, it can account for most traits identified by other widely used instruments.

Despite its merits, however, MBTI is not a comprehensive instrument. As a measure of learning styles, its most significant shortcoming is its inability to identify preferences for visual, auditory, and kinesthetic channels of perception and communication. Other questions that have been raised by researchers (Loomis, 1982) about the MBTI is its use of forced-choice items. Singer and Loomis (Loomis, 1982) believe that Myers' method for determining types is too rigid and not in tune with Jung's theory about the possible transcendence of opposites. As opposed to MBTI, The Singer Loomis Inventory of Personality (SLIP) does not include a scale to measure a preference for Judging or Perceiving (which was Myers and Briggs' major extension of Jung's model). SLIP, developed by June Singer and Mary Loomis, avoids forced-choice items that lead to a single preference score (toward either S or N, for example) but measures only one function at a time. Such measurement leads to independent results for each cognitive process (e.g. a separate score for both intuitive and sensory perception), and can be
classified as a cognition-centered instrument, as opposed to personality-centered
instruments, such as the MBTI (Sternberg, 1997, p. 144).

Another instrument to measure learning styles is Sternberg's Thinking Styles
Inventory. Sternberg (1997) defines "style" as a preferred way of thinking, and as a
preferred way of using the abilities one has. The metaphor Sternberg uses to describe his
approach to thinking and learning styles is that of mental self-government, stating that
"there are a number of parallels between the organization of the individual and the
organization of society" (Sternberg, 1997, p. 20). Sternberg uses the following categories
for classification of thinking styles: functions (legislative, executive, and judicial), forms
(monarchic, hierarchic, oligarchic, and anarchic), levels (global and local), scope
(internal and external), and leanings (liberal and conservative). Sternberg's inventory,
although not as well-known as MBTI, is more suitable for the current project, as its focus
is largely on styles of thinking that represent themselves in group interaction, especially
the parts of his inventory that deal with (1) external and internal, and (2) global and local
styles.

External and internal thinking styles roughly correspond to extroverts and introverts.
However, Sternberg's inventory, as compared to MBTI, describes this category
specifically in terms of approach to problem-solving, not as a general descriptor of a
person's behavior in all situations. Such an approach may be more beneficial for the
present study than MBTI, as it may help highlight specific students' characteristics
relevant to a learning (discussion) group. Global and local categories highlight the types
of problems certain people prefer to deal with: large and abstract issues (global style) or
details (local style). These differences may manifest themselves in the types of comments the students make in their on-line discussions, and the kinds of questions/prompts they tend to respond to.

**Effects of personality types and individual differences on L2 learning and writing**

As mentioned earlier, a number of studies (Ehrmann and Oxford, 1989, 1995; Ely, 1988; Moody, 1988; Oxford and Crookall, 1989; Ittzes, 1997) support the hypothesis that personality types affect learning outcomes by influencing attitudes towards L2 language learning activities or preference toward certain types of presentation of material. For example, such personality characteristics as risk taking and sociability predetermine positive attitudes in open-ended creative activities that allow free expression and predict negative attitudes when students are involved in highly structured grammar-based activities (Ely, 1988). The results of a study by Ehrman & Oxford (1989, 1990) that investigated the influence of personality on task motivation indicated that Feeling students were more motivated by communicative activities and social interaction, while Sensing students were more motivated by metacognitive activities.

In their study of basic writers and ESL writers, addressing the relationships between psychological type scale and performance in writing measured by various composition scores, Carrell and Monroe (1993) found that ESL writers who were Intuitive, Feeling and Perceiving tended to use greater lexical diversity in their writing. In these results, we may be seeing "possibly a willingness on the part of learners with less concrete styles to take risks in trying new vocabulary in their second language" (Carrell
and Monroe, 1993, p.160). The study yielded other interesting results that indicate a relationship between personality types and writing styles.

On the Thinking-Feeling scale, the study by Carrell and Monroe (1993) yielded the following results for ESL writers enrolled in a composition class that emphasized analytical writing tasks: ESL students who scored higher on the Thinking scale tended to score higher on the holistic rating, to write more, and to write with greater syntactic complexity than those lower on the scale, and vice versa for the Feeling scale. ESL writers scoring higher on the Feeling scale tended to write with greater lexical diversity than those lower on the scale, and vice versa for the Thinking scale. The results were opposite for basic writers, enrolled in a program that emphasized self-generated topics and freewritings. These results suggest that the positive correlations may be the effects of basic compatibility between the processing styles of students high on these scales with the method of writing instruction to which they have been exposed. The negative correlations may be the effect of incompatibilities between the processing styles of students high on these scales with the method of writing instruction under which they had been required to work (Carrell and Monroe, 1993). The present study will attempt to investigate whether there are differences between the patterns of on-line communication exhibited by students of different thinking styles as they participate in discussions of different modes (anonymous vs. non-anonymous) and configurations (small group vs. whole class).
Computer-mediated communication, personality types, and L2 learners

A relatively new area of research into the issue of personality and identity has been initiated with the introduction of computer-mediated communication (CMC) in the classroom, especially among sociopsychologists interested in 'hyperpersonal' relationships in cyberspace (Turkle, 1995; Stone, 1995; Walther, 1992, 1996). Computer-mediated communication can be defined as exchanges of textual, audio and video information among people through computer networks. Such exchanges can be synchronous or asynchronous. Some of the types of computer-mediated communication (CMC) include e-mail, listservs, local area networks, the World Wide Web, newsgroups/bulletin boards, computer conferencing (audio/video), voice mail systems, Internet Relay Chats, MUDs/MOOS, whiteboard environments and others. The current study investigates the use of a specific type of computer-mediated communication program that allows both for synchronous exchange of messages and collaborative work on documents.

Discussing learning preferences exhibited by students in face-to-face and on-line environments, Ellsworth (1995) notes that students who prefer observation without the interference of personal interaction learn how to combine both while on-line. Meunier (1995, 1996a, 1996b) shows that unilinear learners adapt to the multilinear hypertextual environment. These classroom studies contribute to research on personality differences in computer-mediated environments and illustrate that CMC facilitates pluralism, and may ease mental access to both preferred and less preferred learning styles (Meunier, 1996b). However, we cannot assert that CMC can accommodate all personal preferences, learning
styles and personality types. In her 1997 study comparing attitudes of different personality types to computer-mediated interaction, Meunier (1997) notes that Thinking students have a more favorable attitude to CMC than Feeling students. This result may be due to the fact that Thinking students need more time to develop their responses, and CMC can be more conducive to thought-out responses than rapid exchanges in a face-to-face interaction environment. Feeling students, on the other hand, may need extralinguistic information that is not available in computer-mediated environments.

Another point that needs to be noted in this discussion is a word of caution on how we approach the issue of different personalities in computerized environments: for example, claims (Elsworth, 1995; Beauvois, 1995) that CMC helps introverted students develop a more extraverted style may indicate the implicit assumption that introverted style is less desirable than extraverted style. However, while introverted students may be less likely to express their opinions in a discussion, such reluctance does not indicate a lack of willingness to learn, or lack of intellectual engagement with the material. The issue of personality differences and differences in learning styles as exhibited by L2 students in an on-line environment is one of the central concerns for the current study, as it attempts to examine the patterns of on-line interaction demonstrated by students of different thinking styles.

Sullivan and Pratt (1996) found that 100% of the students in an ESL study participated in electronic discourse and only 50% in face-to-face discussion. In their studies of learners of French (Kern, 1995b) and Portuguese (Kelm, 1995), researchers found that some students said nothing in person, while all participated on-line. In an
experimental study comparing small-group ESL discussion on-line to discussion face-to-face, Warschauer (1996) found that the on-line groups were twice as balanced, as the silent students increased their participation on-line. These findings are quite interesting and, possibly, require further examination in order to fully understand their significance. One of the main questions that such results pose is that of the reasons for such participation: Did the students who were not likely to participate in a face-to-face discussion feel more comfortable in a computer-mediated environment and so feel inclined to participate? Or did they feel the pressure to participate due to the presence of a computer and a keyboard in front of them? Or were there still some other reasons behind such willingness to participate? Another question that comes to mind is that of the quality of the participation: Does more participation equal high quality comments? This last question was addressed by Chun's (1994) and Warschauer (1996) studies. The results of both of these studies have been reported to be positive regarding quality of discourse. Students of German took greater control over discourse management in on-line discussion than in traditional classroom discussion (Chun, 1994). They used language that was lexically and syntactically more complex (Warschauer, 1996) and covered a wide range of communicative and discourse functions (Chun, 1994).

The issue of individual differences and the benefits of CMC for various personality types was addressed by Barry Maid (1998) in his recent discussion of on-line personalities. Maid (1998) outlines the following advantages of CMC for different personality types:
1. For extroverts, the immediacy of media offers opportunities to work with more people and things, as the medium itself is interactive.

2. For introverts, computers may be used to help create an environment where a student is not overpowered by others, so that s/he can work more with ideas and thoughts, allowing these ideas to grow and expand.

3. For sensing types, the on-line environment is sensory, while for intuitive types "the whole graphical interface is a hunch" (Maid, 1998).

4. For thinking types, the system itself is logical, and logic sometimes aids in navigation; while for feeling types CMC provides a connection to other humans, as virtual communities spring up among people of like interests and values.

5. As for the judgement/perception, Barry Maid (1998) believes that judgement skills seem to help us create on-line environments, while perception skills seem to help us live and work and play in on-line environments.

Maid's (1998) claims are a good starting point for a discussion of effects of personality types on interaction in on-line environments. At the same time, some of his assumptions can be seen as problematic when applied to the classroom context. For example, in his first point he seems to be stating that on-line environments are inherently interactive, offering the extroverts a chance to work with "more people and things" (Maid, 1998). However, this point is up for debate: is it the medium itself that creates a certain environment and promotes a certain style of interaction, or is it the way this medium is used? This question was addressed by Marshall McLuhan in his controversial discussion of the effects of media on society back in the 1960's. Considering the radical
changes brought about by new media, McLuhan claimed that "the medium is the message," or, in other words, that the medium affects us physically. One of the examples he provides to illustrate this point is that of the effects of a TV set, "a cathode ray stimulator that produces a unique and characteristic mental state" (McLuhan & Zingrone, 1995, p. 8). McLuhan argued that it is impossible to separate the medium and the message, as the medium can often shape the type of response to a given message: "if you say 'I love you' in person, over the phone, or by billboard, it is likely the medium that most shapes the response you get back" (McLuhan, & Zingrone, 1995, p. 8).

Taking McLuhan's argument a step further, one could assert that technology and computer-mediated communication shape the type of teaching and learning taking place in the classroom. In the 1990's, Richard Clark (Ehrmann and Zuniga, 1997) argued the opposite regarding the effect of technology in the classroom, stating that these technologies "are so flexible that they do not dictate methods of teaching and learning, and ... could be explained by the teaching methods they supported" (Ehrmann and Zuniga, 1997, p. 2-5). These arguments do not have to necessarily be seen as contradictory, but rather as complementary to one another. On the one hand, technology can be used to support specific learning and teaching methods, and it is up to the teachers and students to choose which technologies are best suited for given purposes. On the other hand, technologies can open up new possibilities for teaching and learning and therefore lead to discovery of teaching and learning methods that would be impossible otherwise. On the negative side, in some cases technology may interfere with the teaching/learning process. It can happen if the use of technology is not integrated in the
course curriculum and/or does not help the instructor achieve the goals of the course, but the technology is used because it is available, or because the instructor feels the pressure to use it. In other words, if the use of technology is not a means to an end but an end in itself, it can have negative effects on the teaching/learning process.

Another point that needs to be noted is that Maid does not address the problems that certain types might experience in on-line environments due to their differences from "real" environments, as he seems to be implying that certain type-specific behaviors will be automatically transferred to on-line interaction. This point may also be seen as problematic, since previous research (Beauvois, 1995; Ittzes, 1997; Meunier, 1997) has shown that on-line interaction of students of different personality types is not the same as their face-to-face interaction. Also, in his focus on the positive effects of CMC for different personality types, Maid seems to ignore the negative sides of temperament types that may hinder on-line interaction: dominating types who take over the leadership in the discussion, shy types who are reluctant to express their opinions, extroverts who prefer face-to-face over on-line conversation, and for whom the medium may be a factor in determining their interaction styles, and others.

**SMALL GROUP DYNAMICS AND DYNAMICS OF DISCUSSION**

Human interaction can take many diverse forms that differ in the communicative context and content, manner and medium, as well as the number of participants and their relationships with each other. Jones, Barnlund, and Haiman (1980) provide a general framework for analysis of conversation dynamics by outlining the two extremes: a dyad and a public form of communication. While recognizing that this division is somewhat
arbitrary and may not take into consideration the finer distinctions between and within each of these extremes, it is important to examine this concept in more detail to begin to gain an appreciation for the multiple forms of discourse. Jones, Barnlund, and Haiman (1980) define a dyad as a form of face-to-face interaction that is "interpersonal, usually highly informal spontaneous, unstructured, rather unpredictable, and satisfies human needs for attention, appreciation, support, and intimacy" (Jones, Barnlund, and Haiman, 1980, p.23). The collective (or public) form of communication set by Jones, Barnlund and Haiman (1980) as the polar opposite of the dyad is defined by much greater control, when "hundreds or even thousands listen to an address or watch a performer... messages are usually calculated and rehearsed, and the role of speaker and listener are sharply defined" (Jones, Barnlund, and Haiman, 1980, p.23).

The small discussion group that is at the focus of this project is placed by Jones, Barnlund, and Haiman between these two extremes. A classroom discussion group has some features of both of these forms of interaction: it is informal and spontaneous, yet task-centered, goal-oriented and focused. The communicative patterns, even in the smallest group, are governed by norms and rules of interaction established by its members. In a face-to-face discussion group, both verbal and non-verbal communication is used to carry out interaction. In a computer-mediated environment, written speech becomes the dominant form of interaction. Group discussion is a valuable tool for constructing knowledge and establishing one's identity through interaction, as people relate to the world by interacting and "transacting" (Barnlund, 1970) with it, and every experience acquires its meaning out of a "creative transaction between what the person
brings to the situation and chooses to select or reject of what can be found there" (Jones, Barnlund, and Haiman, 1980, p.21). In other words, communication is concerned with the way meanings evolve through an exchange of messages between people and with the factors that facilitate or complicate that process. Interaction and collaboration help us to recognize limitations and the subjectivity of our vision of the world, based on our personal experiences, backgrounds, and biases. Jones, Barnlund, and Haiman (1980) state that "when we recognize the limits of our subjective vision of the world, we seek to collaborate with others; when we fail to recognize such limits, when we become arrogant about our personal truths, we dismiss or sabotage such collaboration" (Jones, Barnlund, and Haiman, p.22).

Group dynamics theorists outline two major functions that are involved in group interaction: the maintenance function, aimed at establishment and development of interpersonal relations, and the problem-solving function, which deals directly with the specific goals of the group. In their discussion of different types of groups, Jones, Barnlund, and Haiman (1980) provide a sample continuum of five types of groups that differ in the extent to which the two above functions are given a priority: at the interpersonal/maintenance end of the continuum, they place a casual group, followed by cathartic, learning, policy-making groups, and at the other (problem-solving) end of the continuum, action groups are placed. The purpose of an interpersonal/maintenance group is interaction itself, which provides security, support and possibilities for sharing experiences. The purpose of problem-solving groups, placed on the other end of the continuum, is to arrive at practical decisions and solutions.
In the middle of the continuum is the learning group that encompasses both functions. The concept of the learning group is important in this project, as it is this type of group that is being investigated by the current study. Social discussion can be very useful in helping group members become more sensitive to their individual uniqueness and thus gain insight into the motivations of others. It can also be deleterious to the group process, as too much attention to outside factors can inhibit productive discussion. However, since these groups are situated on a continuum, each group has some characteristic of the other. Jones, Barnlund, and Haiman (1980) state that it is the "balance between personal and social goals that shifts as one moves from the left to the right across this diagram" (Jones, Barnlund, and Haiman, 1980, p.43).

The following section of the chapter will focus on the issues pertaining to group dynamics that are most salient to the current project. Another issue that needs to be addressed is that of communication networks that develop within groups as the participants develop specialized roles for themselves in a discussion, and form specific channels for sharing their thoughts and emotions with other participants.

In their discussion of communication networks, Jones, Barnlund, and Haiman (1980) address the following four patterns as the most common: recitative, subgrouping, dialogue, and multilateral pattern. Recitative pattern indicates a tendency for the conversation to focus on specific individuals who are either aggressive, dominant, or have extensive knowledge of the problem. Subgrouping means that there are private conversations taking place within the framework of larger discussion. According to Jones, Barnlund, and Haiman, the reason for subgrouping is either too much or too little
interest in the topic. Dialogue is a conversational pattern where a few people carry on a
car on a conversation in front of the entire group, and the remaining group members are listeners.
Multilateral pattern is a flow of communication from person to person, according to
whoever is moved to speak or whoever has relevant information to contribute. Jones,
Barnlund, and Haiman consider the predominance of group-directed, rather than person-
directed, contributions one of the characteristics of a mature group (Jones, Barnlund, and

Analysis of communication networks is one way to analyze group behavior.
Another method is to categorize everything that the members do to establish a pattern.
One of the most well-known methods for analyzing group interaction -- Interaction
Process Analysis, or IPA -- was developed by Robert Bales in the 1950's (Hartley, 1997).
Bales based his system on three basic ideas about group functioning: (1) the small group
is a social system, (2) there are fundamental issues which every group must resolve, and
(3) we can observe and classify group behavior on these lines. Bales' system was
initially developed to study problem-solving groups, and IPA categories reflect this focus
(Davis, 1977). Bales' definition of a unit of behavior, in a face-to-face environment, is
that of the "smallest discriminable segment of verbal and non-verbal behavior to which
the observer, using the present set of categories...can assign a classification" (Bales &
Strodtebeck, 1951, p. 486). A detailed description of IPA categories (Bales and
Strodbeck, 1951) is presented in Table 2.1 below.
Table 2.1 Interaction process categories defined and grouped by type

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Social-emotional area: positive reactions</td>
<td>1. Shows solidarity, raises other's status, gives help, rewards.</td>
</tr>
<tr>
<td></td>
<td>2. Shows tension release, jokes, laughs, shows satisfaction.</td>
</tr>
<tr>
<td></td>
<td>3. Agrees, shows passive acceptance, understands, concurs, complies.</td>
</tr>
<tr>
<td></td>
<td>5. Gives opinion, evaluation, analysis, expresses feedback, wish.</td>
</tr>
<tr>
<td></td>
<td>6. Gives orientation, information, repeats, clarifies, confirms.</td>
</tr>
<tr>
<td>C. Task area: attempted questions</td>
<td>7. Asks for orientation, information, repetition, confirmation.</td>
</tr>
<tr>
<td></td>
<td>8. Asks for opinion, evaluation, analysis, expression of feelings.</td>
</tr>
<tr>
<td>D. Social-emotional area: negative reactions</td>
<td>10. Disagrees, shows passive rejection, formality, withholds help.</td>
</tr>
<tr>
<td></td>
<td>11. Shows tension, asks for help, withdraws out of field.</td>
</tr>
<tr>
<td></td>
<td>12. Shows antagonism, deflates other's status, defends or asserts self.</td>
</tr>
</tbody>
</table>

As seen in Table 2.1 above, Bales' categories for certain cognitive, affective and instrumental aspects of task-oriented behavior are distributed among the following areas: social-emotional area one (positive reactions), task area one (attempted answers), task area two (attempted questions), social-emotional area two (negative reactions). Even though Bales' system is not perfect, as any one utterance can contain a number of acts, IPA "has been widely used and is summarized as the 'standard coding interaction system in virtually every social psychology textbook" (Hartley, 1997, p. 37). It is important to note here that the IPA system was originally developed for face-to-face environments, and its use for such environments presented certain difficulties due to the problems with coding of non-verbal information. The on-line environment analyzed in the current study
eliminated such difficulties, as the transcripts of on-line interactions are the conversations themselves, and include all the information of the actual conversation.

**COMPUTER-MEDIATED DISCUSSIONS IN L2 WRITING CLASSES**

In their discussion of the increasing acceptance and use of collaborative group communication in educational and business settings, Jones, Barnlund, and Haiman (1980) turn to two interrelated cultural developments -- "the breakdown of traditional authority and the demand by large numbers of previously deprived individuals that they be accorded the rights and respect that are given to other people" (Jones, Barnlund, and Haiman, 1980, p.6). The current rationale behind the use of computer-mediated discussions in the classroom is that on-line discussions help more students learn better by placing them in an intellectual environment that encourages active, thoughtful, and equal participation. In theory, the student-centered nature of computer-mediated communication offers learning opportunities for the students of various learning styles. According to Faigley (1992), written electronic discussions also provide advantages for more equal participation of marginalized groups members over conventional oral discussions.

However, the reality of group interaction and collaboration, whether face-to-face or on-line, is more complicated. Research on group interaction has shown that:

- dominant people tend to get along with their opposites but not with other dominant individuals. Individuals who are either high or low on "affiliation" -- the need to be with others -- tend to get along best with their own kind. Assertiveness and sociability are "ideal" traits for a group member only when there are not too many assertive people, when other participants are similarly high in affiliational tendencies, and when task structure and other situational factors require people with these qualities (Jones, Barnlund, and Haiman, 1980, p.63).
Another factor that further complicates the issue of computer-mediated discussions in the SLA context is that of the cultural influences on the nature of discussion. A small group can be viewed both as a model of larger groups, and as a model of society as a whole, as well as a distinct entity in itself. The principles, norms and acceptable behaviors of group discussion participants vary greatly from culture to culture.

Cultural norms exert a great influence over interpretations of what is perceived and in the type of communicative style they promote. Cultural norms encourage not only ways of seeing and of meaning, but also certain ways of relating to others. Comparative studies of communicative styles reveal that cultures influence what can be talked about, who should talk to whom, and the specific forms of communication that are favored (Barnlund, 1975). Every society develops its own conversational agenda, encouraging talk about some topics and discouraging the exploration of others (Jones, Barnlund, and Haiman, 1980, p.25).

In order to use the possibilities of computer-mediated interaction in the most effective way in an L2 classroom, it is important to examine the patterns of student-student and student-teacher on-line interaction, as well as to analyze the issues of power and authority in the computerized classrooms. One of the purported benefits of CMC is that it helps establish a more egalitarian atmosphere in the classroom and encourages equal participation by all students. However, the term "equal participation" needs to be defined more clearly in computer-mediated environment: does it refer to a mere opportunity for each student to send a message, or does it refer to the discussion that
follows such message? In other words, while computerized environments can provide the opportunity for everybody to type in messages, it does not guarantee a response to each message. In face-to-face discussions, the situation is usually different in that every comment made in class usually merits a response, either from the teacher, or from another student. One of the questions addressed by the present study focuses on the possible differences that students of different thinking styles may demonstrate during their interaction in an on-line environment. More specifically, this study addresses the issue of whether there are differences in discussion content, amount of communication, and interaction dynamics between students of internal and external thinking styles.

Another question that needs to be addressed is to find out “how much demand there is among students for an alternative to the traditional classroom” (Althaus, 1997, p. 158), as well as to “look at the kinds of discourse that characterize these electronic spaces and to explore the full range of possibilities that such discourse brings to classroom settings” (Hawisher and Selfe, 1992, p. 24). The following discussion will address two studies (Althaus, 1997; Hawisher and Selfe, 1992) that focus on these questions in more detail.

The study conducted by Scott A. Althaus (1997) addresses the pedagogical uses of on-line discussions. The research questions explored by the study included the following: Would students want computer-mediated discussions as a part of their educational development, and if so, why? Who among them would volunteer to participate in such discussion groups? Would students feel that computer-mediated discussions help them learn? (Althaus, 1997, p.158). Participants in the study were 142
undergraduate students of University of Illinois at Urbana-Champaign (59% male, 37% first year students, 29% second year, 17% third year, 17% fourth year) enrolled in a sociology class (93% were taking the class to fulfill a general education requirement).

The study examined whether supplementing face-to-face discussions with computer-mediated discussion (CMD) enhanced the academic performance of undergraduate students in large lecture courses. Another question addressed by the study involved the characteristics of students who participate in CMD (when participation is optional and worth a small number of credit points). To address these research questions, student evaluations of the CMD system were used (which were positive), as well as comparative student performance data (defined as grades, class participation and attendance). Student performance data indicated that students involved in CMD discussion “not only performed better on the first paper and the final exam, but they also attended class more regularly and were more active in face-to-face discussions than other students” (Althaus, 1997, p.165). However, these findings do not clarify whether taking part in on-line discussions led to better attendance and more vocal classroom participation, or if higher levels of motivation (revealed in superior levels of attendance and class participation) caused students to join the CMD groups. This confounding variable could be minimized if assignment to control and experimental groups were random (as opposed to voluntary).

The results of the study suggest that a combination of face-to-face interaction with CMD provides a learning environment superior to that of a traditional classroom (students involved in CMD reported learning more and tended to earn higher grades). As
to the issue of characteristics of students who chose to participate in on-line discussions, the findings indicated that they were not associated with prior computer experience, year in school, or gender. However, the students who had more experience with e-mail tended to become more active participants. The study did not examine the effects of personality types on the patterns of participation in on-line discussions. Even though the results of the study indicate that supplementing face-to-face discussions with CMD discussions can enhance the traditional classroom environment, more research is needed to determine precisely how best this medium can be used to help the students become better learners and better thinkers, and what constitutes an optimal ratio of on-line relative to face-to-face interaction. Althaus' study is important for the present study, especially in its finding that prior computer experiences did not affect the students' willingness to participate in on-line discussions. For the present study, this finding indicates that prior experience with computers may not constitute a confounding variable -- this issue, however, needs to be examined in more detail.

Gail Hawisher and Cynthia Selfe took a different approach to the analysis of computer-mediated discussions and focused on the analysis of the discourse generated by the students participating in a class-related electronic discussion. The general research question was to explore the gender and power relationships among participants. More specifically, the study addressed the following questions:

What are the general patterns of student engagement in a class-based electronic conference? What are the topics a group of undergraduates chooses to discuss in such a conference? What sorts of differences in male and female participation can be attributed to gender? What sorts of differences in the discourse occur when students use pseudonyms? How does the discourse seem to reinforce or depart from authority structures of traditional classrooms? (Hawisher and Selfe, 1992, p. 25).
In order to answer the research questions, a number of variables were analyzed, such as:

1. Number of messages participants sent,
2. Length of messages,
3. Number of references made to other participants,
4. Number of topics participants initiated and the length of time they lasted,
5. Number of times participants agreed and disagreed with others,
6. Number of apologies participants made.

The participants of the study were students in two undergraduate asynchronous English conferences. One conference was a part of a grammar and editing class at Michigan Tech taught by Cynthia Selfe, the other – a part of a descriptive grammar class at the University of Illinois taught by Gail Hawisher. The study lasted for 10 weeks: for the first 5 weeks the students used their own names, for the next 5 weeks the students used pseudonyms. An important aspect of the study design is the removal of the teacher as a participant from the electronic conference in order to gain some understanding of the power relationships. Unfortunately, since this was a preliminary study, the article did not provide information as to the number of participants or their characteristics (such as previous experience with computers, previous writing experiences, learning styles or personality types) that could provide more insight into the dynamics of interaction. However, the variables examined are quite important for the present study, as the present study examined some of the same variables, such as the number and the mean length of
messages, the number of references made to other participants, and the number of agreements and disagreements.

The main findings of the study indicated that:

1. The men in Hawisher's class averaged the longest messages overall, whereas the women in Selfe's class averaged the greatest number of messages.

2. The students in Hawisher's class contributed more messages during the real-name period, whereas the students in Selfe's class contributed more messages during the pseudonym period.

3. The men in Hawisher's class initiated more topics and they lasted for a longer number of days. In Selfe's class it was women who initiated more topics and they lasted for a longer number of days.

4. The women and their ideas in both classes were referred to more frequently than the men and their ideas. Even though the two teachers did not participate in the discussion, they were referred to more often than any other single individual.

5. In both classes women agreed more and posed more questions than the men in both conditions; in Selfe's class they also apologized more frequently. Hawisher's class only evidenced one apology and it was from a man.

One of the more interesting findings of the study was the strong presence of the teacher in computer-mediated discussions even when the teachers are not participating in these discussions. This finding suggests that as teachers we need to carefully consider our roles in these learning spaces to avoid promoting traditional classroom roles where "teachers talk, students listen; teachers' contributions are privileged; students respond in
predictable, teacher-pleasing ways" (Hawisher and Selfe, 1991, p. 55). To promote a more collaborative classroom environment, the teachers can assume the role of facilitators of the learning process and participants in the shared creation of knowledge. In his analysis of on-line communication dynamics, Faigley (1992) notes such changes in classroom dynamics as the loss of teacher control of the floor and the faster pace of on-line discussions, as compared to discussions with the teacher "standing at the front" (Faigley, 1992, p. 181). At the same time, Faigley notes that the two teachers were the ones who provided initial "bids for topics" (Faigley, 1992, p. 178), and that "most of messages 4 through 20" were reactions to the teacher's initial question. In his analysis of transcripts of anonymous (using pseudonyms) on-line discussions, Faigley (1992) notes that the discussion became very heated and antagonistic. None of the comments, though, were aimed at the teacher, even though Faigley anticipated that "the students might take a shot or two at me because I had argued vigorously in earlier discussions, and a few students were unhappy with their grades at the midterm evaluation" (Faigley, 1992, p. 197). Even more so, the students excluded the teacher from the conversation completely and he had "no opportunity to enter it" (Faigley, 1992, p. 197). However, it must be noted that the teacher was never anonymous in these discussions, and this factor might have influenced the dynamics of discussion, as it might have established the authority of the teacher as different from that of the anonymous participants. The teacher's non-anonymity might have also affected the students' willingness to argue with the teacher's position. The issue of teacher anonymity is especially relevant to the current project, as
one of its questions is to investigate the differences between anonymous (for all participants, including the teacher) and non-anonymous discussions.

Hawisher and Selfe's study investigated the patterns of group interaction in order to trace the changes in the ways students work, to gain a better understanding of the social construction of texts. In 1988, Sirc (1988) suggested that we need to research the effects of computers on the behavior of people in groups, and to demonstrate that students are actively learning and that good writing is being produced. To contribute to achieving this goal, this project will explore what students talk about, what they value, and how they identify themselves and others (Sirc, 1988). Another important research question offered by electronic environments, and partially addressed by the current study, concerns the dynamics of social construction of knowledge.

The fact that this kind of collaborative process takes place with the participation of all (or most) students can be interpreted in two different ways. One interpretation is based on Kenneth Bruffee's (1993) model of collaborative learning, in which conversation leads to cooperation and to building of a learning community that can be observed in the electronic space through the written transcripts of conversations. In his interpretation of the role of conversations in on-line environments, Faigley (1992) notes that the "equality of participation does not necessarily lead to 'community building'" (Faigley, 1992, p. 185), as conversation does not necessarily lead to cooperation. Faigley offers a different interpretation, stating that conversation is "inherently antagonistic and to speak is to fight" (Faigley, 1992, p. 185). These two opposing interpretations of the role of on-line conversations and the consequences of a more equal participation in computer-mediated
discussions are especially relevant for the current study, as one of its focal points is the issue of dynamics of student participation in on-line discussions.

**COMPUTER-MEDIATED COMMUNICATION IN L2 WRITING CLASSROOM: RESEARCH PERSPECTIVES**

This section of the chapter establishes a research basis for the current study by providing an overview of recent research studies on CMC in L2 writing classrooms that are relevant to the present study.

**Electronic mail in L2 writing classroom**

A study conducted by Gonzalez-Bueno (1998) with 50 students of first and second semester Spanish at the University of Southwestern Louisiana examined the effectiveness of using e-mail as a tool to promote foreign language learning in and out of the classroom, and to improve the students' L2 writing ability. Linguistic features of e-mail writing samples were compared to those produced in traditional in-class paper-and-pencil assignments. The results of the study identified the following features of the foreign language generated through the electronic medium, as compared to the paper-and-pencil assignments: (a) greater amount of language produced; (b) more variety of topics and language functions; (c) higher level of language accuracy; (d) more similarity with oral language; (e) more student-initiated interactions; and (f) more personal and expressive language use. The results of Gonzales-Bueno's study are relevant to the current study, as both studies address the features of foreign language produced in an on-line interaction. However, an important difference between the two studies must be noted in terms of the communication media examined. Gonzales-Bueno's study compared the
linguistic features of interaction across two different media: paper-and-pencil and e-mail assignments, whereas the present study addressed the issue of interaction of groups that differ in size and anonymity/non-anonymity in the same medium.

**Electronic Bulletin Board in L2 writing classroom**

Meagher and Castanos (1996) conducted their study with 26 Mexican 10th grade students (11 boys and 15 girls) who participated in a bilingual computer-mediated cultural exchange with American students in Spanish classes. The use of computer-mediated communication (an electronic bulletin board) was a part of the English course designed to enable Mexican students to interact with people from other cultures in writing. During the study, the Mexican students spent one 50-minute English class a week in the computer lab, writing their messages to be posted to an electronic bulletin board that permitted participants in both countries access to messages.

The main research hypothesis was that due to the opportunity offered by CMC to facilitate global, cross-cultural communication, participation in a CMC exchange can modify the L2 students' attitudes towards members of the culture of L2. These changes are reflected in students' written descriptions of members of that culture. The results indicated that participation in an electronically-mediated cultural exchange program produced significant changes in student attitudes towards members of the culture of L2. Mexican students' perceptions of the American culture were significantly less positive after than before the CMC exchange. Even though the current study does not explicitly address issues of cross-cultural communication, they are definitely issues that might surface in the way students interact with their peers from different cultures.
Internet Relay Chat in L2 writing classroom

Ringo Ma (1996) conducted his study with 20 U.S. students (12 female, 8 male) taking junior-level communication courses at a state university in the northern U.S., who volunteered to fulfill a class project requirement by participating in relay chats and writing a report based on their relay chats. Each student was required to complete 15 "natural conversation" sessions (duration varied from 20 minutes to several hours) with East Asian students from China, Japan, Hong Kong, Korea, and/or Taiwan within a two month period, as well as engage in relay chats with North American students, so that a comparison could be made between their East Asian and North American partners. The study examined the students' attitudes to intercultural computer-mediated communication (CMC) and found the following:

1) 18 out of 20 U.S. students stated that intercultural CMC helped them understand the culture of their communication partner.

2) 16 U.S. students did not think that they had to adapt to each other in their relay chats with East Asian students.

3) Students in both cultural groups reported that people in relay conversations are more direct than people usually are in face-to-face conversations.

4) Both U.S. and East Asian students perceived themselves to engage in a higher level of self-disclosure in relay conversations that in FTF conversations.

The last two findings are especially relevant to the present study, as they provide an important insight into the differences between face-to-face and on-line interaction. Even though the present study does not compare these two types of discussions, these
results need to be taken into consideration when applying and interpreting the group
dynamics categories developed for face-to-face environments to on-line interaction.

**Daedulus Interchange in the L2 writing classroom**

Meunier (1997) conducted a study of synchronous written communication
(conducted via *Daedulus Interchange*) with three third-year French and two third-year
German writing classes at the college level, in which Computer-Mediated Foreign
Language Communication (CMFLC) was regularly scheduled in a computerized
language lab. The purpose of her study was to examine the students' perspectives on
what motivates them to participate more or less actively in CMFLC. More specifically,
the following questions were addressed: What motivational and affective factors are
associated with networking participation? What motivational and affective differences
are there between students of various personalities? What are the motivational and
affective effects of different teaching styles?

The study was designed to allow students to express their own views and to
describe their experiences during synchronous on-line discussions in French and German
classes. Surveys and questionnaires used for this study included both closed and open-
ended questions, in order to collect both quantitative and qualitative data. Students were
given two questionnaires at the end of the semester: (1) a 43 question survey to measure
the students' motivation types; (2) the Myers-Briggs Type Indicator.

The results of the study indicated that 83% of the students had positive attitudes
towards CMFLC, and 60% of the students thought that CMFLC had contributed to a
better atmosphere during regular classroom sessions. The major strength of CMC is the
high level of situational and task motivation it promotes, and a positive attitude among L2 students, regardless of initial motivations and computer background. Meunier (1997) notes that the students "find it attractive to write casually, as if passing notes in class" (Meunier, 1997, p. 27), thus they spend more time writing in L2. Another benefit of CMC illustrated by this study is that it "encourages participation from students who do not usually speak in class" (Meunier, 1997, p. 27), thus providing opportunities for L2 writing practice for more students. Meunier's study of participation in on-line discussion by students of different personality types raises questions that are important for the current study, as one of the goals of the study is to examine whether there is a relationship between students' learning styles/personality types and their on-line interaction patterns.

CONCLUSION

This chapter illustrates the complexity of the issue of L2 writing in a computer-mediated environment by providing an overview of research studies conducted in this area. In order to develop better teaching methods and appropriate methods of inquiry for the new electronic environment, we need to assess how electronic learning spaces differ from face-to-face environments (Levin, Kim and Riel, 1990). The analysis of the types of on-line discourse can lead us to a better understanding of the learning processes of the students, and to more effective teaching that creates learning environments suitable for various learning styles.

In order to organize an environment for learning that will use what we know about learning, technology, and the social construction of texts, we need to look at the
changes in the ways students interact, write and learn. Sirc (1988) suggests that we need to research the effects of computers on behavior of people in groups, and to demonstrate that students are actively learning and that effective writing is being produced. To achieve this goal, we need to explore what the students discuss, how they identify themselves and others, as well as how their communication shows the dynamics of power in their learning environment (Sirc, 1988). Another important research issue is the analysis of the process of social construction of the learning community, which can be readily observed in the electronic space, through the written transcripts of conversations. Such analysis can provide insight into the process of the social construction of knowledge and suggest ways to make this process more interesting, engaging and effective for the students. The current study attempts to address some of these issues.

The purpose of the present study is to analyze both the products of collaborative and independent writing, and the processes -- on-line discussions the students engage in to develop their critical thinking skills and to improve their English writing abilities. The study attempts to bring together SLA theory, writing theory, learning styles theory, and group dynamics theory in order to gain insights into the complex world of computer-mediated L2 writing.
Chapter Two

1. Since 1960, approximately 30 instruments of learning styles have appeared. Some of the more frequently used are the Hidden Figures Test (1962), Matching Figures Test (1965), Group Embedded Figures Test (1971), Student Learning Styles Questionnaire (1974), Cognitive Style Mapping Inventory (1975), Kolb's Learning Styles Inventory (1976), and Dunn, Dunn, and Price's Learning Styles Inventory (adults, 1977; students, 1978). These and other instruments collectively measure about 20 aspects of learning styles.

2. 64 students (French 54, German 10): 5th semester, 46 students; 6th semester, 18 students; 50 female students, 14 male students. 5 instructors (one instructor who taught two classes volunteered to participate in the study).
CHAPTER THREE

METHODS AND PROCEDURES

INTRODUCTION

This study addresses two issues pertinent to the use of computer-mediated communication in an ESL writing class: patterns of student participation in on-line discussions, and writing performance in collaborative and independent essays. Chapter One of this dissertation provided the theoretical background of the study and a detailed explanation of research questions and hypotheses; Chapter Two presented an overview of relevant research studies. This chapter, Chapter Three, will describe methodological principles and procedures used in the present study. The chapter will recall the research questions and hypotheses, provide definitions for the variables to be examined, and discuss the data collection procedures and methods of data analysis. The chapter will also include an explanation of the computerized text analysis program used for text analysis of essay data in this study.

RESEARCH QUESTIONS AND HYPOTHESES

As discussed in the first two chapters, pedagogical research into the patterns of group interaction in on-line environments has been initiated with the introduction of the computer-mediated communication in the classroom, especially among sociopsychologists interested in "hyperpersonal" relationships in cyberspace (Turkle, 1995; Stone, 1995; Walther, 1992, 1996).

Analysis of transcripts of on-line discussion can provide useful information about small group interaction, students' participation, and dynamics of discussion. Research
Question One was designed to provide an insight into these issues. Research Question Two addresses the issue of collaborative vs. independent writing -- this question is designed to evaluate the effectiveness of group work in collaborative writing tasks. Both computerized text analysis and holistic grading by ESL raters is discussed.

Research Question One: Does student participation in on-line synchronous discussions vary in different configurations of discussions and for different thinking styles?

H₀: There is no difference in student participation among discussions of different configurations.

H₀: There is no difference in participation in discussions among students of different thinking styles.

Research Question Two: Is there a difference in writing performance between collaborative and independent tasks?

H₀: There is no difference in writing performance between collaborative and independent tasks.

Research Question Three: Is there a change in the students' attitudes to (a) collaborative assignments, and (b) the use of computers in class from the beginning and to the end of semester?

(a) H₀: There is no change in the students' attitudes to collaborative assignments from the beginning and to the end of semester.

(b) H₀: There is no change in the students' attitudes to the use of computers in class from the beginning and to the end of semester.
RESEARCH CONTEXT AND SUBJECTS

To answer the research questions, an experiment was designed in which the students were required to: (1) participate in weekly on-line in-class synchronous discussions based on a list of questions about a given week's readings, and (2) write two take-home essays -- an independent one, written by each student individually, and a collaborative one, written in a group with two other group members. The purpose of the experiment was to compare the patterns of the students' participation in on-line discussions of different sizes (whole class vs. small group) and different anonymity settings (anonymous vs. non-anonymous). In whole class discussions, all students had access to all their classmates' messages, and in small group discussions the students had access only to messages of their group members (group memberships were set by the teacher before each class). In anonymous discussions, the students were assigned ID-numbers. In non-anonymous discussions, the students were using their real names.

Research was conducted in an English Composition 107 class that met twice a week: once in a regular classroom, once in the College of Humanities Collaborative Learning Laboratory (COHlab). English 107 is a freshman composition course designed to introduce international students who are non-native speakers of English to the strategies and conventions of the U.S. academic writing. The course is intended for advanced learners of English and corresponds in its curriculum content to English 101 -- a freshman composition course for native speakers of English. The general emphasis of English 107 courses is on developing textual analysis and research skills. In addition, the emphasis in this specific course was on collaborative writing using Norton Connect.Net --
a software tool that facilitates collaborative writing. It can be best described as a macro-
program that works in the *Microsoft Word* environment, allowing students to work both in synchronous and asynchronous modes on their papers and conduct on-line discussions.

*Norton Connect.Net* was selected for this study because of the following features:

1. its capability to combine essay and discussion modes on one screen, enabling the students to read essays (or discussion assignments) and comment on them without having to switch from one mode to the other,
2. a large writing space for discussion messages -- this feature was considered important by the instructor because it enabled students to develop their thoughts in writing more than other programs (such as chat rooms) would allow,
3. convenient classroom management features, such as the ease of changing group configurations -- both between small group and whole class formats, as well as between anonymous and non-anonymous formats,
4. familiarity of most students with the features of the *Microsoft Word* that allowed a shortening of the learning time, and
5. the archive feature that allowed for convenient data collection and retrieval for research purposes.

The two main pedagogical approaches used in this course were process writing and collaborative learning. A process-oriented approach to writing was implemented through engagement of students in brainstorming and free-writing activities, as well as composing multiple drafts. Revision of the first draft was usually done after in-class peer review sessions and after receiving written feedback from the instructor. A collaborative learning approach was implemented through in-class discussions (both on-line and face-to-face discussions), peer reviews and collaborative writing of essays in groups of three.
Although quite often writing is thought of as an activity of an individual working in isolation, most writing processes involve social interaction and, therefore, in certain ways, all writing can be seen as collaborative (Bakhtin, 1981; Rubin, 1988), at least at certain stages of the process. A number of theories of collaborative writing have been developed by researchers analyzing the processes of group work and interaction in the writing process. Ede and Lunsford (1990) developed a categorization of seven approaches to organization in collaborative writing; Sharples et al. (1993) categorized the coordination strategies used by joint authors; Posner (1991) used a classification of roles assumed by group members during the composing process. This study approaches the issue of collaborative writing from the perspective of the text itself: the study examines textual differences between independently and collaboratively written texts. The explanation of such a distinction is provided later in this chapter.

The subjects were chosen by virtue of their enrollment in English 107 section 4 -- a pilot computer-mediated writing course taught by the researcher; there were 20 subjects. The general goal of the course was to help the students develop their writing and analytical skills through on-line written discussions and collaborative writing assignments. More specifically, the objectives of the course included development of informal writing skills through on-line discussions, and academic writing skills through independent and collaborative take-home essays.

The assignments for on-line discussions were prepared by the instructor before each class session in the COHlab and included a number of questions about a given week's readings. The readings were organized by topics, such as gun control, euthanasia,
the death penalty, and others. The students were free to either choose a question for the discussion from the list provided by the instructor, or address other issues related to the readings being discussed. The students' participation in on-line discussions was not graded.

The two essay assignments used for this study asked the students to write a rhetorical analysis of an essay of their choice from the anthology used in class. The only difference between the two assignments was the number of student authors: in the case of the independent essay, each student was required to write and submit his/her own essay, and in the case of the collaborative essay, the students were required to work in groups of three and submit one essay per group. All group members were assigned the same grade for their collaborative essay. Peer reviews were done in class for both types of essays.

The data used in the study included writing samples collected over the network, transcripts of on-line discussions, Sternberg's Thinking Styles questionnaire results, students' assessment of their interest level for different topics used for on-line discussions, and pre- and post-treatment surveys. Both quantitative and qualitative data analysis methods were used. As the subjects represented an intact group of students enrolled in a class rather than a group of subjects selected by random sampling, the ex post facto design was used that allows the researcher to investigate the relationship between independent and dependent variables without considering prior events. Ex post facto designs examine the degree of relationship between two or more variables, and while they do not examine the causal relationship between the variables, they provide
evidence in support of links between such variables. *Ex post facto* design was chosen for this study, as the goals of the study were to examine whether there were links between:

1. various configurations of discussions (i.e. small group vs. whole class, and anonymous vs. non-anonymous) and such discussion features as discussion content, amount of communication, and interaction dynamics. In other words, *ex post facto* design helped the researcher identify whether there were differences in the above mentioned features between discussions of different configurations;

2. essay type (collaborative vs. independent) and linguistic features of texts (such as lexical density, lexical diversity, syntactic complexity and grammatical accuracy). *Ex post facto* design enabled the researcher to examine whether the linguistic features of texts were represented differently in the two different types of essays.

The purpose of this research study was explained to the students in the beginning of the semester and the students had the freedom to decide whether they wanted to participate in the study. It was also made clear to the students that completion of independent and collaborative essay assignments, as well as participation in on-line discussions were required in the course. However, the students could decide whether they wanted their essays and comments used for this research. All students agreed to participate, and, therefore, they all signed a written consent form.

Table 3.1 below provides the subjects' basic demographic data, including the following categories: gender distribution, year in college, academic majors, and the students' native languages.
Table 3.1 Subjects' basic demographic data

<table>
<thead>
<tr>
<th>gender distribution</th>
<th>13 male, 7 female</th>
</tr>
</thead>
<tbody>
<tr>
<td>year in college</td>
<td>13 freshmen, 4 sophomores, 3 juniors</td>
</tr>
<tr>
<td>academic majors</td>
<td>8 MIS, 2 Accounting, 2 Computer Science, Agricultural Economics, BPA, Business, Chemical Engineering, Computer Engineering, Electrical Engineering, English, Pre-Architecture</td>
</tr>
<tr>
<td>native languages</td>
<td>4 Bengali, 3 Arabic, 2 Japanese, 2 Korean, 1 Bangla, 1 Cantonese, 1 Chinese, 1 French, 1 Hebrew, 1 Icelandic, 1 Indonesian, 1 Russian, 1 Spanish,</td>
</tr>
</tbody>
</table>

It's important to note that even though seven out of twenty subjects were enrolled as sophomores or juniors, it does not indicate their higher level of experience or familiarity with the University of Arizona, or with any American university, as most students have transferred course credits from their home countries. Another point worth mentioning is that most students' academic majors are quite technical in nature, therefore, the level of general familiarity with the use of computers (although not with the specific software application used in this study) is quite high.

DATA MEASUREMENT

The following section of this chapter provides operational definitions of the variables to be examined, explains the research design, and discusses the measurements of the variables.

Discussion content was measured using Bales' Interaction Process Analysis (IPA) categories. IPA is one of the most well-known methods for analyzing group interaction, developed by Robert Bales in the 1950's (Hartley, 1997). Bales based his system on three basic ideas about group functioning: (1) the small group is a social system, (2) there are fundamental issues which every group must resolve, and (3) we can observe and classify
group behavior on these lines. Bales' system was initially developed to study problem-solving groups, and IPA categories reflect this focus (Davis, 1977).

Bales' categories for certain cognitive, affective and instrumental aspects of task-oriented behavior are distributed among the following areas: social-emotional area one (positive reactions), task area one (attempted answers), task area two (attempted questions), social-emotional area two (negative reactions). Positive reactions category (social-emotional area one) includes showing solidarity, tension release, and agreement; attempted answers category (task area one) includes giving suggestions, opinion, and information; attempted questions category (task area two) includes asking for information, opinion, suggestion; negative reactions category (social-emotional area two) includes showing disagreement, tension, and antagonism. For the purposes of the current study, discussion messages were classified into four categories: positive reactions, negative reactions, task-related questions, and task-related answers.

The amount of communication was measured by the number and the mean length of messages, similar to the measurement used by Hawisher and Selfe (1992) in their study of dynamics of asynchronous classroom discussion. The goal of Hawisher and Selfe's study was to explore the gender and power relationships among the participants. The subjects of their study were students in two undergraduate asynchronous English conferences, one taught by Gail Hawisher, the other taught by Cynthia Selfe. The study compared the dynamics of male and female participation in discussions of two different modes: using real names and using pseudonyms. To examine the general patterns of student participation in on-line discussions, the researchers used the following variables:
(1) the number of messages participants sent, (2) the length of messages, (3) the number of references made to other participants, (4) the number of topics participants initiated and the length of time they lasted, (5) the number of times participants agreed and disagreed with others, (6) the number of apologies participants made. The measurement of amount of communication in the current study differs from that of Hawisher and Selfe's study in that the mean length of messages is used, i.e. the ratio of the total number of words written by a student in a given discussion over the total number of messages sent by this student in that discussion.

Two types of measurement were used in the present study to examine interaction dynamics. One measurement of interaction dynamics was based on categories established by Morgan (1992), and Hawisher and Selfe (1992). As mentioned earlier, these categories include the number of student-initiated topics, the length of time these topics lasted, the number of references made to other participants, the intended audience of the message, the number of apologies made to other participants, and the number of agreements and disagreements. In the current study, only four of the following categories were used: the number of references made to other participants, the intended audience of the message, the number of agreements, and the number of disagreements.

The other measurement was that of communication networks based on Jones, Barnlund, and Haiman's (1980) classification of recitative and dialogic patterns in communication. In their discussion of communication networks, Jones, Barnlund, and Haiman (1980) address the following four patterns as the most common: recitative pattern, subgrouping, dialogue, and multilateral pattern. Recitative pattern indicates a
tendency for the conversation to focus on specific individuals who are either aggressive, dominant, or have extensive knowledge of the problem. Subgrouping means that there are private conversations taking place within the framework of a larger discussion. According to Jones, Barnlund, and Haiman (1980) the reason for subgrouping is either too much or too little interest in the topic. Dialogue is a conversational pattern where a few people carry on a conversation in front of the entire group, and the remaining group members are listeners. Multilateral pattern is a flow of communication from person to person according to whoever is moved to speak or whoever has relevant information to contribute. Jones, Barnlund, and Haiman consider the predominance of group-directed rather than person-directed contributions one of the characteristics of a mature group (Jones, Barnlund, and Haiman, 1980, 99-104). In this study, a qualitative analysis of communication networks will be performed to examine what roles and channels of communication the participants develop in the course of group interaction. Such analysis is important as it can shed some light on the types of interaction patterns used by the participants and provide some information as to whether these patterns contribute to effective discussion or promote exclusion of certain group members and disrupt the flow of communication.

Thinking styles were measured by Sternberg’s Thinking Styles Questionnaire (Sternberg, 1997) administered to the students during the course of the semester (see Appendix J). Sternberg defines styles as preferred ways of thinking, emphasizing that people’s abilities do not depend on their thinking styles: the abilities can be almost the same, yet the styles can differ greatly from one person to the other. At the same time,
Sternberg postulates that one of the main criteria by which people are judged in society is by the fit between their preferred thinking style and a specific task they are asked to perform. Sternberg uses the analogy of mental self-government to create his thinking styles theory. This analogy is based on the assumption that the forms of the government used in the world are "external reflections of what goes on in people's minds" (Sternberg, 1997, p. 23). Sternberg uses the following categories for classification of thinking styles: functions (legislative, executive, and judicial), forms (monarchic, hierarchic, oligarchic, and anarchic), levels (global and local), scope (internal and external), and leanings (liberal and conservative).

According to Sternberg's (1997) classification of functions of mental government, people need to perform legislative, executive, and judicial functions in their thinking. Legislative people like to create their own rules, and prefer to "decide for themselves what they will do and how they will do it" (Sternberg, 1997, p. 24). Executive people "like to follow rules and prefer problems that are prestructured" (Sternberg, 1997, p. 25). In other words, executive people like to work with existing structures rather than create new structures themselves. Judicial people like to work on evaluation and assessment of existing rules and procedures, and prefer problems that are aimed at such analysis.

The four forms of mental self-government (monarchic, hierarchic, oligarchic, and anarchic) are defined by Sternberg in terms of a specific way of approaching a problem. Monarchic people are "single-minded and driven" (Sternberg, 1997, p. 25), and they usually do not "let anything get in the way of solving a problem" (Sternberg, 1997, p. 25). Hierarchic people approach problem-solving differently: they have a hierarchy of goals...
and recognize the need to set priorities, and to view a problem from a number of angles in order to set the priorities. Sternberg compares the next form of self-government, the oligarchic one, to the hierarchic form, in that both these types are characterized by "having a desire to do more than one thing at the same time" (Sternberg, 1997, p. 25). However, the difference is that oligarchic people tend to have several competing goals at a time, and are not always sure what to do first. Anarchic people are characterized by Sternberg (1997) as being "motivated by a potpourri of needs and goals" (Sternberg, 1997, p. 25) that are hard for them to sort out and prioritize. The main strength of anarchic people is their ability to approach problems creatively.

Levels of mental self-government are defined by Sternberg as global and local. As evident from the definitions, global individuals like to deal with large and abstract problems, whereas local individuals prefer more specific problems that require working with details. Sternberg emphasizes that local and global individuals work well together, as each tend to focus on a different aspect of a problem.

The scope of mental self-government is identified by Sternberg (1997) as internal or external. Internal people "tend to be introverted, task-oriented, aloof, and sometimes less socially aware" (Sternberg, 1997, p.26); they usually prefer to work by themselves, in isolation from other people. External people "tend to be extroverted, outgoing, and people-oriented" (Sternberg, 1997, p. 26). This distinction is very important in light of the recent pedagogical tendency to set up cooperative learning environments: whereas external individuals can benefit greatly from peer interaction, people with internal styles may experience more anxiety in a group setting, and learn less than if they were working
by themselves. At the same time, each kind of individual needs to develop the flexibility to be able to adjust to a specific learning (or working) environment, and be able to use both the preferred and the less preferred style.

Sternberg's last distinction, that between liberal and conservative styles, is defined in terms of the approach to rules and set procedures. Liberal people like to go beyond existing rules, "to maximize change, and to seek situations that are somewhat ambiguous" (Sternberg, 1997, p. 27). Conservative people prefer to "adhere to existing rules and procedures, minimize change, and avoid ambiguous situations" (Sternberg, 1997, p. 27).

Sternberg's questionnaire consists of a short (eight questions) self-assessment instrument for each of the categories described above. In other words, there are three instruments to establish the function of the thinking style (one for legislative, one for executive, and one for judicial style), four for the forms of thinking styles (one each for monarchic, hierarchic, oligarchic, and anarchic forms), two for the levels of thinking styles (global and local), two for scope (internal and external), and two for the leanings (liberal and conservative). There is a total of thirteen instruments, each consisting of eight questions. All instruments are based on a seven point Likert-type scale, asking the students to evaluate how well each statement describes them with one of the following scores: (1) not at all well, (2) not very well, (3) slightly well, (4) somewhat well, (5) well, (6) very well, (7) extremely well. For example, to evaluate how strong a student's preference is towards the legislative style, the following instrument would be used:

1. When making decisions, I tend to rely on my own ideas and ways of doing things. 1 2 3 4 5 6 7
2. When faced with a problem, I use my own ideas and strategies to solve it. 1 2 3 4 5 6 7
3. I like to play with my ideas and see how far they go. 1 2 3 4 5 6 7
4. I like problems where I can try my own way of solving them.  
5. When working on a task, I like to start with my own ideas.  
6. Before starting a new task, I like to figure out for myself how I will do my work.  
7. I feel happier about a job when I can decide for myself what and how to do it.  
8. I like situations where I can use my own ideas and ways of doing things.

To evaluate the score, the eight numbers circled above are to be added, divided by eight, rounded by the first decimal point, and matched with interpretive categories provided by Sternberg depending on status (student vs. non-student) and gender. For example, for the legislative category, Sternberg (1997, p. 29) provides the following interpretive table for college students:

**Table 3.2 Sternberg’s score interpretation table**

<table>
<thead>
<tr>
<th>Category</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very high</td>
<td>Top 1-10%</td>
<td>6.2-7.0</td>
</tr>
<tr>
<td>High</td>
<td>Top 11-25%</td>
<td>5.6-6.1</td>
</tr>
<tr>
<td>High middle</td>
<td>Top 26-50%</td>
<td>5.1-5.5</td>
</tr>
<tr>
<td>Low middle</td>
<td>Top 51-75%</td>
<td>4.4-5.0</td>
</tr>
<tr>
<td>Low</td>
<td>Top 76-90%</td>
<td>4.0-4.3</td>
</tr>
<tr>
<td>Very low</td>
<td>Top 91-100%</td>
<td>1.0-3.9</td>
</tr>
</tbody>
</table>

It must also be noted that, in the present study, to eliminate possible bias caused by names of different styles, the researcher compiled all the instruments together which resulted in one questionnaire consisting of 94 questions, and calculated the scores herself. After the scores were calculated and the category for each student was established, the researcher had to make the numbers between males and females comparable and differentiate the categories more. To achieve this, the researcher assigned numbers from 0 to 3 as follows: 0 for "very low", "low" and "low middle", 1 for "high middle", 2 for
"high", and 3 for "very high". These numbers were based on verbal descriptions provided by Sternberg in his explanation of the strength of preference for each of these categories.

Sternberg states that:

If you scored in the "very high" category, then you have all or almost all of the characteristics of a legislative person. If you scored in the "high" category, you have many of these characteristics. And if you scored in the "high middle" category, then you have at least some of the characteristics. If you scored in the bottom three categories, then this is not one of your preferred styles (Sternberg, 1997, pp.28-29).

Tables 3.3a and 3.3b below provide an overview of this research question and methodology.

**Table 3.3a Research question one: methodology**

Does student participation in on-line synchronous discussions vary (a) in different configurations of discussions, and (b) for students of internal and external thinking styles?

<table>
<thead>
<tr>
<th>Question</th>
<th>Variable</th>
<th>Measurement instruments</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1A) Is there a difference in discussion content between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?</td>
<td>Discussion content</td>
<td>Bales' Interaction Process Analysis: positive reactions; negative reactions; task-related questions; task-related answers (Davis, 1977)</td>
<td>- repeated measures MANOVA tests (alpha = 0.05). Independent variables: anonymity and group size, Dependent variables: positive emotions, negative emotions, task-related questions, task-related answers. Interaction test between anonymity and group size for each of the four dependent variables.</td>
</tr>
<tr>
<td>Question</td>
<td>Variable</td>
<td>Measurement instruments</td>
<td>Analysis</td>
</tr>
<tr>
<td>----------</td>
<td>----------</td>
<td>-------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>(1B) Is there a difference in the amount of communication between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?</td>
<td>Amount of communication</td>
<td>- Number of messages; - Mean length of messages (Hawisher and Selfe, 1992).</td>
<td>- repeated measures MANOVA tests (alpha = 0.05). Independent variables: anonymity and group size. Dependent variables: number of messages, mean length of messages. Interaction test between anonymity and group size for each of the two dependent variables.</td>
</tr>
<tr>
<td>(1C) Is there a difference in the interaction dynamics between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?</td>
<td>Interaction dynamics</td>
<td>- communication networks (Jones, Barlunnd and Haiman, 1980); - references made to other participants; - intended audience of the message (group, individuals, etc.); - number of agreements; - number of disagreements (Morgan, 1992, Hawisher and Selfe, 1992).</td>
<td>- coding into qualitative categories, summary of findings</td>
</tr>
<tr>
<td>(1D) Is there a difference in discussion content, amount of communication, and interaction dynamics between students of internal and external thinking styles?</td>
<td>- discussion content, - amount of communication, - interaction dynamics, - internal and external thinking styles</td>
<td>- same as above - same as above - same as above - Sternberg's Thinking Styles Questionnaire</td>
<td>- coding into qualitative categories, summary of findings</td>
</tr>
</tbody>
</table>

The first column of Table 3.3a above reiterates each of the four sub-questions of Research Question 1. It is important to note that the first three subquestions examine the difference between small group and whole class discussions, as well as between anonymous and non-anonymous discussions for the following variables: discussion
content, amount of communication, and interaction dynamics. The fourth subquestion examines the difference between students of internal and external thinking styles for the same variables.

The second column identifies the variable to be examined for each of the four subquestions, while the third column provides information about the measurement instruments. The discussion content was measured with the help of Bales' Interaction Process Analysis categories that include positive reactions, negative reactions, task-related questions, and task-related answers. The amount of communication was measured by the number and mean length of messages. Interaction dynamics were measured by two different instruments. The first instrument was a description of communication networks, based on Jones, Barmlund and Haiman (1980) analysis categories. The second instrument was interaction dynamics categories, established by Morgan (1992), and Hawisher and Selfe (1992). These categories include the number of references made to other participants, the intended audience of the message, the number of agreements, and the number of disagreements. For the fourth subquestion, the students' thinking styles were measured with the help of Sternberg's Thinking Styles Questionnaire.

The fourth column briefly explains the type of analysis to be used. It is worth mentioning here that both qualitative and quantitative analyses were used. Subquestions (1A) and (1B) that examine discussion content and amount of communication data were answered with the help of repeated measures MANOVA tests, while subquestions (1C) and (1D) were answered using qualitative analysis.
Table 3.3b below summarizes the types of data that were analyzed to answer this research question. It includes information about the number of discussions of each configuration used in the study, as well as discussion topics. It also lists Sternberg's Thinking Styles Questionnaire as an instrument used to collect data about the students' thinking styles.

**Table 3.3b Research question one: encounters**

<table>
<thead>
<tr>
<th>Data</th>
<th>Session (topics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small group anonymous discussion - 2</td>
<td>&quot;Should drugs be legalized?&quot; and discussion of sample essays</td>
</tr>
<tr>
<td>Small group non-anonymous discussion - 2</td>
<td>&quot;Genetics or society?&quot; and &quot;Are criminals made or born?&quot;</td>
</tr>
<tr>
<td>Whole class anonymous discussion - 2</td>
<td>&quot;Euthanasia&quot; and &quot;Abortion&quot;</td>
</tr>
<tr>
<td>Whole class non-anonymous discussion -2</td>
<td>&quot;Capital punishment&quot; and &quot;Gun control&quot;</td>
</tr>
<tr>
<td>Sternberg's Thinking Styles Questionnaire</td>
<td>-</td>
</tr>
</tbody>
</table>

The first column of Table 3.3b above provides a summary of the data collected, identified by types of discussions and the questionnaire used to examine students' thinking styles. Number "2" indicates that there were two discussions of each type. The second column specifies topics for each type of discussion.

**ON-LINE DISCUSSION TASKS OF DIFFERENT CONFIGURATIONS AND DIFFERENT GROUP SIZES**

A number of studies conducted in the area of the classroom use of computer-mediated communication indicate a higher level of student involvement in electronic discourses, as compared to face-to-face environments (Sullivan and Pratt, 1996; Kern, 1995b; Kelm, 1995), the use of a more complex language, lexically and syntactically (Warschauer, 1996), and a wider range of communicative and discourse functions (Chun, 1994). However, the comparison of face-to-face to on-line environments might sometimes lead to problematic conclusions, as research (Beauvois, 1995; Ittzes, 1997;
Meunier, 1997) has shown that students can exhibit different behaviors in on-line vs. face-to-face interactions due to factors other than different personality types and learning styles.

In order to eliminate problems related to cross-medium comparisons, the current study examines the patterns of student participation in on-line discussions only, focusing on the differences between different anonymity settings (anonymous vs. non-anonymous discussions) and different sizes of discussions (whole class vs. small group). All topics of discussions are based on class readings (see Appendix D for specific discussion assignments), and, as was explained earlier, are part of the course syllabus. On-line written discussions are especially important for non-native speakers of English, as they not only provide the students with an opportunity for more interaction and sharing of ideas, but also with additional English reading and writing practice.

To test the hypothesis that ESL student participation varies between anonymous and non-anonymous discussion assignments, the following assignments were designed (see Appendix D for more detailed description of each assignment):

Anonymous:

Discussion Assignment (March 4): Euthanasia

Discussion Assignment (March 25): Should Drugs be Legalized?

Discussion Assignment (Apr 1): Abortion

Discussion Assignment (Apr 22): Sample essays discussion
Non-anonymous:

Discussion Assignment (Feb 18): Capital Punishment

Discussion Assignment (Feb 25): Genetics or society?

Discussion Assignment (Apr 8): Gun control

Discussion Assignment (Apr 15): Are Criminals Made or Born?

Each assignment was structured in the same format, as follows:

(1) a brief introduction that included the discussion topic and a statement about the type of discussion configuration to be used. For example:

Euthanasia (March 4, 1999)

Today we will have a whole class anonymous discussion, in which you will be assigned a number instead of your name. I will have access to your real names.

The topic of today's discussion is this week's readings about euthanasia. Feel free to raise your own points, as well as address the following questions:

(2) a list of questions prepared by the instructor in advance for each of the assigned readings in the anthology, as well as more general questions related to the topic. For example:

It's Not Over, Debbie by Ch. Colson

1) How do you understand the discussion between the priest and the psychiatrist (par. 22-28, p. 1019)? What is the significance of this discussion for the essay? Why did the author include it as part of his essay? How do you understand the last line of the essay "you're going to end up killing Jews"?
2) What is the author's main point in par. 16 (p. 1018)? Why does the author compare euthanasia to abortion? What is your opinion of such comparison?

*Active and Passive Euthanasia* by James Rachels

3) Why is the "distinction between active and passive euthanasia thought to be crucial for medical ethics" (p.1019)? What is your opinion on this distinction and on the issue of euthanasia in general?

4) What is the author's opinion on the distinction between active and passive euthanasia? Is he convincing in arguing his point? What strategies does he use to get his point across? Are these strategies effective for his purpose? Be specific; use examples from the text.

5) How can you describe the tone and language used in the essay? Who is the intended audience?

Other questions:

6) If an elderly person, a terminally ill patient (or even a healthy person) is rational and able by legal standards to make a life-or-death decision for him/herself, should this decision be honored? Explain your point of view.

7) Can the option of choosing death guarantee dignified life? Is this a paradox? Explain your opinion.

Other assignments were structured similarly. The following section presents the assignments for the other three anonymous discussions (Should Drugs Be Legalized?; Abortion; and Sample essays discussion):
Should Drugs Be Legalized? (March 25, 1999)

Today we will have a SMALL GROUP ANONYMOUS DISCUSSION (I will have access to your real names) of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you do need to address both essays in your group discussion. Good luck and have fun!

Should Drugs Be Legalized? by William Bennett

1) What is the main purpose of the essay, Should Drugs Be Legalized? by William Bennett?

2) What are the main writing strategies that the author uses to get his point across? Be specific; provide references to paragraph numbers.

3) How is organization used to convey the main message?

4) What tone is used? Is it effective for the author's purpose?

5) How are ethos, pathos, and logos used to get the main point across? Be specific; provide references to paragraph numbers.

Prohibition and Drugs by Milton Friedman

The main argument of this essay is that "prohibition is an attempted cure that makes matters worse -- for both the addict and the rest of us" (p. 932, par. 5).

1) In your opinion, why does Friedman choose to define current drug problems in terms of economics rather than ethics? Why is the issue of ethics is an unclear point to him?

2) Is there enough evidence to support his argument and to make his essay convincing?

3) Do you think that tougher laws on drugs are a restriction of personal freedom?
4) What should be the role of the government in controlling the drug problem? What should be the role of individuals? How is this issue dealt with in your country?

Abortion (April 1, 1999)

Today we will have a whole class anonymous discussion in which you will be assigned a number instead of your name. I will have access to your real names. The topic of today's discussion is this week's readings about abortion. Feel free to raise your own points, as well as address the following questions:

*A Pro-Life View from the Left* by Mary Meehan

1) What strategies does the author use to convince her audience of her views? Is she addressing a conservative or a liberal audience? How did you react to her points? Be specific, don't focus only on the main message.

*Our Choices, Ourselves* by Sally Quinn

2) In her essay, Quinn asserts that being for abortion rights is a political position in favor of personal privacy -- being pro-abortion rights does not necessarily mean that one is for abortion. How does Quinn build this distinction? In your opinion, is she successful in making this distinction work for her readers?

*A Pox on Both Your Houses* by Mike Royko

3) Please read the final statement of the essay stating that women need to eat more "brain food" because of the 26 million abortions performed in the United States over the last 19 years. While this statement is certainly offensive to women, it also underlies a problem area of the essay: the essay is written from a narrowly male perspective that does not
acknowledge the unique problems faced by women as childbearers and primary providers for children.

4) Could a 24-hour waiting period be a real problem for some women? Explain.

5) Does the author simplify or ignore certain problems in his discussion of the controversies surrounding abortion? Explain; give examples.

Sample essays discussion (April 22, 1999)

Today we will have a SMALL GROUP ANONYMOUS DISCUSSION of the two sample open letters -- one is about eating disorders, the other is about the death penalty.

Please address the following questions in discussing the essays, and feel free to raise your own. Be specific; refer to paragraphs and pages in the essays to support your points.

Who is the intended primary audience?

What is the purpose?

How does the author establish his/her credibility?

What writing strategies does the author use to convey his/her message?

Are these strategies effective for the given purpose/audience?

What is the most effective strategy in each essay?

Least effective?

What suggestions for improvement would you give to each of the authors?

What questions do you have about this assignment?

The assignments for non-anonymous discussions were structured in the same way. The following section presents the assignments for the four non-anonymous
discussions (Capital Punishment; Genetics or Society?; Gun Control; and Are Criminals Made or Born?):

Capital Punishment (February 18, 1999)

Today we will have an on-line discussion about capital punishment. Please use your background knowledge and information from this week's readings to argue your points. Below you will find a summary of main arguments from the essay Death and Justice; use it in your discussion.

Main questions for discussion:

1) What is your view on the death penalty — should it be allowed? Why or why not? Explain.

2) What is your reaction to the essay This is Your Death, by J. Weisberg? What is Weisberg's position on the death penalty? Why do you think so? What are his main writing strategies? Are they effective for his purpose?

Death and Justice by Ed. Koch

<table>
<thead>
<tr>
<th>Argument</th>
<th>Counter-argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) The death penalty is</td>
<td>The opponents consider &quot;barbaric&quot; the death itself, not the method. We may not</td>
</tr>
<tr>
<td>&quot;barbaric.&quot;</td>
<td>like the death penalty but it must be available to punish crimes of cold-blooded</td>
</tr>
<tr>
<td></td>
<td>murder, cases in which any other form of punishment would be inadequate and,</td>
</tr>
<tr>
<td></td>
<td>therefore, unjust.</td>
</tr>
<tr>
<td>2) No other major democracy uses the death penalty.</td>
<td>No other major democracy has a murder rate as high as that in the United States.</td>
</tr>
<tr>
<td>Argument</td>
<td>Counter-argument</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3) An innocent person might be executed by mistake.</td>
<td>If government functioned only when the possibility of error didn't exist, government wouldn't function at all.</td>
</tr>
<tr>
<td>4) Capital punishment cheapens the value of human life.</td>
<td>On the contrary, death penalty strengthens the value of human life. When we lower the penalty for murder, it signals a lesser regard for the value of the victim's life.</td>
</tr>
<tr>
<td>5) Thou Shall Not Kill (The Bible).</td>
<td>The U.S. constitution condemns cruel and inhuman punishment, but does not condemn capital punishment.</td>
</tr>
<tr>
<td>6) The death penalty is a state-sanctioned murder.</td>
<td>The state has rights that the private individual does not. In a democracy, these rights are given to the state by the electorate.</td>
</tr>
</tbody>
</table>

**Genetics or Society? (February 25, 1999)**

Today we will have a SMALL GROUP DISCUSSION of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you need to address both essays in your group discussion. Good luck and have fun!

*The Search for His and Her Brains* by Le Anne Schreiber

1) What is the main purpose of the essay *The Search for His and Her Brains* by Le Anne Schreiber?

2) What are the main writing strategies that the author uses to get her point across? Be specific; provide references to paragraph numbers.

3) How is organization used to convey the main message?
4) What tone is used? Is it effective for the author's purpose?

5) How are ethos, pathos, and logos used to get the main point across? Be specific; provide references to paragraph numbers.

*Women's Brains* by S.J. Gould

The main concern of this essay is mismeasure of "women's brains," specifically the studies of 19th century surgeon Paul Broca.

1) Why is this discussion still of interest to today's readers? What can it tell us about scientific evidence? Can it be an example of a scientific "fact" that was refuted later?

2) Can you think of any examples of long-held scientific truths that changed as new facts were discovered?

3) Is it likely that more research will have to be done before we make the final decision about the existence of biological differences between male and female brains, if such differences exist?

*Gun Control (April 8, 1999)*

Today we will have a whole class NON-ANONYMOUS discussion.

The topic of today's discussion is this week's readings about gun control. Feel free to raise your own points, as well as address the following questions:

*Gun Control Sprouts from Racist Soil* by R. Innis

1) What conclusions can you make about racism and gun control, especially given what you know about the historical and present status of minorities in American society? Can gun control advocates be racist if, as Innis also says, "with the influx of large numbers of
Irish, Italian and Jewish immigrants into the country, gun laws now also targeted whites from the underprivileged classes of immigrants" (11)?

*Women and Handguns* by E. Swazey

2) Swazey's title indicates that women and guns are this essay's principal concern. How do the female students respond to her position? Would they be willing to buy a gun -- and use it, if necessary? What is the reaction of the male students to this question?

*Constitutional Law and the Second Amendment* by P. Lawton

3) Lawton states that the U.S. Constitution absolutely protects citizens' "right to bear arms." What are gun control laws of your countries?

*Gun Control is Constitutional* by R. Goldwin

4) Goldwin believes that "certain explanations were lost or buried in the legislative process" from Madison's original amendment proposal to the Senate's final draft; and although after the Senate's revision, the Second Amendment no longer explicitly stated "that the right to bear arms meant the right to serve in the militia" (14), that public use of firearms nevertheless was, and should be understood. Do you think that Goldwin's evidence is sufficient to suggest that the Second Amendment was intended to be understood exclusively in relation to service in the militia?

*Are Criminals Made or Born? (April 15, 1999)*

Today we will have a SMALL GROUP DISCUSSION of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you need to address all three essays in your group discussion. Good luck and have fun!
**Are Criminals Made or Born? by R.J. Herrnstein and J.Q. Wilson**

1) Herrnstein and Wilson assert that, while social factors contribute to criminal behavior, research increasingly shows that there is a strong biological basis for criminal behavior. In paragraphs 27-31, Herrnstein and Wilson discuss the problems inherent in asserting the dominance of biology in criminal behavior. Why do the authors choose to include this discussion of some of the problems after giving so much evidence supporting their position?

**Why Aren't There More Women Murderers? by A. Bass**

2) Bass frames her article with a discussion of an atypical female murderer. Why does she choose to do this -- is it to provide a vivid contrast to the composite portrait of the typical female murder that she explores in the body of her article? Does ending with the detailed description of the life of atypical murderess Aileen Wuornos add pathos to the piece? Why would Bass want to leave her readers on this note? What is accomplished?

**Address to the Prisoners in the Cook County Jail by C. Darrow**

3) Darrow's final recommendation is, "Make fair conditions of life" in order to eliminate the conditions that make the existence of jails possible (36). By the end of the essay, Darrow is, in essence, suggesting a variation on Thoreau's assertion that the place of the honest man is in jail when those on the outside are corrupt. What are your opinions on this? Has Darrow convinced you of the validity of his position by the end of the essay? If so, what was most compelling about his argument? Least compelling? Are you persuaded by his point of view?
The students were asked to read the assignment and engage in an on-line discussion using the discussion feature of Connect.Net. After the first introductory session conducted early in the semester, the students did not have any serious problems understanding the task or using the software. The instructor was always available to help the students understand the content of the assignment and to answer technical questions regarding the software. The discussion process developed as follows: one of the students would initiate the discussion by writing a comment that appeared on everybody's screens; after that other students joined the discussion by either responding to comments sent previously or by responding to questions from the instructor's assignment. The comments could be read at the students' individual paces, as Connect.Net did not automatically switch to the next comment -- it was up to the individual student to decide when s/he was ready to read and/or to respond to a new comment.

To test the hypothesis that student participation varies between whole class and small group discussions, four of the eight above-mentioned assignments were administered for discussion by all students in class as one group, and the other four were administered to the class divided into small groups of 4-5 students each (see Appendix D for more detailed description of each assignment).

*Whole class:*

Discussion Assignment (Feb 18): Capital Punishment
Discussion Assignment (March 4): Euthanasia
Discussion Assignment (Apr 1): Abortion
Discussion Assignment (Apr 8): Gun control
Small groups:

Discussion Assignment (Feb 25): Genetics or Society?
Discussion Assignment (March 25): Should Drugs be Legalized?
Discussion Assignment (Apr 15): Are Criminals Made or Born?
Discussion Assignment (Apr 22): Sample essays discussion

The students were required to participate in the eight discussions selected for data analysis as part of English 107 course. Discussion assignments were based on course readings and were designed to help the students better understand the issues presented in the corresponding readings. Another purpose of such assignments was to give the students a chance to practice their informal English written interaction skills.

All eight discussions were conducted by the students in class on the day when the class met in the collaborative computer lab (COHlab). Each on-line discussion was conducted on a Thursday, and each previous Tuesday was devoted to face-to-face discussion of the articles on the same topic and other assignments done in the regular classroom. There were general guidelines and/or specific questions for each assignment, but no requirements in terms of the length of each discussion entry or the amount of entries per session.

To establish whether the discussion topics themselves could be a confounding variable, the students were asked to complete a brief questionnaire, designed using a Likert-type five point scale (see Appendix I), indicating their level of interest in each of the discussion topics. The questionnaire asked the students to rate the topics of semester's readings on a scale from 1 to 5, where "1" stood for "not interesting at all," "2" for "not
very interesting," "3" for "somewhat interesting," "4" for "very interesting," and "5" for "extremely interesting." The results of the questionnaire (summarized in Table 3.4 below) showed that there was no statistical difference in the students' interest levels ($p = 0.348$ is higher than alpha at 0.05 level). These results indicate that the level of the students' interest in various discussion topics did not vary from topic to topic and, therefore, their participation in discussion was not significantly affected by the topic.

**Table 3.4 Scores of students' interest in discussion topics**

<table>
<thead>
<tr>
<th>Discussion topic</th>
<th>Mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do women and men think differently?</td>
<td>3.63</td>
</tr>
<tr>
<td>Capital punishment</td>
<td>3.84</td>
</tr>
<tr>
<td>Euthanasia</td>
<td>3.89</td>
</tr>
<tr>
<td>Drug legalization</td>
<td>3.42</td>
</tr>
<tr>
<td>Abortion</td>
<td>3.84</td>
</tr>
<tr>
<td>Gun control</td>
<td>3.53</td>
</tr>
<tr>
<td>Are criminals made or born?</td>
<td>4.11</td>
</tr>
<tr>
<td>Sample essays discussion</td>
<td>3.37</td>
</tr>
</tbody>
</table>

This study distinguishes between collaborative and independent writing assignments in terms of authorship: independent essays have one author, whereas collaborative essays have three authors. The writing sample data selected for this assignment were two take-home essays, both developed through at least two drafts that were submitted to the teacher: first draft -- for formative comments and suggestions, second draft -- for (mostly) summative comments and a grade. The assignments for each of these essays were almost identical (see Appendix E and F). The difference between the two essays was that the collaborative one was to be written in a group of three students (each student in the group received the same grade), and the independent one was to be
written by each student individually, for an individual grade. Peer reviews and outside comments were allowed and encouraged for both essays.

ATTITUDES TO COLLABORATIVE ASSIGNMENTS AND TO THE USE OF COMPUTERS IN THE COURSE

A number of L2 studies conducted in the past have demonstrated that the process of L2 acquisition is affected by a multitude of factors beyond the linguistic ones. Such factors can include extrinsic and intrinsic motivation, the students' anxiety level, the attitude towards the L2 culture and L2 speakers (Doughty, 1987; Ehrman and Oxford, 1995; Gardner, 1985; Meunier, 1997; Warschauer, 1996), and other social, cultural, cognitive and personal factors (Brown, 1994; Ellis, 1994). All these factors can significantly affect the learning process and learning outcomes. The present study examines the effects of such factors on the process of L2 acquisition in a computer-mediated environment.

In the present study, students' attitudes, motivation, computer literacy, and previous experiences with collaborative work were measured through self-reported pre-activity and post-activity surveys (see Appendix B and C). Both surveys were developed by the University of Arizona College of Humanities committee researching the use of the collaborative computer lab (COHlab) across departments. The COHlab Committee was created when the COHlab was first opened in the Fall 1998 semester, with the following goals: (1) to evaluate and assess computer-mediated classes in terms of students' engagement, levels of interest and academic achievement; (2) to conduct workshops for prospective COHlab instructors; (3) to promote collaboration between various
departments in the College of Humanities aimed at designing computer-mediated curriculum.

The main goal of the surveys was to investigate the students' experiences with and attitudes to the use of computers, as well as their experiences with and attitudes to collaborative work. More specifically, the surveys were aimed at gathering data on the students' experience and comfort level with the use of various software applications, data on their access and typical patterns of use of computers and the Internet, their attitudes to the use of computers for writing and communication, as well as the students' experiences with and attitudes to collaborative work. Questions 1 through 8 on the surveys asked the students to provide information on their experience, comfort level and convenience of access to computers and to the Internet. Questions 9 through 22 asked the students to express their attitudes to the use of computers. Questions 23 through 33 asked the students to indicate their experience and comfort level with various types of collaborative work, as well as their attitudes to collaborative work. The surveys were administered to all classes conducted in the COHlab.

Item 1 on the pre-survey asked the students to rate their experience and comfort level with various computer applications on a scale from 1 to 4. This item was not used for this study due to incompleteness of data. Items 2 through 7 addressed the issues of accessibility to computers and to the Internet/World Wide Web. The questions combined a multiple choice format with brief open-ended explanations. Students' answers to items 2 through 7 are summarized in table 3.5 below.
2. From where do you primarily access a computer? ___ home ___ dorm ___ campus lab ___ work ___ library ___ other

3. What basic hardware do you have? (check all that apply) ___ PC ___ Mac ___ CD-Rom ___ zip drive ___ modem ___ ethernet connection

4. Do you have Internet access from this location? ___ yes ___ no If no, where do you go for Internet access? ____________

5. How convenient is your access to a computer? ___ quite convenient ___ moderately convenient ___ moderately inconvenient ___ quite inconvenient

6. How convenient is your access to the Internet/WWW? ___ quite convenient ___ moderately convenient ___ moderately inconvenient ___ quite inconvenient

7. Do you use a graphical WEB browser? ___ yes ___ no If yes, which one (Netscape, Microsoft Explorer, other)? ____________

Table 3.5 Self-reported data on computer access/use

<table>
<thead>
<tr>
<th>Place of computer access</th>
<th>computer lab (11), home (10), library (10), dorm (2), other (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware used regularly</td>
<td>PC (16), Mac (1), modem (10), CD-ROM (8), zip drive (2), Ethernet connection (2)</td>
</tr>
<tr>
<td>Availability of regular Internet access</td>
<td>yes (18), no (2)</td>
</tr>
<tr>
<td>Access to a computer</td>
<td>quite convenient (13), moderately convenient (6), quite inconvenient (1)</td>
</tr>
<tr>
<td>Access to the Internet/WWW</td>
<td>quite convenient (10), moderately convenient (6), moderately inconvenient (1), quite inconvenient (2)</td>
</tr>
<tr>
<td>Availability of a graphical Web browser</td>
<td>yes (15), no (5)</td>
</tr>
</tbody>
</table>

It is important to note that even though the students indicated a variety of places as their primary locations for computer access, most stated that their access to computers and the Internet was "quite convenient" or "moderately convenient" and regular. One of the students, however, stated that he regularly uses a Macintosh computer -- this statement is also important, as the use of Norton Connect.Net is limited to PCs, and the student had to work with the instructor to make special arrangements to use Connect.Net outside of class. Item 8 on the pre-survey asked the students to rate their own typing skills:

8. How would you rate your typing skills (overall proficiency)? ___ excellent ___ good ___ adequate ___ hunt-and-peck
Table 3.6 Self-reported typing skills

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>excellent</td>
<td>0</td>
</tr>
<tr>
<td>good</td>
<td>7</td>
</tr>
<tr>
<td>adequate</td>
<td>11</td>
</tr>
<tr>
<td>hunt-and-peck</td>
<td>2</td>
</tr>
</tbody>
</table>

Most students rated their typing skills as good or adequate, and only two students stated that their typing skills were poor ("hunt-and-peck"). Although this information may be important, as varying typing speeds of discussion participants may affect the dynamics of discussion, it was not used for the current study. This information was not considered to be reliable enough for this research study due to the fact that it was self-reported data based on students' own perceptions. It was included in the college-wide survey for the purposes of gathering information about the students' perceptions of their typing skills.

Items 9 through 22 addressed the questions of students' attitude and motivation and were measured through 5 point Likert-type scale items that addressed the students' comfort level with computers, their enjoyment of computer use, and their perception of the importance of computer use in the future. The survey items were phrased in the form of statements, and the students were asked to indicate their agreement or disagreement by circling one of five options: "strongly agree," "agree," "neither agree nor disagree," "disagree," or "strongly disagree":

9. I can write better essays when I do them on the computer.  
   | Strongly | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
   | agree    |       |                            |         |                 |

10. I enjoy writing my papers by hand more than by computer.  
    | Strongly | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
    | agree    |       |                            |         |                 |
11. I enjoy using the computer to communicate with my classmates. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
12. I am more comfortable contacting my classmates in person rather than by e-mail. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
13. If I have an urgent question or a comment, I would rather contact my teachers in person than by e-mail. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
14. E-mail helps people learn from each other. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
15. Writing to others by e-mail helps me develop my thoughts and ideas. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
16. Using a computer gives me more chances to read and write. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
17. I want to continue using a computer in my classes. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
18. Using a computer is not worth the time and effort. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
19. I enjoy the challenge of using computers. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
20. Learning how to use a computer is important to my career. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
21. Computers keep people isolated from each other. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |
22. Computers are usually very frustrating to work with. | Strongly agree | Agree | Neither agree nor disagree | Disagree | Strongly disagree |

Item 23 addressed the students' previous experiences and comfort level with various types of collaborative work on a scale from 1 to 4. This item was not used for analysis due to incompleteness of data.

Items 24 through 32 addressed the students' attitudes to the various aspects of collaborative activities, measured through the five-point Likert-type scale described above:
<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.</td>
<td>Studying with a group usually helps me get better grades on tests.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>25.</td>
<td>The feedback on my work I get from peers is usually helpful.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>26.</td>
<td>Working on a group project is usually not worth the time and effort.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>27.</td>
<td>In a group, usually one person ends up doing most of the work.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>28.</td>
<td>Feedback from my peers is not as useful as feedback from the instructor.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>29.</td>
<td>Group members should not be given the same grade on a project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>30.</td>
<td>Working in groups is a good way to gain different perspectives on an issue.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>31.</td>
<td>It's very hard to distribute the workload fairly in a group project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>32.</td>
<td>I would not hesitate to complain to the instructor if a member of my group was not contributing his/her fair share to a project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>33.</td>
<td>The quality of work produced by a group is usually better than what I can produce on my own.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>

Item 33 was not used in analysis due to the lack of basis for comparison (this item was omitted from the post-survey). Items 34 to 44 were administered to the students as a part of a college-wide survey but were not analyzed for the purposes of this study.

The post-survey administered to the students at the end of the semester was the same as the pre-survey except for item 10 -- it was phrased differently and, therefore, was not used in this analysis. In addition, the post-survey included a take-home part (see Appendix G) that consisted of four open-ended questions asking the students to discuss...
specific positive and negative experiences with collaborative work and with the use of computers in the course:

1) Tell us about a specific assignment/activity when your collaboration with other students in this class worked well. What happened?

2) Tell us about a specific assignment/activity when your collaboration with other students in this class did NOT work well. What happened?

3) Tell us about a specific time when a particular technology (ConnectNet, OldPuebloMOO, etc.) facilitated collaborative work in this course. How and why do you believe the technology helped?

4) Tell us about a specific time when a particular technology (ConnectNet, OldPuebloMOO, etc.) seemed to hinder collaborative work in this course. How and why do you believe the technology interfered?

To summarize, Research Question Three investigates whether there is a change in the students' attitudes to collaborative assignments and to the use of computers in class from the beginning and to the end of the semester, using the following data: pre-surveys (that included close-ended questions only), post-surveys (that included both close-ended and open-ended questions), and course evaluations. Tables 3.7a and 3.7b provide an overview of this research question and methodology.

Table 3.7a Research question three: methodology

<table>
<thead>
<tr>
<th>Question</th>
<th>Variable</th>
<th>Measurement instruments</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a change in students' attitudes to collaborative assignments and to the use of computers in class from the beginning and to the end of semester?</td>
<td>- students' attitudes to collaborative writing assignments; students' attitudes to the use of computers in class.</td>
<td>- pre- and post-surveys; course evaluations.</td>
<td>- coding into qualitative categories, summary of findings</td>
</tr>
</tbody>
</table>

The first column of Table 3.7a above reiterates Research Question Three. The second column identifies the variables to be examined, the third column provides
information on the measurement instruments, and the fourth column states that qualitative analysis was used.

**Table 3.7b Encounters**

<table>
<thead>
<tr>
<th>Data</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course evaluations</td>
<td>Last class period</td>
</tr>
<tr>
<td>Survey</td>
<td>Pre- and post-surveys</td>
</tr>
</tbody>
</table>

Table 3.7b above summarizes the information about the two types of measurement instruments used to answer Research Question Three. The first instrument, course evaluations, refers to the standard evaluations administered to the students at the end of the semester. Only the students' answers to the open-ended questions from the course evaluations were used in this study, as follows: What is your overall rating of this course? What is your overall rating of the instructor's teaching effectiveness? What was your overall experience in this course?

**DEPENDENT VARIABLES**

In the present study, dependent variables were (1) the students' writing performance in independent and collaborative tasks, and (2) the students' participation in on-line discussions. The independent writing task was a take-home assignment that required the students to write a rhetorical analysis (see Appendix E) based on any essay from the anthology used in the course. Work on this assignment included peer reviews and feedback from the instructor, but each student had to turn in his/her own essay, and was given an individual grade. For the collaborative assignment (see Appendix F), the task was the same -- to write a rhetorical analysis of an essay from the anthology. However, for this assignment the students were asked to work in groups of three. In their
group, the students were expected to choose an essay for analysis, to divide tasks among group members, and to incorporate ideas of all group members into one essay. Work on this assignment also included peer reviews and feedback from the instructor, but each group had to turn in one essay, and all group members received the same grade for the essay.

Writing performance was evaluated in two ways: (a) measurement performed by computerized text analysis software, focusing on lexical diversity, lexical density, syntactic complexity, and grammatical accuracy (see subsequent section for descriptions of these criteria), and (b) evaluation done by ESL raters focusing on overall writing quality and features of essays (see Appendix H for evaluation form used by the ESL raters). Tables 3.8a and 3.8b provide an overview of this research question and methodology.

**Table 3.8a Research question two: methodology**

Is there a difference in writing performance between collaborative and independent tasks?

<table>
<thead>
<tr>
<th>Question</th>
<th>Variable</th>
<th>Measurement instruments</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Is there a difference in lexical complexity between collaborative and independent tasks?</td>
<td>(2A) lexical diversity</td>
<td>1. lex. diversity = # of different words/# of words</td>
<td>repeated measures MANOVA (0.05 level) to compare the means of the essays on these variables</td>
</tr>
<tr>
<td></td>
<td>(2B) lexical density</td>
<td>2. lex. density = # of lexical items/# of words</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2C) Is there a difference in grammatical accuracy between collaborative and independent tasks?</td>
<td>grammatical accuracy</td>
<td>1. ratio of # of grammatical errors = (1) # of grammatical errors/# of sentences; and (2) # of grammatical errors/# of words</td>
<td>same as above</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. ratio of types of grammatical errors = (1) # of types of grammatical errors/# of sentences (2) # of types of grammatical errors/# of words</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Variable</td>
<td>Measurement instruments</td>
<td>Analysis</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>(2D) Is there a difference in syntactic complexity between collaborative and independent tasks?</td>
<td>syntactic complexity</td>
<td>1. ratio of subordinated structures = subordination/subordination + coordination</td>
<td>same as above, and follow-up tests to examine which means differ (if difference found)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. ratio of sentence-level cohesive conjunctions = # of sentence-level cohesive conjunctions/# of sentences</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. ratio of paragraph-level transitions = # of paragraph-level transitions/# of paragraphs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. average sentence length = # of words per sentence (i.e. total number of words/total number of sentences)</td>
<td></td>
</tr>
</tbody>
</table>

The first column of Table 3.8a above reiterates each of the four subquestions of Research Question Two. This question addresses the issue of differences between the students' performance in collaborative and independent writing tasks through the following variables: lexical complexity, grammatical accuracy, and syntactic complexity. It is important to note that lexical complexity is comprised of two variables: lexical density and lexical diversity.

The second column identifies the variable to be examined for each of the four subquestions. Writing performance in collaborative and independent tasks was measured with the help of the following variables: lexical complexity (operationalized by lexical density and lexical diversity), grammatical accuracy, and syntactic complexity.

The third column provides information on the measurement instruments. Lexical diversity was operationally defined as the type to token ratio, i.e. the number of different non-repeated words, including function and content words divided by the total number of words in the text. Lexical density was operationally defined as the type to token ratio excluding the function words (for the list of function words, see Appendix L).
Grammatical accuracy was calculated as the ratio of number and types of grammatical errors (described in more detail later in this chapter) over the total number of sentences in a piece of writing. Syntactic complexity was measured with the help of the following data: the ratio of subordinated structures, the ratio of sentence-level cohesive conjunctions, the ratio of paragraph-level transitions, and the average sentence length. The ratio of subordinated structures was calculated as the number of subordinated structures over the total number of subordinated and coordinated structures together. The ratio of sentence-level cohesive conjunctions was calculated as the number of sentence-level cohesive conjunctions over the number of sentences. The ratio of paragraph-level transitions was calculated as the number of paragraph-level transitions over the total number of paragraphs. The average sentence length was calculated as the average number of words per sentence, i.e. as the ratio of the total number of words over the total number of sentences.

The fourth column briefly explains the type of analysis to be used: for all four subquestions, repeated measures ANOVA was used. The types of data used to answer this research question are presented in Table 3.8b below.

**Table 3.8b Research question two: encounters**

<table>
<thead>
<tr>
<th>Data</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaborative essay</td>
<td>Rhetorical analysis essay</td>
</tr>
<tr>
<td>Independent essay</td>
<td>Rhetorical analysis essay</td>
</tr>
</tbody>
</table>

Table 3.8b above summarizes the information about the two essays used in this study. Both assignments required the students to write rhetorical analysis essays. The only difference between the two assignments was that the collaborative essay was written
by groups of three students, and the independent essay was written by each student individually. One grade per group was assigned for collaborative essays, and one grade per student was assigned for independent essays. Both essays were peer reviewed in class.

PERFORMANCE MEASUREMENT DONE BY COMPUTER

Wordsmith

WordSmith Tools is an integrated suite of programs for linguistic analysis of texts, used in this study to analyze lexical diversity, lexical density and syntactic complexity of the students’ essays. It operates on IBM-compatible machines, and accepts data in ASCII, ANSI and plain text formats. It is a package of programs that includes six tools, each aimed at a specific text analysis purpose. The two main programs used for this study were Wordlist and Concord tools.

Wordlist Tool analyzes a text and produces a list of all the words or word-clusters in a text, in alphabetical or frequency order, as well as descriptive statistics for the text that include the number of tokens, the number of types, the type/token ratio, the average sentence length, the number of sentences, the number of paragraphs, and the average paragraph length. In the study, lexical diversity was operationally defined as the type to token ratio, i.e. the number of different non-repeated words, including function and content words, divided by the total number of words in the text. Lexical density was operationally defined as the type to token ratio excluding the function words. The list of function words was based on the list compiled by Yili Li (1998) for her dissertation research (see Appendix L). The following are some important definitions used by
Wordsmith Wordlist Tool in linguistic analysis:

- *A sentence* is "the full stop, question mark or exclamation mark immediately followed by one or more word separators and then a capital letter or an accented capital letter, a number of a currency symbol" (Wordsmith, 1996);

*Wordlist Tool* searches for and identifies sentences on the basis of the above definition.

- *A word* is "as a string of valid letters with a separator at each end" (Wordsmith, 1996);

*Wordlist Tool* defines separators as spaces and specific codes, such as page eject codes, tabs, carrier returns, and line feeds. Whether hyphens are considered as separators or not is up to the user. In this analysis, hyphens were defined as separators.

- *A token* is "the number of all the running words encountered as *Wordlist* processed the text file(s)" (Wordsmith, 1996);

In other words, *token* refers to the total number of words.

- *A type* refers to the different number of words, excluding the repeated ones.

Another important function that needs to be mentioned in connection with the type/token ration is the stop list function. Words included in the stop list by the researcher are not counted when the program calculates the type/token ration. For the lexical density analysis, a list of function words (see Appendix L) was created and used based on an existent list prepared by Li (1998), with modifications in accordance with the examples of function words provided in English grammar references (Halliday & Hasan, 1976; Kaplan, 1989). To determine the level of lexical density, the stop list function was
used to exclude the function words from the type/token calculation (i.e. only the content words were used in this calculation). It should be mentioned that the calculation of type/token ratio may present a difficulty when working with texts of different lengths, as it varies with the length of the text. To avoid this problem, *Wordlist* provides the user with an option to specify a certain word limit for the calculation of type/token ratio. When such a word limit is set, the program calculates the type/token ratio for the number of words specified, and starts anew for the next number of words. If the text is shorter than the specified word limit, then the type/token ratio will equal zero. To avoid obtaining zero values in this calculation, and to account for the smallest text interval, the word limit was set to 50 in this analysis.

The *Concord* tool provides an opportunity to see a specified word or phrase in context. It presents a concordance display, provides information about collocates of the search word, and produces dispersion plots showing where the search word came in each file; cluster analyses, showing repeated clusters of words (phrases), etc. In this study, the *Concord* tool was used to analyze syntactic complexity in the students' texts. Syntactic complexity was defined as the ratio of subordination in the students' essays. Before describing the use of *Concord tools* in more detail, a review of coordination and subordination rules in English will be provided.

Coordinate structures have clauses on either side of a coordinate conjunction (*and, or, but, nor*). Both of these coordinate clauses are independent, i.e. they do not depend on another clause, although they may be linked to another independent clause.
For example: The cat ran away but the dog stayed.

I need to put this chocolate bar away or I will eat it all.

Subordinate structures have an independent clause and a dependent clause usually linked by a subordinate conjunction (such as when, that, after, etc.) or a relative pronoun. As implied by its name, subordinate (dependent) clauses are subordinate to and depend on the independent clause (also named main, or principal clause).

For example: After this class is over, I will go to the library.

Jane told us that she was leaving for the summer.

As mentioned in the above discussion, coordinate clauses are joined by coordinate conjunctions (and, or, but, nor) and subordinate clauses are joined by subordinate conjunctions (e.g. when, that, after, etc.). It is assumed that the use of subordinate structures is indicative of a higher level of syntactic complexity (Polio, 1997), therefore, this study defines syntactic complexity as the ratio of subordinate structures to the overall number of coordinate and subordinate structures.

A list of coordinating and subordinating conjunctions was established (Li, 1998; Kaplan, 1989; Irmscher, 1972) for the purposes of this analysis (see Appendix M). These two lists were used in the WordSmith Concord program analysis to create concordances of coordinate and subordinate structures in the students' essays.

During the use of the Concord tools, an ambiguity was encountered by the researcher that had to be resolved in order to achieve correct results. The essence of the
ambiguity was that some conjunctions linked smaller segments of sentences instead of indicating a certain syntactic structure. For example,

1) The author used short *and* incomplete sentences in the essay.

2) This essay provides a lot of information about the doctor *and* the patient's family.

3) By writing *that*, he informs the readers of the patient's condition.

To resolve this ambiguity, the lists generated by the *Concord tools* were manually examined by the researcher, and the examples like the ones above were eliminated from the calculation.

Another purpose for which the *Concord* program was used in this study was to examine the use of cohesive devices in the students' texts. To conduct such analysis, a list of cohesive devices (see Appendix N) was compiled based on Halliday and Hasan's (1976) and Li's (1996) descriptions of cohesive devices consisting of the following five categories: additive, adversative, causal, temporal, and continuative. To conduct the search, the search word function of the *Concord tools* was used where the list of all cohesive devices could be input. The result of the search is a list of all cohesive devices used in a particular student's essay. Similar to the above-mentioned problem with coordinating and subordinating conjunctions, the results of the *Concord tools* search included both cohesive devices and other words in English with similar meanings that do not function as cohesive devices. To eliminate this ambiguity, the researcher examined the search results manually and deleted items that were not examples of cohesive devices.
The following are some examples of such occurrences:

1) So far, the article talks about Debbie's case.

2) This strategy was not so effective.

In contrast, an example of "so" being used as a cohesive device indicating causal relation would be as follows:

The resident received the call, so he went to Debbie's ward.

Grammatik

To analyze grammatical accuracy, the Grammatik function in Novell WordPerfect 6.0 was used. Grammatik is an integrated text analysis program that is more commonly referred to as a grammar checker. Grammatik was chosen over other grammar checkers because of its capacity to sort errors by the type of rule violated, as well as to provide descriptive statistics (such as the number and types of errors found, the number of sentences, the number of paragraphs, and the number of words). Besides, Grammatik has an option of setting the style of text to be checked -- for this particular study, "student composition" style was chosen as it was seen as the most appropriate for the task, as student writing samples were analyzed.

The default rules employed by Grammatik to check all styles of texts include grammar, usage, style, and punctuation; therefore, the initial analysis of student texts included identification of errors in all these categories. Since the study is mainly concerned with grammatical problems, other categories were manually removed from the initial results. The remaining categories for the "student composition" style were as follows: adjective use, adverb use, article use, comma splice or fused sentence,
conjunction use, double negative, homonym, incomplete sentences, incorrect verb form, misplaced modifier, noun phrase, object of verb, possessive form, pronoun case, pronoun number agreement, relative pronoun agreement, subject-verb agreement, subordination, and tense shift (see Appendix K for examples of error categories used in the analysis). The resulting statistics included only the ratio of the number and types of grammatical errors mentioned above, over the total number of sentences in a piece of writing. This ratio was used as an index of grammatical accuracy.

PERFORMANCE MEASUREMENT DONE BY ESL RATERS

To supplement discrete-point analysis of texts performed by the computer, another form of evaluation of texts was used -- assessment by the ESL raters. This assessment focused on the overall rhetorical quality and features of the students' essays. The grading rubric included two parts: holistic and analytic. The holistic part asked the ESL raters to rate their overall impression of the essay on a scale from 1 ("poor") to 5 ("excellent"). The analytic part asked the raters to evaluate various aspects of the essay, such as the effectiveness in addressing the writing task, organization, the development of ideas, sentence structure, the use of vocabulary, grammar and mechanics. The analytic evaluation was also done on a scale from 1 ("poor") to 5 ("excellent").

The two raters (a male and a female) who assisted with this task were two experienced ESL teachers, both native speakers of English. Both have gone through a year-long training with the composition board at the University of Arizona during their first year of teaching. Both raters were enrolled in the same doctoral degree program in Second Language Acquisition and Teaching at the time of the study, and both were
working as ESL composition instructors. The raters were given an explanation of the rating rubric and the type of assignment that needed to be evaluated, after which each of the two raters was provided with the following: (1) assignment sheet, (2) 20 evaluation forms, (3) 20 essays identified by numbers only. No indication as to whether the essays were independently or collaboratively written was provided to reduce bias. The initial explanation of the essay assignment and the discussion of the rating rubric was conducted in person, after which the raters took the materials home to work on at their convenience and returned them to the researcher upon completion.

To calculate inter-rater reliability, the Spearman-Brown Prophesy Formula (Hatch, 1991, p. 533) was used:

\[ r_{it} = n r_{a,b} / 1 + (n-1) r_{a,b} \]

where,

- \( r_{it} \) = inter-rater reliability;
- \( n \) = the number of raters whose combined estimates form the final mark for the examinees;
- \( r_{a,b} \) = the correlation between the raters, or the average correlation among the raters if there are more than two.

The STAT101© package was used to calculate the Pearson product-moment correlation coefficients \( (r_{a,b}) \) necessary for this formula. Inter-rater reliability was calculated separately for the holistic and for the analytic parts of the evaluation. To calculate the rating assigned by each of the raters to each essay on the analytic part, an average of that essay's scores for the six analytic criteria was used in the analysis. For the
20 essays analyzed, inter-rater reliability for holistic rating was 0.756, and inter-rater reliability for the analytic part was 0.924. These inter-rater reliability figures were deemed sufficient, and the ratings of these two ESL graders were used in the study.

SUMMARY

This chapter has presented the methodology and procedures employed in the present study. It has discussed the research questions and hypotheses, provided background information about the research context and the subjects participating in the study, described the data collection and analysis procedures, defined the variables and the measurement instruments, as well as methods for the statistical and qualitative analysis. Tables 3.5 through 3.7 present a summary of the research questions, the corresponding variables, the measurement instruments and the data analysis procedures discussed earlier in this chapter. The chapter also discussed writing performance measures as done by the computer and by the ESL raters. The next chapter will present the analysis of data gathered by this study and its findings.
CHAPTER FOUR

RESULTS AND ANALYSES

INTRODUCTION

The previous chapter discussed the methods and procedures for analysis of the data gathered in this study; this chapter will focus on the results of such analysis and present both statistical and qualitative results. The interpretation of results and conclusions will shed some light on the effects of collaborative computer-mediated work on the second language pedagogy. The research questions will provide the overall framework for this chapter.

STATISTICAL ANALYSIS

In order to answer the major research questions presented earlier, both statistical and qualitative analyses were used. One-way repeated measures MANOVA tests were used to answer major research questions one and two. SPSS software for Unix was used to perform these tests. The following section will provide a more detailed explanation and discussion of the statistical tests used to answer major research questions one and two.

Research Question One: Does student participation in on-line synchronous discussions vary (a) in different configurations of discussions, and (b) for students of internal and external thinking styles?

(a) $H_0$: There is no difference in student participation among discussions of different configurations.
(b) H_0: There is no difference in participation in discussions among students of internal and external thinking styles.

This general research question was divided into four sub-questions (1A, 1B, 1C and 1D) with corresponding null hypotheses. The following section of the chapter will present these four questions, results of the analysis, and discussion.

(1A) Is there a difference in discussion content between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1A) H_0: There is no difference in discussion content between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions.

To answer this question, a one way repeated measures MANOVA was performed with two independent variables (anonymity and group size), and the following dependent variables that operationalize the concept of discussion content: the number of task-related questions, the number of task-related answers, the number of positive reactions, and the number of negative reactions. The analysis also included an interaction test between anonymity and group size for each of the dependent variables. As there were two instances of each type of discussion (e.g. two small group anonymous discussion, two whole class non-anonymous discussions, etc.), the dependent variable numbers were added for each individual, and each pair of the same type of discussion was viewed as one discussion for the purposes of statistical analysis. The alternative hypothesis was that discussion content varies depending on the size of group participating in a discussion and depending on whether the discussion is anonymous or non-anonymous. As mentioned earlier, based on Bales' Interaction Process Analysis categorization, discussion content
variable was operationalized as the number of positive reactions expressed by the students in a discussion, the number of negative reactions, the number of task-related questions, and the number of task-related answers (Davis, 1977).

Table 4.1 below presents the means and standard deviation (in parenthesis) of the four dependent variables used to measure discussion content.

Table 4.1 Discussion content variables: means and standard deviations

<table>
<thead>
<tr>
<th>Variable</th>
<th>small-anon</th>
<th>small-non-anon</th>
<th>whole-anon</th>
<th>whole-non-anon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task-questions</td>
<td>2.15 (3.62)</td>
<td>3.30 (6.47)</td>
<td>3.35 (3.80)</td>
<td>2.40 (3.38)</td>
</tr>
<tr>
<td>Task-answers</td>
<td>13.10 (8.67)</td>
<td>12.05 (11.98)</td>
<td>13.05 (10.02)</td>
<td>10.95 (11.13)</td>
</tr>
<tr>
<td>Pos.reactions</td>
<td>2.30 (5.06)</td>
<td>2.45 (4.63)</td>
<td>1.20 (1.96)</td>
<td>1.70 (4.33)</td>
</tr>
<tr>
<td>Neg. reactions</td>
<td>1.65 (2.70)</td>
<td>0.60 (1.05)</td>
<td>1.10 (2.55)</td>
<td>1.35 (3.54)</td>
</tr>
</tbody>
</table>

Generally, the standard deviations are very large, and it is possible that these large within-group deviations, along with small sample sizes, led to the inability to reject the null hypothesis. In other words, the results show that there was no difference in the number of positive or negative reactions expressed by the students in different types of discussion, nor was there a difference in the amount of task-related answers. However, there was an interaction effect found between group size and anonymity for task-related questions. More specifically, the students tended to ask more task-related questions in whole class anonymous discussions than in small group anonymous discussions, and fewer questions in whole class non-anonymous discussions than in small group non-anonymous discussions. To conclude, the analysis of data for question (1A) indicates that there was no statistical difference in discussion content between small group and whole class discussions, or between anonymous and non-anonymous discussions.
The next subquestion (1B) examines the difference in the amount of communication between the various types and configurations of discussions, as follows:

(1B) Is there a difference in the amount of communication between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1B) $H_0$: There is no difference in the amount of communication between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions.

To answer this question, a one way repeated measures MANOVA was performed with two independent variables (anonymity and group size) and corresponding dependent variables: the number of messages sent by students in a discussion, and the mean length of messages. The analysis also included an interaction test between anonymity and group size for each of the dependent variables. As in the case of subquestion (1A), there were two instances of each type of discussion (i.e. two small group anonymous discussions, two whole class non-anonymous discussions, etc.); the dependent variable numbers were added for each individual, and each pair of the same type of discussion was viewed as one discussion for the purposes of statistical analysis.

The alternative hypothesis was that the amount of communication varies depending on the size of the group participating in a discussion and depending on whether the discussion is anonymous or non-anonymous. The amount of communication was operationalized as the number of messages sent in a given type of discussion and the mean length of messages. To answer this question, a one way repeated measures MANOVA was performed with two independent variables (anonymity and group size) and the two dependent variables defining the amount of communication: the number of
messages sent by students in a discussion, and the mean length of messages. The analysis also included an interaction test between anonymity and group size for each of the dependent variables. Table 4.2 below presents the means and standard deviations (in parenthesis) of the four dependent variables used to measure the amount of communication.

Table 4.2 Amount of communication variables: means and standard deviations

<table>
<thead>
<tr>
<th>Variable</th>
<th>small-anon</th>
<th>small-non-anon</th>
<th>whole-anon</th>
<th>whole-non-anon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of messages</td>
<td>17.80 (15.13)</td>
<td>16.20 (18.69)</td>
<td>17.20 (13.43)</td>
<td>14.70 (17.46)</td>
</tr>
<tr>
<td>Mean length of messages</td>
<td>89.20 (82.75)</td>
<td>72.95 (58.91)</td>
<td>112.15 (154.64)</td>
<td>91.60 (86.38)</td>
</tr>
</tbody>
</table>

The results show that there is no difference in the number or the mean length of messages sent in different types of discussion. Generally, the standard deviations are very large, and it is possible that these large within-group deviations along with small sample sizes led to the inability to reject the null hypothesis. In other words, no difference was found in the amount of communication between small group and whole class discussions, or between anonymous and non-anonymous discussions.

The next subquestion (IC) examines the difference in the interaction dynamics between the different discussion modes and configurations, as follows:

(1C) Is there a difference in the interaction dynamics between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions?

(1C) $H_0$: There is no difference in the interaction dynamics between (1) small group and whole class discussions, and (2) anonymous and non-anonymous discussions.
To answer this question, both qualitative and quantitative analyses were performed. In this study, the term "interaction dynamics" includes the following variables (Jones, 1980; Morgan, 1992; Hawisher and Selfe, 1992) that will be explained below: communication networks, and interaction variables that include the number of references made to other participants, the intended audience of the message, the number of agreements, and the number of disagreements.

**Communication networks**

As discussed in Chapter Three, the concept of communication networks was introduced and developed by Jones, Barnlund and Haiman (1980) in their study of dynamics of group communication. Jones, Barnlund and Haiman (1980) view analysis of such communication networks or patterns as important, as it can shed some light on the specialized roles and channels of communication that participants in a discussion develop during the course of group interaction. The four main patterns that Jones, Barnlund and Haiman identify are recitative, subgrouping, dialogue, and multilateral patterns.

In describing the recitative pattern, Jones, Barnlund, and Haiman (1980) indicate that it is a pattern that is typical of many classrooms -- where the teacher introduces a question, and students are required to provide answers. When such roles are not defined explicitly, they might still surface due to "tendency of talk to center on certain individuals" (Jones, Barnlund, and Haiman, 1980, p. 99) who are aggressive, dominant or high-status. At the same time, however, Jones, Barnlund and Haiman note that the causes of recitative patterns need to be examined before taking measures to break them, as such patterns may be a result of "legitimate, temporary factors" (Jones, Barnlund, and Haiman,
1980, p.100), such as a conflict in a group or another factor that may cause a temporary focus on one of the group members. Jones, Barmlund, and Haiman do not specify what percentage of messages need to be addressed to a specific individual in a discussion for that individual to be considered the center of that discussion. However, it seems reasonable to assume that this percentage should be at least higher than 1%. To investigate whether there were recitative patterns in the on-line discussions in the current study, the total number of times each individual was addressed in each type of discussion and the total number of messages in each discussion were calculated. These number are presented in Table 4.3a below.

Table 4.3a Recitative patterns

<table>
<thead>
<tr>
<th>s-a-1</th>
<th>s-a-2</th>
<th>s-na-1</th>
<th>s-na-2</th>
<th>w-a-1</th>
<th>w-a-2</th>
<th>w-na-1</th>
<th>w-na-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of messages</td>
<td>243</td>
<td>113</td>
<td>155</td>
<td>169</td>
<td>167</td>
<td>162</td>
<td>143</td>
</tr>
<tr>
<td>subject # 1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>subject # 2</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>subject # 3</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>subject # 4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>subject # 5</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>subject # 6</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>subject # 7</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>subject # 8</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>subject # 9</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>subject # 10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>subject # 11</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>subject # 12</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>subject # 13</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>subject # 14</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>subject # 15</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>subject # 16</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>subject # 17</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>subject # 18</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>subject # 19</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>subject # 20</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
The first row of Table 4.3a above lists the types of discussions: the letter "s" indicates "small group discussion," the letter "w" indicates "whole class discussion," the letter "a" indicates "anonymous discussion," and the letters "na" indicate "non-anonymous discussion." The second row presents the number of messages sent by the students in each discussion. The remaining rows present the number of times each student was addressed in a discussion. The ratio of messages that were addressed to each specific student is below 1%; therefore, there were no cases where a certain individual became the center of attention. Since all the ratios are below 1%, it was considered unnecessary to provide exact percentages for each case.

The next pattern, subgrouping, is defined by Jones, Barnlund and Haiman as "private conversations taking place within the framework of the larger discussion" (Jones, Barnlund and Haiman, 1980, p. 101). These private conversations can take certain group members out of discussion due to too much or too little interest in the topic. Jones, Barnlund and Haiman (1980) contend that these private conversations do not constitute a problem with group interaction unless they occur constantly and become a persistent pattern. The only type of subgrouping observed in the current study was the dialogue pattern. Dialogue is defined by Jones, Barnlund and Haiman (1980) as a special case of subgrouping, where two people carry on a conversation or an argument in front of the whole group, and the other participants' roles are reduced to those of mere listeners. As with the case of subgrouping, Jones, Barnlund and Haiman (1980) do not consider such pattern a problem unless it "continues very long which may lead to apathy or interpersonal friction in the group" (Jones, Barnlund and Haiman, 1980, p. 103).
Table 4.3b below presents a summary of data regarding the number of dialogs that the students engaged in during online discussions.

**Table 4.3b On-line dialogs data**

<table>
<thead>
<tr>
<th>Discussion</th>
<th>Number of dialogs</th>
<th>Total number of messages</th>
<th>Ratio: dialogs/message</th>
</tr>
</thead>
<tbody>
<tr>
<td>s-a-1</td>
<td>3</td>
<td>243</td>
<td>0.010</td>
</tr>
<tr>
<td>s-a-2</td>
<td>5</td>
<td>113</td>
<td>0.040</td>
</tr>
<tr>
<td>s-na-1</td>
<td>2</td>
<td>155</td>
<td>0.010</td>
</tr>
<tr>
<td>s-na-2</td>
<td>3</td>
<td>169</td>
<td>0.020</td>
</tr>
<tr>
<td>w-a-1</td>
<td>1</td>
<td>167</td>
<td>0.006</td>
</tr>
<tr>
<td>w-a-2</td>
<td>4</td>
<td>162</td>
<td>0.020</td>
</tr>
<tr>
<td>w-na-1</td>
<td>4</td>
<td>143</td>
<td>0.030</td>
</tr>
<tr>
<td>w-na-2</td>
<td>4</td>
<td>151</td>
<td>0.030</td>
</tr>
</tbody>
</table>

The first column of Table 4.3a above describes the type of discussion, such as small group or whole class (identified by letters "s" and "w" respectively), and anonymous or non-anonymous discussions (identified by letters "a" and "na" respectively). The numbers 1 and 2 are used to distinguish between two discussions of each type. The second column, "number of dialogs," presents the total number of dialogs engaged in by the students in each type of discussion. The third column, "total number of messages," presents the total number of messages sent in a given discussion. The fourth column, "ratio: dialogs/message," presents the ratio of dialogs per message in each specific type of discussion.

To examine whether there is a difference in the number of dialogs between small-group and whole class discussion, as well as between anonymous and non-anonymous discussions, t-tests for independent samples were performed. The results of the analysis are presented in Table 4.3b below.
Table 4.3c On-line dialogs data: t-tests results

<table>
<thead>
<tr>
<th>Comparison</th>
<th>t (6)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small group vs. whole class</td>
<td>0.46</td>
<td>0.662</td>
</tr>
<tr>
<td>Anonymous vs. non-anonymous</td>
<td>0.34</td>
<td>0.745</td>
</tr>
</tbody>
</table>

The first column of Table 4.3b identifies the types of discussions being compared: the data in the first line presents the t-tests results comparing the ratio of dialogs produced by the students in small group and whole class on-line discussions, whereas the second line compares the ratio of dialogs produced by the students in anonymous and non-anonymous discussions. As seen from the table, in both cases probability levels are above 0.05, therefore, no difference was found in the number of dialogs in anonymous and non-anonymous discussions, or in whole class and small group discussions.

As mentioned earlier, Jones, Bamlund and Haiman view the multilateral pattern of communication as a sign of mature group. A group can be characterized as having a multilateral pattern of communication when the other three patterns are not dominant. On-line discussions in this study are characterized by the lack of recitative patterns and a small number of dialogs, therefore, the discussions can be seen as generally representative of the multilateral pattern. The dynamics of conversation in a multilateral pattern is described by Jones, Bamlund and Haiman as follows: "attention shifts randomly around the group, and departures from this pattern are a result of special issues that arouse conflict or of some other kind of temporary crisis" (Jones, Bamlund and Haiman, 1980, p. 103). Another important characteristic of a multilateral discussion pattern is a high number of remarks addressed to the group, not to specific individuals.
Such remarks "profoundly improve communication because they tend to open up the communication channels, encourage everyone to offer information and opinions, provide maximum feedback for the correcting of error, and facilitate better interpersonal relations" (Jones, Bamlund and Haiman, 1980, p. 104).

**Interaction variables**

Interaction variables (references made to other participants, intended audience of the message, number of agreements, and number of disagreements) were used by Morgan (1992), and Hawisher and Selfe (1992) in their studies of interaction dynamics in on-line environments. Table 4.4a below summarizes the data produced by the students in the current study.

**Table 4.4a Summary of interaction variables**

<table>
<thead>
<tr>
<th>Categories</th>
<th>Small group raw</th>
<th>Whole class raw</th>
<th>Anonymous raw</th>
<th>Non-anonymous raw</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ratio</td>
<td>ratio</td>
<td>ratio</td>
<td></td>
</tr>
<tr>
<td>Agreements</td>
<td>52</td>
<td>0.0764</td>
<td>42</td>
<td>0.0674</td>
</tr>
<tr>
<td>Disagreements</td>
<td>41</td>
<td>0.0603</td>
<td>59</td>
<td>0.0947</td>
</tr>
<tr>
<td>References to specific people</td>
<td>365</td>
<td>0.5368</td>
<td>361</td>
<td>0.5795</td>
</tr>
<tr>
<td>Specific audiences</td>
<td>113</td>
<td>0.1662</td>
<td>116</td>
<td>0.1862</td>
</tr>
<tr>
<td>References to teacher</td>
<td>57</td>
<td>0.0838</td>
<td>72</td>
<td>0.1156</td>
</tr>
<tr>
<td>Teacher as audience</td>
<td>8</td>
<td>0.0118</td>
<td>19</td>
<td>0.0305</td>
</tr>
<tr>
<td>Number of dialogs</td>
<td>13</td>
<td>0.0191</td>
<td>13</td>
<td>0.0209</td>
</tr>
</tbody>
</table>

The first column of Table 4.4a above presents variables used to analyze communicative patterns in this study. "Agreements" refers to the number of times the students indicated their explicit agreement with comments made by other students by
such statements as "I agree," "I think so, too," "You are right," etc. "Disagreements" refers to the number of times the students indicated their explicit disagreement with comments made by other students by such statements as "I disagree," "You are wrong," "I don't think so," etc. The category "References to specific people" indicates the number of times the students explicitly referred to other students in their messages, either by name (in non-anonymous discussions), by number (in anonymous discussions), or by quoting part of the message they were referring to. For example:

FROM: Student 142 TO: Class 03/04/99 11:10:11
what did the conversation between the priest and the psychiatrist mean? what do you think??

FROM: Student 413 TO: Class 03/04/99 11:15:33
> what did the conversation between the priest and the psychiatrist mean? what do you think??

I think the author believes bible is acceptable for real world. That is why he quote that he can be psychiatrist, even though he is a priest.

In the example above, student 413 makes an explicit reference to an earlier message sent by student 142. The category "Specific audiences" refers to the number of messages addressed to specific students. For example:

FROM: Student 127 TO: Class 03/04/99 12:07:12
You can use your religion if you want to, but others might not.
If that's the case...why abide by laws?...to me religion comes first...so does it mean I go out of my way and defy all laws?

FROM: Student 794 TO: Class 03/04/99 12:08:35
> If that's the case...why abide by laws?...to me religion comes first...so does it mean I go out of my way and defy all laws?
just curious, what is your religion?
In the example above, student 794 addresses his question to student 127. Even though there is no explicit address by the student's number, it is clear who the question is addressed to because of the quote from a message sent by student 127 earlier.

The category, "References to teacher" indicates the number of times the students made references to the teacher; "Teacher as audience" refers to the number of messages addressed specifically to the teacher. The last category, "number of dialogs" refers to the number of two-way exchanges of messages between a pair of students. The columns identified as "raw" in each of the four types of discussions (small group, whole class, anonymous and on-anonymous) refer to the total number of messages identified for each of the seven categories explained above, whereas "ratio" refers to the number of messages in each category divided by the overall number of messages sent in a given type of discussion.

To examine whether there are differences in interaction variables between small group and whole class discussions, as well as between anonymous and non-anonymous discussions, t-tests for paired samples were performed (using ratio data). Table 4.4b below presents the results of the t-test analysis.

**Table 4.4b Summary of interaction variables: t-tests results**

<table>
<thead>
<tr>
<th></th>
<th>t (6)</th>
<th>p</th>
<th>standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small group vs. whole class</td>
<td>-2.88</td>
<td>0.028</td>
<td>0.018</td>
</tr>
<tr>
<td>Anonymous vs. non-anonymous</td>
<td>1.63</td>
<td>0.155</td>
<td>0.035</td>
</tr>
</tbody>
</table>
The first column of Table 4.4b identifies the types of discussions being compared: the data in the first line presents the t-tests results comparing the interaction variables in small group and whole class on-line discussions, whereas the second line compares the interaction variables in anonymous and non-anonymous discussions. As seen from the table, in the first line (comparing small group and whole class discussions), the probability level is under 0.05 ($p = 0.028$), therefore, a difference was found, and the null hypothesis was rejected. To determine where the difference is, the researcher compared the differences between ratios in each of the seven pairs, and found that the only difference that was greater than two standard deviations ($2 \times 0.018 = 0.036$), was the difference in the variable "References to specific people" (0.0427). Therefore, it was concluded that the students make more references to specific people in whole class discussions than in small group discussions. Such difference could be due to the overall higher number of messages and a higher number of participants in whole class discussions, necessitating more clarifications than in small group discussions. Such clarifications are sometimes done with the help of references to specific people.

In the second line (comparing anonymous and non-anonymous discussions), the probability level is greater than 0.05, therefore, no difference was found, and the null hypothesis was not rejected. In other words, there is no difference in interaction variables between anonymous and non-anonymous discussions. To conclude, the analysis of data for subquestion (1C) indicated that there is no difference in interaction dynamics between anonymous and non-anonymous discussions, and there is a difference between small group and whole class discussions. More specifically, the students made more references
to specific people in whole class discussions (both anonymous and non-anonymous) than in small group discussions. As mentioned earlier, this difference may be due to the greater number of messages and participants in whole class discussions as compared to small group discussions that sometimes leads to misunderstandings and to the need for clarification.

The last subquestion of the first research question (1D) examines the relationship between the students' thinking styles and patterns of their participation in on-line discussions, as follows:

(1D) Is there a difference in discussion content, amount of communication and interaction dynamics between students of internal and external thinking styles?

(1D) $H_0$: There is no difference in discussion content, amount of communication and interaction dynamics between students of internal and external thinking styles.

To answer this question, both qualitative and quantitative analyses were performed. As discussed in Chapter Three, discussion content was measured using Bales' Interaction Process Analysis (IPA) categories. These categories are divided between the following four areas: positive reactions, negative reactions, task-related answers, and task-related questions. The amount of communication was measured by the number and the mean length of messages sent by the students in each discussion. The interaction dynamics was measured in two different ways. The first measurement type included the number of references made to other participants, the intended audience of the message, the number of agreements, and the number of disagreements. The other measurement type was based on Jones, Barnlund, and Haiman's concept of communication networks.
that includes four interaction patterns: recitative, subgrouping, dialogue, and multilateral. As discussed in Chapter Three, the students' preferences for internal and external thinking styles were identified on the basis of Sternberg's Thinking Styles Questionnaire. The following section of the chapter will present the results of comparisons between students of internal and external thinking styles done for this question, divided into the following parts: discussion content analysis, amount of communication analysis, and interaction dynamics analysis.

**Discussion content analysis**

This section presents the data and analysis of the difference in discussion content between students of internal and external thinking styles. Table 4.5a below presents discussion content data for the 20 subjects of the study.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Internal score</th>
<th>External score</th>
<th>positive reactions</th>
<th>negative reactions</th>
<th>task-related questions</th>
<th>task-related answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject #1</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>Subject #2</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>35</td>
<td>57</td>
</tr>
<tr>
<td>Subject #3</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>26</td>
</tr>
<tr>
<td>Subject #4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Subject #5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Subject #6</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>14</td>
<td>62</td>
</tr>
<tr>
<td>Subject #7</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>18</td>
<td>59</td>
</tr>
<tr>
<td>Subject #8</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>59</td>
</tr>
<tr>
<td>Subject #9</td>
<td>3</td>
<td>3</td>
<td>26</td>
<td>32</td>
<td>7</td>
<td>59</td>
</tr>
<tr>
<td>Subject #10</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Subject #11</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>Subject #12</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Subject #13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Subject #14</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>61</td>
</tr>
<tr>
<td>Subject #15</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>30</td>
</tr>
<tr>
<td>Subject #16</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Subject #17</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>8</td>
<td>11</td>
<td>117</td>
</tr>
<tr>
<td>Subject #18</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>87</td>
</tr>
<tr>
<td>Subject #19</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>47</td>
</tr>
<tr>
<td>Subject #20</td>
<td>1</td>
<td>1</td>
<td>63</td>
<td>25</td>
<td>64</td>
<td>154</td>
</tr>
</tbody>
</table>

Column one of Table 4.5a above lists the 20 subjects who participated in the study, identified by numbers. Columns two and three present the subjects' scores on internal and external thinking style preferences, respectively. The remaining columns present the dependent variables used for this analysis: the total number of positive reactions expressed in discussions, the total number of negative reactions expressed in discussions, the number of task-related questions, and the number of task-related answers. As explained in Chapter 3, Sternberg's questionnaire consists of a short (eight questions) self-assessment instrument for each of the two categories (internal and external thinking styles). In other words, each student filled out two surveys, and the
results indicated his/her preferences for each of the two styles. Therefore, a student who scored high on the internal style survey could have also scored high on the external style survey, indicating that s/he has both preferences, or a student could have scored low on both indicating that s/he has neither preference. To analyze whether there are differences between students of internal and external thinking styles in discussion content, correlation analysis was performed. Table 4.5b below presents results of this analysis.

Table 4.5b Students' thinking styles and discussion content: correlations

<table>
<thead>
<tr>
<th></th>
<th>Positive reactions</th>
<th>Negative reactions</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal style</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>r (20) = - 0.1071</td>
<td>r (20) = 0.1164</td>
<td>r (20) = - 0.0519</td>
<td>r (20) = - 0.1646</td>
<td></td>
</tr>
<tr>
<td>p = 0.654</td>
<td>p = 0.625</td>
<td>p = 0.828</td>
<td>p = 0.488</td>
<td></td>
</tr>
<tr>
<td>External style</td>
<td>r (20) = 0.1334</td>
<td>r (20) = 0.2555</td>
<td>r (20) = - 0.0061</td>
<td></td>
</tr>
<tr>
<td>p = 0.575</td>
<td>p = 0.277</td>
<td>p = 0.980</td>
<td>p = 0.458</td>
<td></td>
</tr>
</tbody>
</table>

The first column of Table 4.5b identifies the preferred thinking style as internal or external. The remaining four columns present data on the following dependent measures: the total number of positive reactions expressed in discussions, the total number of negative reactions expressed in discussions, the number of task-related questions, and the number of task-related answers. The numbers for each of the measures include the correlation coefficient (r) between each of the internal/external styles and the dependent measures, and the probability value (p). As seen from the table, correlation values are low, and all probability values are greater than 0.05, therefore, the null hypothesis was retained. In other words, no difference was found in interaction variables between students who scored high and those who score low on either internal or external thinking style survey. However, some interesting trends were noted related to the sign of correlations. For internal style, the correlation is negative for three out of four variables.
(positive reactions, task-related answers, and task-related questions), and positive for negative reactions. Negative correlation means that the students who scored higher on internal style expressed fewer positive reactions, and wrote fewer task-related questions and answers, than those who scored lower on internal style. They also tended to express more negative reactions. The students with higher scores on external style tended to express more reactions (both positive and negative), but asked and answered fewer task-related questions and answers than those with lower scores on external style.

**Amount of communication analysis**

This section presents the data and analysis of the difference in amount of communication between students of internal and external thinking styles. Table 4.6a below presents amount of communication data for the 20 subjects of the study.
Table 4.6a Students' thinking styles and amount of communication

<table>
<thead>
<tr>
<th>Subject</th>
<th>Internal score</th>
<th>External score</th>
<th>Number of messages</th>
<th>Mean length of messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject #1</td>
<td>3</td>
<td>3</td>
<td>44</td>
<td>38.48</td>
</tr>
<tr>
<td>Subject #2</td>
<td>3</td>
<td>1</td>
<td>96</td>
<td>30.99</td>
</tr>
<tr>
<td>Subject #3</td>
<td>0</td>
<td>0</td>
<td>35</td>
<td>32.03</td>
</tr>
<tr>
<td>Subject #4</td>
<td>2</td>
<td>3</td>
<td>23</td>
<td>22.78</td>
</tr>
<tr>
<td>Subject #5</td>
<td>3</td>
<td>0</td>
<td>19</td>
<td>121.42</td>
</tr>
<tr>
<td>Subject #6</td>
<td>0</td>
<td>0</td>
<td>72</td>
<td>41.58</td>
</tr>
<tr>
<td>Subject #7</td>
<td>3</td>
<td>0</td>
<td>74</td>
<td>32.91</td>
</tr>
<tr>
<td>Subject #8</td>
<td>3</td>
<td>0</td>
<td>55</td>
<td>62.53</td>
</tr>
<tr>
<td>Subject #9</td>
<td>3</td>
<td>3</td>
<td>102</td>
<td>48.82</td>
</tr>
<tr>
<td>Subject #10</td>
<td>2</td>
<td>0</td>
<td>16</td>
<td>69.13</td>
</tr>
<tr>
<td>Subject #11</td>
<td>3</td>
<td>0</td>
<td>30</td>
<td>102.9</td>
</tr>
<tr>
<td>Subject #12</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>41.4</td>
</tr>
<tr>
<td>Subject #13</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>36.00</td>
</tr>
<tr>
<td>Subject #14</td>
<td>3</td>
<td>0</td>
<td>68</td>
<td>59.65</td>
</tr>
<tr>
<td>Subject #15</td>
<td>1</td>
<td>0</td>
<td>43</td>
<td>23.3</td>
</tr>
<tr>
<td>Subject #16</td>
<td>3</td>
<td>3</td>
<td>31</td>
<td>62.32</td>
</tr>
<tr>
<td>Subject #17</td>
<td>0</td>
<td>0</td>
<td>141</td>
<td>38.39</td>
</tr>
<tr>
<td>Subject #18</td>
<td>0</td>
<td>1</td>
<td>109</td>
<td>51.80</td>
</tr>
<tr>
<td>Subject #19</td>
<td>0</td>
<td>1</td>
<td>51</td>
<td>30.55</td>
</tr>
<tr>
<td>Subject #20</td>
<td>1</td>
<td>1</td>
<td>270</td>
<td>15.91</td>
</tr>
</tbody>
</table>

Column one of Table 4.6a above lists the 20 subjects who participated in the study, identified by numbers. Columns two and three present the subjects' scores on internal and external thinking style preferences respectively. The remaining two columns present data for the two dependent variables: the total number of messages sent by each subject in all discussions, and the mean length of messages. To analyze whether there are differences between students of internal and external thinking styles in the amount of communication, correlation analysis was performed. Table 4.6b below presents the results of this analysis.
Table 4.6b Students' thinking styles and amount of communication: correlations

<table>
<thead>
<tr>
<th></th>
<th>Number of messages</th>
<th>Mean length of messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal style</td>
<td>r (20) = -0.1275</td>
<td>r (20) = 0.0908</td>
</tr>
<tr>
<td></td>
<td>p = 0.592</td>
<td>p = 0.704</td>
</tr>
<tr>
<td>External style</td>
<td>r (20) = -0.0562</td>
<td>r (20) = 0.1068</td>
</tr>
<tr>
<td></td>
<td>p = 0.814</td>
<td>p = 0.654</td>
</tr>
</tbody>
</table>

The first column of Table 4.6b identifies the preferred thinking style as internal or external. The remaining two columns present data on the following dependent measures: the total number messages sent in discussions, and the mean length of messages. The numbers for each of the measures include the correlation coefficient (r) between each of the internal/external styles and the dependent measures, and the probability value (p). As seen from the table, correlation values are low, and all probability values are greater than 0.05, therefore, the null hypothesis was retained. In other words, no difference was found in the amount of communication between the students who scored high and those who score low on either the internal or external thinking style survey.

However, some interesting trends were noted related to the sign of correlations. The correlation was found to be negative for the number of messages, and positive for the mean length of messages for students who scored high on either of the two styles. In other words, the students who scored higher on either of the styles tended to write longer messages, but fewer of them, than the students who scored lower on either of the styles.

**Interaction dynamics analysis: communication networks**

This section presents the data and analysis of the difference in the amount of communication between the students of internal and external thinking styles. Table 4.7a below presents communication networks data for the 20 subjects of the study.
Table 4.7a Students' thinking styles and communication networks

<table>
<thead>
<tr>
<th>Subject #</th>
<th>Internal score</th>
<th>External score</th>
<th>Total number of messages sent by the subject</th>
<th>Total number of times the subject addressed others</th>
<th>Total number of times the subject was addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject #1</td>
<td>3</td>
<td>3</td>
<td>44</td>
<td>19</td>
<td>6</td>
</tr>
<tr>
<td>Subject #2</td>
<td>3</td>
<td>1</td>
<td>96</td>
<td>12</td>
<td>17</td>
</tr>
<tr>
<td>Subject #3</td>
<td>0</td>
<td>0</td>
<td>35</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Subject #4</td>
<td>2</td>
<td>3</td>
<td>23</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Subject #5</td>
<td>3</td>
<td>0</td>
<td>19</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Subject #6</td>
<td>0</td>
<td>0</td>
<td>72</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Subject #7</td>
<td>3</td>
<td>0</td>
<td>74</td>
<td>21</td>
<td>24</td>
</tr>
<tr>
<td>Subject #8</td>
<td>3</td>
<td>0</td>
<td>55</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Subject #9</td>
<td>3</td>
<td>3</td>
<td>102</td>
<td>54</td>
<td>22</td>
</tr>
<tr>
<td>Subject #10</td>
<td>2</td>
<td>0</td>
<td>16</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Subject #11</td>
<td>3</td>
<td>0</td>
<td>30</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Subject #12</td>
<td>0</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Subject #13</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Subject #14</td>
<td>3</td>
<td>0</td>
<td>68</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Subject #15</td>
<td>1</td>
<td>0</td>
<td>49</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Subject #16</td>
<td>3</td>
<td>3</td>
<td>40</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Subject #17</td>
<td>0</td>
<td>0</td>
<td>141</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>Subject #18</td>
<td>0</td>
<td>1</td>
<td>109</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Subject #19</td>
<td>0</td>
<td>1</td>
<td>51</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Subject #20</td>
<td>1</td>
<td>1</td>
<td>270</td>
<td>38</td>
<td>12</td>
</tr>
</tbody>
</table>

Column one of Table 4.7a above lists the 20 subjects who participated in the study, identified by numbers. Columns two and three present the subjects' scores on internal and external thinking style preferences respectively. The remaining three columns present data for the three dependent variables: the total number of messages sent by each subject in all discussions, the total number of times the subject addressed others, and the total number of times the subject was addressed. Even though the total number of messages was included in the earlier analysis of amount of communication, it is also presented here as part of the communication networks analysis, as it helps to interpret the
other two variables. As seen in Table 4.7a above, the following four individuals were
dressed most often by others in on-line discussions (numbers are total number of times
they were addressed in all discussions): subject #17 (30 times), subject #7 (24 times),
and subject #9 (22 times). To understand why these three individuals were addressed by
their peers so often, it is helpful to look at the number of messages sent by these students
as compared to the number of messages sent by other students (in all discussions). One
possible explanation for such a high number of messages being addressed to these three
individuals may be that they dominated the discussion by sending more messages overall
than the other students and focused attention on themselves. According to Table 4.7a
above, the explanation provided above is unsatisfactory, as the number of messages sent
by each of these students, even though they are in the high range, does not exceed the
number of messages sent by their peers. It is also worth noting that the number of
messages sent by subject #20 is much higher than the number of messages sent by any
other student, but he was not addressed more than other students and, therefore, we can
interpret that he was not perceived as dominating the discussions, and did not become the
center of discussions. As seen in Table 4.7a above, the following students were
addressed more than 10 times during the discussion: subject #2 (17 times), subject #14
(17 times), subject #8 (14 times), subject #19 (14 times), subject #20 (12 times), subject
#18 (11 times). Other students were addressed less than 10 times.

To analyze whether there are differences between students of internal and external
thinking styles in the amount of communication, correlation analysis was performed.
Table 4.7b below presents the results of this analysis.
Table 4.7b Students’ thinking styles and communication networks: correlations

<table>
<thead>
<tr>
<th></th>
<th>Number of messages</th>
<th>Number of times the subject addressed others</th>
<th>Number of times the subject was addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal style</td>
<td>$r (20) = -0.1275$</td>
<td>$r (20) = 0.1168$</td>
<td>$r (20) = -0.0095$</td>
</tr>
<tr>
<td></td>
<td>$p = 0.592$</td>
<td>$p = 0.624$</td>
<td>$p = 0.968$</td>
</tr>
<tr>
<td>External style</td>
<td>$r (20) = -0.0562$</td>
<td>$r (20) = 0.3226$</td>
<td>$r (20) = -0.0981$</td>
</tr>
<tr>
<td></td>
<td>$p = 0.814$</td>
<td>$p = 0.165$</td>
<td>$p = 0.681$</td>
</tr>
</tbody>
</table>

The first column of Table 4.7b identifies the preferred thinking style as internal or external. The remaining three columns present data on the following dependent measures: the total number of messages sent in discussions, the total number of times the subject addressed others, and the total number of times the subject was addressed. The numbers for each of the measures include the correlation coefficient ($r$) between each of the internal/external styles and the dependent measures, and the probability value ($p$). As seen from the table, the correlation values are low, and all probability values are greater than 0.05, therefore, the null hypothesis was retained. In other words, no difference was found in communication networks between the students who scored high and those who score low on either internal or external thinking style survey.

However, some interesting trends were noted related to the sign of correlations: for students who scored high on either of the two styles, correlation is negative for the number of times the subject was addressed, and positive for the number of times the subject addressed others. In other words, students who scored higher on either of the styles tended to address others more, but tended to be addressed by others less than those who scored lower on either of the two styles.
Interaction dynamics analysis: interaction variables

This section presents the data and analysis of the difference in the amount of communication between the students of internal and external thinking styles. Table 4.8a below presents interaction variables data for the 20 subjects of the study.

Table 4.8a Subjects' thinking styles and interaction variables

<table>
<thead>
<tr>
<th>Subject</th>
<th>Internal score</th>
<th>External score</th>
<th>References made to others</th>
<th>Number of agreements</th>
<th>Number of disagreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject #1</td>
<td>3</td>
<td>3</td>
<td>35</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Subject #2</td>
<td>3</td>
<td>1</td>
<td>67</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>Subject #3</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Subject #4</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Subject #5</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subject #6</td>
<td>0</td>
<td>0</td>
<td>52</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Subject #7</td>
<td>3</td>
<td>0</td>
<td>48</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Subject #8</td>
<td>3</td>
<td>0</td>
<td>27</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Subject #9</td>
<td>3</td>
<td>3</td>
<td>78</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Subject #10</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subject #11</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Subject #12</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subject #13</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Subject #14</td>
<td>3</td>
<td>0</td>
<td>37</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Subject #15</td>
<td>1</td>
<td>0</td>
<td>32</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Subject #16</td>
<td>3</td>
<td>3</td>
<td>21</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Subject #17</td>
<td>0</td>
<td>0</td>
<td>104</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Subject #18</td>
<td>0</td>
<td>1</td>
<td>67</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Subject #19</td>
<td>0</td>
<td>1</td>
<td>33</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Subject #20</td>
<td>1</td>
<td>1</td>
<td>179</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>

Column one of Table 4.8a above lists the 20 subjects who participated in the study, identified by numbers. Columns two and three present the subjects' scores on internal and external thinking style preferences, respectively. The remaining three columns present data for the three dependent variables: the total number of references made to others, the total number of agreements, and the total number of disagreements.
To analyze whether there are differences between the students of internal and external thinking styles in the interaction variables, correlation analysis was performed. Table 4.8b below presents the results of this analysis.

Table 4.8b Subjects' thinking styles and interaction variables: correlations

<table>
<thead>
<tr>
<th></th>
<th>References made to others</th>
<th>Number of agreements</th>
<th>Number of disagreements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal style</td>
<td>r (20) = -0.2130, p = 0.367</td>
<td>r (20) = -0.2279, p = 0.334</td>
<td>r (20) = -0.1331, p = 0.576</td>
</tr>
<tr>
<td>External style</td>
<td>r (20) = -0.0462, p = 0.847</td>
<td>r (20) = 0.0072, p = 0.976</td>
<td>r (20) = -0.0912, p = 0.702</td>
</tr>
</tbody>
</table>

The first column of Table 4.8b identifies the preferred thinking style as internal or external. The remaining three columns present data on the following dependent measures: the total number of references made to others in discussions, the total number of agreements, and the total number of disagreements. The numbers for each of the measures include the correlation coefficient (r) between each of the internal/external styles and the dependent measures, and the probability value (p). As seen from the table, the correlation values are low, and all probability values are greater than 0.05, therefore, the null hypothesis was retained. In other words, no difference was found in interaction variables between students who scored high and those who scored low on either internal or external thinking style survey. However, some interesting trends were noted related to the sign of correlations. These trends are reflected in Tables 4.8c and 4.8d below.
Table 4.8c External thinking styles and interaction variables: correlation trends

<table>
<thead>
<tr>
<th></th>
<th>External</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>More positive and negative reactions</td>
</tr>
<tr>
<td></td>
<td>Fewer task-related questions</td>
</tr>
<tr>
<td></td>
<td>Fewer task-related answers</td>
</tr>
<tr>
<td>Low</td>
<td>Fewer positive and negative reactions</td>
</tr>
<tr>
<td></td>
<td>More task-related questions</td>
</tr>
<tr>
<td></td>
<td>More task-related answers</td>
</tr>
</tbody>
</table>

Table 4.8d Internal thinking styles and interaction variables: correlation trends

<table>
<thead>
<tr>
<th></th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Fewer positive reactions</td>
</tr>
<tr>
<td></td>
<td>More negative reactions</td>
</tr>
<tr>
<td></td>
<td>Fewer task-related questions</td>
</tr>
<tr>
<td></td>
<td>Fewer task-related answers</td>
</tr>
<tr>
<td>Low</td>
<td>More positive reactions</td>
</tr>
<tr>
<td></td>
<td>Fewer negative reactions</td>
</tr>
<tr>
<td></td>
<td>More task-related questions</td>
</tr>
<tr>
<td></td>
<td>More task-related answers</td>
</tr>
</tbody>
</table>

As seen in Table 4.8c, the students with higher scores on external style tended to express more reactions (both positive and negative), but asked and answered fewer task-related questions and answers than those with lower scores on external style. As the data in Table 4.8b indicates, the students with higher scores on internal style expressed fewer positive reactions, and wrote fewer task-related questions and answers than those who scored lower on internal style. They also tended to express more negative reactions. As was mentioned above, this data reflects only the trends as found in the direction of correlations. Statistically, these findings are inconclusive, and to understand possible implications of this data, further research is needed.
To conclude, the analysis of data for question (1D) indicates that there is no difference in the discussion content, the amount of communication, and the interaction dynamics between students of internal and external thinking styles. However, the directions of correlations between a preference on a thinking style and dependent measures showed some interesting trends, discussed above. Further research is needed to explain these trends.

The next section of this chapter will discuss the findings of Research Question Two that examines the differences in writing performance between collaborative and independent tasks.

Research Question Two: Does writing performance vary between collaborative and independent tasks?

$H_0$: There is no difference in writing performance between collaborative and independent tasks.

In order to investigate the difference in writing performance between independent and collaborative academic writing tasks, the following four sub-questions will be examined:

(2A) Is there a difference in lexical diversity between collaborative and independent tasks?

(2B) Is there a difference in lexical density between collaborative and independent tasks?

(2C) Is there a difference in grammatical accuracy between collaborative and independent tasks?
(2D) Is there a difference in syntactic complexity between collaborative and independent tasks?

To answer these questions, two types of statistical analysis were performed: independent measures MANOVA and repeated measures MANOVA with one independent variable: task type (independent vs. collaborative), and multiple dependent variables (lexical diversity, lexical density, grammatical accuracy and syntactic complexity). The independent measures MANOVA treats data as if there are two distinct groups: one comprised of individual students, the other comprised of groups of students. This test has less power than repeated measures MANOVA, due to smaller sample size. In the case of repeated measures MANOVA, for each student, each individual score for a given dependent variable was paired with the corresponding score received by the group to which the student belonged during the collaborative essay assignment. In addition, a repeated measures MANOVA test was performed to examine whether there are differences between independent scores and group scores for each of the dependent variables. The following section of the chapter will present data for each of the four subquestions.

(2A) Is there a difference in lexical diversity between collaborative and independent tasks?

(2A) $H_0$: There is no difference in lexical diversity between collaborative and independent tasks.
Tables 4.9a and 4.9b below present the two types of analysis (independent measures MANOVA and repeated measures MANOVA) performed to answer this subquestion.

**Table 4.9a Lexical diversity: independent measures MANOVA**

<table>
<thead>
<tr>
<th></th>
<th>lexical diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>34.9560 (4.536)</td>
</tr>
<tr>
<td>Group Two</td>
<td>33.1980 (5.326)</td>
</tr>
<tr>
<td><strong>p = 0.480</strong></td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.9a identifies the two groups used in this analysis: "Group One" refers to the scores received by students for independent essays, whereas "Group Two" refers to the scores received by students for collaborative essays. As mentioned earlier, independent measures MANOVA treats data as if there are two distinct groups: one comprised of individual students, the other comprised of groups of students. The second column of the table presents means of lexical diversity scores for each of the two groups and, in parenthesis, corresponding standard deviations. The last line in the column indicates that the probability is above the 0.05 level (p=0.480), therefore, the null hypothesis could not be rejected. In other words, no difference was found in the lexical diversity measure between collaborative and independent essays by independent measures MANOVA. Table 4.9b below presents the results of repeated measures MANOVA performed to answer this subquestion.
Table 4.9b Lexical diversity: repeated measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>lexical diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>34.9360 (4.536)</td>
</tr>
<tr>
<td>Collaborative</td>
<td>33.1987 (4.930)</td>
</tr>
</tbody>
</table>

The first column in Table 4.9b identifies the two groups used in this analysis: "Independent" refers to the scores received by students for independent essays, whereas "Collaborative" refers to the scores received by students for collaborative essays. As mentioned earlier, in repeated measures MANOVA, each score received by a student in the independent essay for a given dependent variable was paired with the corresponding score received by the group to which the student belonged during the collaborative essay assignment. In addition, a repeated measures MANOVA test was performed to examine whether there were differences between independent scores and group scores for each of the dependent variables. The second column of the table presents means of lexical diversity scores for each of the two groups and, in parenthesis, corresponding standard deviations. The last line in the column indicates that the probability is above the 0.05 level (p=0.480), therefore, the null hypothesis could not be rejected. In other words, no difference was found in the lexical diversity measure between collaborative and independent essays by repeated measures MANOVA.

To conclude, the analyses performed to answer subquestion (2A) indicates that there is no difference in lexical diversity between collaborative and independent essays. The next subquestion (2B) examines the difference in lexical density between the two types of essays.
(2B) Is there a difference in lexical density between collaborative and independent tasks?
(2B) H₀: There is no difference in lexical density between collaborative and independent tasks.

Tables 4.10a and 4.10b below present the two types of analysis (independent measures MANOVA and repeated measures MANOVA) performed to answer this subquestion.

Table 4.10a Lexical density: independent measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>lexical density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>26.6120 (3.809)</td>
</tr>
<tr>
<td>Group Two</td>
<td>25.4700 (4.558)</td>
</tr>
<tr>
<td>p = 0.586</td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.10a identifies the two groups used in this analysis: "Group One" refers to the scores received by students for independent essays, whereas "Group Two" refers to the scores received by students for collaborative essays. As mentioned earlier, independent measures MANOVA treats data as if there are two distinct groups: one comprised of individual students, the other comprised of groups of students. The second column of the table presents means of lexical density scores for each of the two groups and, in parenthesis, corresponding standard deviations. The last line in the column indicates that the probability is above the 0.05 level (p=0.586), therefore, the null hypothesis could not be rejected. In other words, no difference was found in the lexical density measure between collaborative and independent essays by independent measures MANOVA. Table 4.10b below presents the results of repeated measures MANOVA performed to answer this subquestion.
Table 4.10b Lexical density: repeated measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>lexical density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>26.6120 (3.809)</td>
</tr>
<tr>
<td>Collaborative</td>
<td>25.4733 (4.219)</td>
</tr>
<tr>
<td><strong>p = 0.290</strong></td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.10b identifies the two groups used in this analysis: "Independent" refers to the scores received by students for independent essays, whereas "Collaborative" refers to the scores received by students for collaborative essays. As mentioned earlier, in repeated measures MANOVA, each score received by a student in the independent essay for a given dependent variable was paired with the corresponding score received by the group to which the student belonged during the collaborative essay assignment. The second column of the table presents means of lexical density scores for each of the two groups and, in parenthesis, corresponding standard deviations. The last line in the column indicates that the probability is above the 0.05 level (p=0.290), therefore, the null hypothesis could not be rejected. In other words, no difference was found in the lexical density measure between collaborative and independent essays by repeated measures MANOVA.

To conclude, the analyses performed to answer subquestion (2B) indicates that there is no difference in lexical density between collaborative and independent essays.

The next subquestion (2C) examines the difference in grammatical accuracy between the two types of essays.

**2C** Is there a difference in grammatical accuracy between collaborative and independent tasks?
(2C) $H_0$: There is no difference in grammatical accuracy between collaborative and independent tasks.

Tables 4.11a and 4.11b below present the two types of analysis (independent measures MANOVA and repeated measures MANOVA) performed to answer this subquestion.

Table 4.11a Grammatical accuracy: independent measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>number/sentence</th>
<th>type/sentence</th>
<th>number/word</th>
<th>type/word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>0.3802 (0.183)</td>
<td>0.1418 (0.45)</td>
<td>0.0205 (0.010)</td>
<td>0.0076 (0.002)</td>
</tr>
<tr>
<td>Group Two</td>
<td>0.3489 (0.088)</td>
<td>0.1223 (0.24)</td>
<td>0.0202 (0.007)</td>
<td>0.0070 (0.001)</td>
</tr>
<tr>
<td>p = 0.618</td>
<td>p = 0.376</td>
<td>p = 0.946</td>
<td>p = 0.588</td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.11a identifies the two groups used in this analysis: "Group One" refers to the scores received by students for independent essays, whereas "Group Two" refers to the scores received by students for collaborative essays. As mentioned earlier, independent measures MANOVA treats data as if there are two distinct groups: one comprised of individual students, the other comprised of groups of students. The second column indicates the grammatical accuracy score as calculated by the number of errors per sentence (number/sentence), the third column indicates the number of types of errors per sentence (type/sentence). Similarly, the fourth and fifth column indicate the number and type of errors per word (number/word and type/word, respectively). Number of errors per sentence and number of errors per word were calculated as the total number of errors in an essay divided by the number of sentences and words, respectively. The number of types of errors per sentence and the number of types of errors per word were calculated as the number of types of errors (identified by
Grammatik error categories), divided by the total number of sentences and words, respectively. The last line in the table indicates the probability numbers. For all the variables, probability levels are above the 0.05 level; therefore, the null hypothesis could not be rejected. In other words, no difference was found in the grammatical accuracy measure between collaborative and independent essays by independent measures MANOVA. Table 4.11b below presents the results of repeated measures MANOVA performed to answer this subquestion.

Table 4.11b Grammatical accuracy: repeated measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>number/sentence</th>
<th>type/sentence</th>
<th>number/word</th>
<th>type/word</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>0.3802 (0.183)</td>
<td>0.1418 (0.045)</td>
<td>0.0205 (0.010)</td>
<td>0.0076 (0.002)</td>
</tr>
<tr>
<td>Collaborative</td>
<td>0.3489 (0.082)</td>
<td>0.1207 (0.023)</td>
<td>0.0201 (0.006)</td>
<td>0.0068 (0.001)</td>
</tr>
<tr>
<td>p = 0.486</td>
<td>p = 0.105</td>
<td>p = 0.853</td>
<td>p = 0.280</td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.11b identifies the two groups used in this analysis: "Independent" refers to the scores received by students for independent essays, whereas "Collaborative" refers to the scores received by students for collaborative essays. As mentioned earlier, in repeated measures MANOVA, each score received by a student in the independent essay for a given dependent variable was paired with the corresponding score received by the group to which the student belonged during the collaborative essay assignment. The second column indicates the grammatical accuracy score as calculated by the number of errors per sentence (number/sentence); the third column indicates the number of types of errors per sentence (type/sentence). Similarly, the fourth and fifth columns indicate the number and type of errors per word (number/word and type/word, respectively). The last line in the table indicates the probability numbers. For all the
variables, probability levels are above the 0.05 level; therefore, the null hypothesis could not be rejected. In other words, no difference was found in the grammatical accuracy measure between collaborative and independent essays by repeated measures MANOVA.

To conclude, the analyses performed to answer subquestion (2C) indicates that there is no difference in grammatical accuracy between collaborative and independent essays. The next subquestion (2D) examines the difference in syntactic complexity between the two types of essays.

(2D) Is there a difference in syntactic complexity between collaborative and independent tasks?

(2D) $H_0$: There is no difference in syntactic complexity between collaborative and independent tasks.

Tables 4.12a and 4.12b below present the two types of analysis (independent measures MANOVA and repeated measures MANOVA) to answer this subquestion.

**Table 4.12a Syntactic complexity: independent measures MANOVA**

<table>
<thead>
<tr>
<th></th>
<th>subordination</th>
<th>cohesive conjunctions</th>
<th>transitions</th>
<th>average sentence length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group One</td>
<td>0.7930 (0.080)</td>
<td>0.2958 (0.112)</td>
<td>0.1072 (0.157)</td>
<td>19.4507 (2.167)</td>
</tr>
<tr>
<td>Group Two</td>
<td>0.8142 (0.078)</td>
<td>0.2422 (0.130)</td>
<td>0.1947 (0.145)</td>
<td>18.2980 (1.649)</td>
</tr>
<tr>
<td>p = 0.613</td>
<td>p = 0.382</td>
<td>p = 0.287</td>
<td>p = 0.294</td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.12a identifies the two groups used in this analysis: "Group One" refers to the scores received by students for independent essays, whereas "Group Two" refers to the scores received by students for collaborative essays. As mentioned earlier, independent measures MANOVA treats data as if there are two distinct groups: one comprised of individual students, the other comprised of groups of
students. The second column indicates the subordination ratio calculated as the total of subordinated structures divided by the sum of subordinated and coordinated structures in the essays. As described in Chapter Three, coordinate structures have clauses on either side of a coordinate conjunction, whereas subordinate structures have an independent clause and a dependent clause usually linked by a subordinate conjunctions. To calculate the number of subordinate and coordinate clauses, the *WordSmith Concord* program was used. The results of computerized analysis were later examined by the researcher to eliminate the cases where subordinate and coordinate conjunctions were used to link smaller segments of sentences. The third column indicates the cohesive conjunctions ratio calculated as the number of sentence-level cohesive conjunctions divided by the total number of sentences. The fourth column indicates the transitions ratio calculated as the number of paragraph-level transitions divided by the total number of paragraphs. The fifth column indicates the average sentence length (number of words per sentence) calculated as the total number of words divided by the number of sentences. The last line in the table indicates the probability numbers. For all the variables, probability levels are above the 0.05 level; therefore, the null hypothesis could not be rejected. In other words, no difference was found in the syntactic complexity measure between collaborative and independent essays by independent measures MANOVA. Table 4.12b below presents the results of repeated measures MANOVA performed to answer this subquestion.
Table 4.12b Syntactic complexity: repeated measures MANOVA

<table>
<thead>
<tr>
<th></th>
<th>subordination</th>
<th>cohesive conjunctions</th>
<th>transitions</th>
<th>average sentence length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>0.7930 (0.080)</td>
<td>0.2958 (0.112)</td>
<td>0.1072 (0.157)</td>
<td>19.4507 (2.167)</td>
</tr>
<tr>
<td>Collaborative</td>
<td>0.8145 (0.073)</td>
<td>0.2217 (0.131)</td>
<td>0.2119 (0.143)</td>
<td>18.3640 (1.528)</td>
</tr>
<tr>
<td>p = 0.413</td>
<td>p = 0.102</td>
<td>p = 0.086</td>
<td>p = 0.113</td>
<td></td>
</tr>
</tbody>
</table>

The first column in Table 4.12b above indicates the type of essay analyzed: independent or collaborative. The remaining columns present syntactic complexity scores as defined by the following variables: subordination, cohesive conjunctions, transitions, and average sentence length. "Subordination" score is determined as the ratio of subordinated structures over the sum of subordinated and coordinated structures. "Cohesive conjunctions" is the category used to determine the score for sentence-level cohesive conjunctions. This score is calculated as the ratio of sentence-level cohesive conjunctions over the number of sentences. "Transitions" is the score used to determine the number of paragraph-level transitions, calculated as the ratio of paragraph-level transitions over the number of paragraphs. The score in the last category, "average sentence length," is calculated as the ratio of total number of words over number of sentences. The last line in the table indicates the probability numbers. For all the variables, probability levels are above the 0.05 level; therefore, the null hypothesis could not be rejected. In other words, no difference was found in the syntactic complexity measure between collaborative and independent essays by repeated measures MANOVA. To conclude, the analyses performed to answer subquestion (2D) indicate that there is no difference in syntactic complexity between collaborative and independent essays.
This section provided the analysis of the difference in writing performance between independent and collaborative writing tasks (Research Question Two). The four subquestions examined to answer Research Question Two reviewed the following data: lexical diversity, lexical density, grammatical accuracy, and syntactic complexity. The results of independent measures MANOVA and repeated measures MANOVA performed to answer this question indicated no difference between collaborative and independent writing performance in any of the above-mentioned variables.

PERFORMANCE MEASUREMENT BY ESL RATERS

In the previous section, Research Question Two (Does writing performance vary between collaborative and independent tasks? and H₀: There is no difference in writing performance between collaborative and independent tasks) investigated the issue of writing performance in terms of results of computerized analysis of essays. This section will examine the same question on the basis of evaluation done by ESL raters.

As mentioned in Chapter Three, such evaluation was performed by two experienced (more than 2 years of ESL composition teaching experience at the University of Arizona) ESL composition instructors, both native speakers of English. The two raters had quite similar experiences: by the time of the study, they both had undergone a year’s training with the composition board at the University of Arizona, both were enrolled in the same doctoral degree program in Second Language Acquisition and Teaching, and both were working as ESL composition instructors. As discussed in Chapter Three, the Spearman-Brown Prophesy Formula was used to calculate inter-rater reliability. The results indicated that inter-rater reliability was 0.756 for the holistic part, and 0.924 for
the analytic part. These inter-rater reliability figures were deemed acceptable for the present study.

As mentioned earlier, the raters were provided with an explanation of the rating rubric and the type of assignment that needed to be evaluated during a face-to-face meeting. After that, each of the two raters was given the assignment sheet, and essays with evaluation forms to work on at their own convenience. The essays were identified by numbers only, and no indication was given as to whether the essays were independently or collaboratively written. Upon completion, the raters returned the materials to the researcher.

Table 4.13 below presents the results of t-tests for paired samples performed to determine whether there were differences in the writing performance between independent and collaborative essays, as evaluated by the ESL raters. The table presents the mean scores assigned by the raters, to collaborative and independent essays, as well as correlations between these pairs of variables.
Table 4.13 ESL raters' writing performance evaluation results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Correlation</th>
<th>Mean (SD)</th>
<th>t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>i-holistic rating</td>
<td>r = 0.000</td>
<td>2.3000 (0.592)</td>
<td>t (14) = -8.56</td>
</tr>
<tr>
<td>c-holistic rating</td>
<td>p = 1.000</td>
<td>3.8333 (0.362)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>i-effectiveness in addressing the task</td>
<td>r = 0.260</td>
<td>2.4667 (0.640)</td>
<td>t (14) = -7.54</td>
</tr>
<tr>
<td>c-effectiveness in addressing the task</td>
<td>p = 0.349</td>
<td>3.7333 (0.372)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>i-organization</td>
<td>r = 0.168</td>
<td>2.7667 (0.651)</td>
<td>t (14) = -4.4</td>
</tr>
<tr>
<td>c-organization</td>
<td>p = 0.55</td>
<td>3.7000 (0.621)</td>
<td>p = 0.001</td>
</tr>
<tr>
<td>i-development of ideas</td>
<td>r = 0.129</td>
<td>2.2667 (0.623)</td>
<td>t (14) = -6.32</td>
</tr>
<tr>
<td>c-development of ideas</td>
<td>p = 0.648</td>
<td>3.5333 (0.550)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>i-sentence structure</td>
<td>r = 0.247</td>
<td>2.6000 (0.507)</td>
<td>t (14) = -8.72</td>
</tr>
<tr>
<td>c-sentence structure</td>
<td>p = 0.375</td>
<td>3.8667 (0.399)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>i-vocabulary</td>
<td>r = 0.126</td>
<td>2.5667 (0.563)</td>
<td>t (14) = -6.69</td>
</tr>
<tr>
<td>c-vocabulary</td>
<td>p = 0.654</td>
<td>3.9000 (0.604)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>i-grammar and mechanics</td>
<td>r = 0.31</td>
<td>2.2000 (0.490)</td>
<td>t (14) = -9.38</td>
</tr>
<tr>
<td>c-grammar and mechanics</td>
<td>p = 0.261</td>
<td>3.9000 (0.389)</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>

The first column of Table 4.13 presents the variables being analyzed; these variables represent the evaluation criteria on the form for ESL raters (see Appendix H). The variables for independent essays are identified by the prefix "i," the variables for collaborative essays are identified by the prefix "c." The second column presents the correlations between scores on independent and collaborative essays assigned by human raters, as well as the corresponding probability values. As indicated by the numbers, the correlation scores were low and probability levels were above p=0.05 for all variables.
Therefore, no correlation was found between the students' performance in collaborative and independent essays.

The third column presents the means and standard deviations of the seven variables for collaborative and independent essays, and the fourth column presents t-test results. For each of the pairs of variables for independent vs. collaborative essays, a significant difference in means was found at the 0.05 level. The negative values for the t-tests indicate that, for that pairing, the mean of a variable for the collaborative essay is higher. In other words, ESL raters evaluated the students' writing performance in collaborative essays higher than that in independent essays for all the writing features analyzed.

Next, a correlation analysis was performed to examine whether there are correlations between evaluations by the human raters and by the computer. Table 4.14 below presents correlations data.

Table 4.14 Correlations between ESL raters' and computer evaluations

<table>
<thead>
<tr>
<th></th>
<th>Grammar and mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of errors per sentence</td>
<td>r (20) = -0.3818</td>
</tr>
<tr>
<td></td>
<td>p = 0.097</td>
</tr>
<tr>
<td>Number of errors per word</td>
<td>r (20) = -0.5025</td>
</tr>
<tr>
<td></td>
<td>p = 0.056</td>
</tr>
<tr>
<td></td>
<td>Use of vocabulary</td>
</tr>
<tr>
<td>Lexical diversity</td>
<td>r (20) = 0.8524</td>
</tr>
<tr>
<td></td>
<td>p = 0.067</td>
</tr>
<tr>
<td>Lexical density</td>
<td>r (20) = 0.2213</td>
</tr>
<tr>
<td></td>
<td>p = 0.348</td>
</tr>
</tbody>
</table>

The correlations between ESL raters' and computer evaluations were performed only for compatible categories. In other words, due to the fact that the computerized
evaluation focused mostly on discrete-point analysis, and the human raters focused mostly on holistic assessment, only a few categories were found to be compatible for correlations analysis. The first column of Table 4.14 above lists categories of the computerized analysis, matched with ESL raters' evaluation categories listed in the second column. More specifically, the computerized analysis categories "number of errors per sentence" and "number of errors per word" were matched with the ESL raters' category "grammar and mechanics"; and the computerized analysis categories "lexical diversity" and "lexical density" were matched with the ESL raters' category "use of vocabulary." None of the correlations are significant at the 0.05 level. However, there is significance at the 0.10 level. There is correlation between the computerized analysis and ESL raters' evaluation of the students' grammar usage. The correlation is negative because the ESL raters were assigning higher scores to essays with fewer numbers of errors, whereas the computerized analysis assigned higher scores to essays with a higher number of errors. In terms of the use of vocabulary, there is correlation between the ESL raters' evaluation and "lexical diversity," but not "lexical density." The lack of correlation for the lexical density category could be explained by the fact that it is a specific category that, in itself, does not signify poor use of vocabulary. Lexical density is usually not considered in a holistic evaluation and, typically, human raters have no way of judging this feature. In other words, ESL raters assigned scores for the overall correct use of vocabulary and the use of academically appropriate vocabulary, without consideration of the lexical density, a very specific analysis category defined by the computerized analysis as the type to token ratio.
To summarize, the analysis of data for Research Question Three indicates that ESL raters evaluated the students' writing performance in collaborative essays higher than in independent essays. At the same time, no correlation was found between the students' independent and collaborative writing performance. In other words, according to ESL raters' evaluation, the students tend to perform in collaboration with others better than on their own. At the same time, a student's writing performance in an independent essay may not serve as an indicator of his/her performance in a collaborative essay and vice versa.

QUALITATIVE ANALYSIS

As mentioned earlier, qualitative analysis was conducted to answer questions (1C) and (1D) partially. More specifically, qualitative analysis was employed to investigate the patterns of communication networks, and to examine on-line interaction dynamics of students of internal and external thinking styles. Research Question Three also required qualitative examination.

Research Question Three: Is there a change in the students' attitudes to (a) collaborative assignments, and (b) the use of computers in class from the beginning to the end of semester?

(a) $H_0$: There is no change in the students' attitudes to collaborative assignments from the beginning to the end of semester.

(b) $H_0$: There is no change in the students' attitudes to the use of computers in class from the beginning to the end of semester.
To answer this question, pre-semester and post-semester surveys and course evaluation comments were used. The pre-semester survey included multiple-choice questions only; the post-semester survey included both multiple-choice and open-ended questions. Patterns of student responses to multiple-choice questions were identified through percentage counts. Patterns to open-ended questions were identified and summarized based on the students' open-ended answers to the post-survey and course evaluations. The next section of the chapter discusses the pre- and post-semester survey results. As discussed in Chapter Three, the surveys were designed using a Likert-type five-point scale with the following categories: "strongly agree," "agree," "neither agree nor disagree," "disagree," and "strongly disagree." In the following analysis, to make the categories more distinct and to make the data more readable, the categories were compressed, as follows: "A" = "agree" or "strongly agree," "N" = "neither agree nor disagree," and "D" = "disagree" or "strongly disagree." A total of 19 students answered the surveys. Tables 4.15a, 4.15b, 4.15c, and 4.15d below present survey data results organized by the following themes: attitudes to the use of computers for writing, attitudes to the use of computers for communication, general attitudes to computers, and attitudes to collaboration. It must be noted that to make data more readable, the percentage numbers were rounded before the first decimal point. Table 4.15a below summarizes the students' responses to the items on the questionnaire that asked them to express their attitudes towards the use of computers for writing.
Table 4.15a Attitudes to the use of computers for writing

<table>
<thead>
<tr>
<th></th>
<th>pre-survey</th>
<th>post-survey</th>
<th>changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can write better essays when I do them on the computer.</td>
<td>6 A 32%</td>
<td>13 A 68%</td>
<td>+36%</td>
</tr>
<tr>
<td></td>
<td>11 N 58%</td>
<td>4 N 21%</td>
<td>-37%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>2 D 11%</td>
<td>0%</td>
</tr>
<tr>
<td>I enjoy writing my papers by hand more than by computer.</td>
<td>5 A 26%</td>
<td>4 A 21%</td>
<td>-5%</td>
</tr>
<tr>
<td></td>
<td>8 N 42%</td>
<td>9 N 47%</td>
<td>+5%</td>
</tr>
<tr>
<td></td>
<td>6 D 32%</td>
<td>6 D 32%</td>
<td>0%</td>
</tr>
</tbody>
</table>

As seen from Table 4.15a, at the beginning of the semester only 6 out of 19 students (32%) stated that they can write better essays on the computer, while at the end of the semester this number increased to 13 students (68%). This difference could be attributed to the considerable amount of computer-mediated writing practice the students had during the semester, to the attention paid to the benefits and limitations of computerized and traditional paper-and-pencil writing, as well as to the students' practical opportunities to compare these two types of writing during the semester. In terms of enjoyment of using computers for writing papers, the numbers remained almost the same: in the beginning of the semester, 26% of students stated their agreement with the statement that they enjoy writing papers by hand more than by computer, 32% disagreed, and 42% neither agreed nor disagreed. At the end of the semester, 21% agreed with the above statement, 47% disagreed, and 32% neither agreed nor disagreed. In other words, the numbers indicate that most students are emotionally neutral as to what medium (paper and pen or computers) to use.

The next theme of the questionnaire was the students' attitudes towards the use of computers for communication. Table 4.15b below summarizes the students' responses to the items that deal with this theme.
Table 4.15b Attitudes to the use of computers for communication

<table>
<thead>
<tr>
<th>Statement</th>
<th>pre-survey</th>
<th>post-survey</th>
<th>changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoy using the computer to communicate with my classmates.</td>
<td>11 A 58%</td>
<td>12 A 63%</td>
<td>+5%</td>
</tr>
<tr>
<td></td>
<td>6 N 32%</td>
<td>5 N 26%</td>
<td>-6%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>2 D 11%</td>
<td>0%</td>
</tr>
<tr>
<td>If I have an urgent question or comment, I would rather contact my teachers in person than by e-mail.</td>
<td>10 A 53%</td>
<td>5 A 26%</td>
<td>-27%</td>
</tr>
<tr>
<td></td>
<td>6 N 32%</td>
<td>9 N 47%</td>
<td>+15%</td>
</tr>
<tr>
<td></td>
<td>3 D 16%</td>
<td>5 D 26%</td>
<td>+10%</td>
</tr>
<tr>
<td>E-mail helps people learn from each other.</td>
<td>12 A 63%</td>
<td>12 A 63%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>5 N 26%</td>
<td>6 N 32%</td>
<td>+6%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>1 D 5%</td>
<td>-6%</td>
</tr>
<tr>
<td>Writing to others by e-mail helps me develop my thoughts and ideas.</td>
<td>9 A 47%</td>
<td>10 A 53%</td>
<td>+6%</td>
</tr>
<tr>
<td></td>
<td>8 N 42%</td>
<td>7 N 37%</td>
<td>-5%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>2 D 11%</td>
<td>0%</td>
</tr>
<tr>
<td>Using a computer gives me more chances to read and write.</td>
<td>8 A 42%</td>
<td>16 A 84%</td>
<td>+42%</td>
</tr>
<tr>
<td></td>
<td>7 N 37%</td>
<td>3 N 16%</td>
<td>-21%</td>
</tr>
<tr>
<td></td>
<td>4 D 21%</td>
<td>0 D 0%</td>
<td>-21%</td>
</tr>
</tbody>
</table>

It is interesting to note that there was a change in the students' preference for the way to communicate with their teachers. In the beginning of the semester, 53% stated they would rather contact their teachers in person than by e-mail with an urgent question or comment, whereas at the end of the semester this number dropped to 26%. Another important change was in the students' reaction to the statement, "Using a computer gives me more chances to read and write": in the beginning of the semester, only 42% agreed with it, whereas at the end this number doubled (84%). This change could be attributed to the specific emphasis placed in this course on the use of computers for the development of reading and writing skills. Other attitudes remained about the same. 58% of students in the pre-survey and 63% in the post-survey agreed with the statement, "I enjoy using the computer to communicate with my classmates," and only 11% disagreed with the statement in both surveys. 63% of students agreed with the statement, "E-mail helps
people learn from each other," in both pre-survey and post-survey, and the number of students who disagreed with it dropped slightly (from 11% to 5%).

The next theme of the questionnaire was the students' general attitudes towards the use of computers. Table 4.15c below summarizes the students' responses to the items that deal with this theme.

**Table 4.15c General attitudes to computers**

<table>
<thead>
<tr>
<th>Statement</th>
<th>pre-survey</th>
<th>post-survey</th>
<th>changes</th>
</tr>
</thead>
</table>
| I want to continue using a computer in my classes. | 17 A 89%  
2 N 11%  
0 D 0% | 18 A 95%  
0 N 0%  
1 D 5% | +6% -11% +5% |
| Using a computer is not worth the time and effort. | 0 A 0%  
4 N 21%  
15 D 79% | 1 A 5%  
3 N 21%  
15 D 79% | +5% 0% +5% |
| I enjoy the challenge of using computers. | 17 A 89%  
2 N 11%  
0 D 0% | 15 A 79%  
4 N 21%  
0 D 0% | -10% +10% 0% |
| Learning how to use a computer is important to my career. | 19 A 100%  
0 N 0%  
0 D 0% | 18 A 95%  
1 N 5%  
0 D 0% | -5% +5% 0% |
| Computers keep people isolated from each other. | 4 A 21%  
4 N 21%  
11 D 58% | 1 A 5%  
7 N 37%  
11 D 58% | -16% +16% 0% |
| Computers are usually very frustrating to work with. | 2 A 11%  
7 N 37%  
10 D 53% | 3 A 16%  
8 N 42%  
8 D 42% | +5% +5% -11% |

An analysis of the part of the questionnaire dealing with the students' general attitudes to computers indicated that most students maintained their positive attitudes throughout the semester. The only statement response which varied slightly from the beginning to the end of the semester was, "Computers keep people isolated from each other." In the beginning of the semester, 4 students (21%) expressed their agreement, while at the end this number dropped to 1 (5%).

The following table, 4.15d, examines the next theme of the survey that dealt with the students' attitudes to collaborative work.
### Table 4.15d Attitudes to collaboration

<table>
<thead>
<tr>
<th>Study</th>
<th>pre-survey</th>
<th>post-survey</th>
<th>changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studying with a group usually helps me get better grades on tests.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 A 42%</td>
<td>5 A 26%</td>
<td>-16%</td>
</tr>
<tr>
<td></td>
<td>9 N 47%</td>
<td>13 N 68%</td>
<td>+21%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>1 D 5%</td>
<td>-6%</td>
</tr>
<tr>
<td>The feedback on my work I get from peers is usually helpful.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14 A 74%</td>
<td>14 A 74%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>5 N 26%</td>
<td>4 N 21%</td>
<td>-5%</td>
</tr>
<tr>
<td></td>
<td>0 D 0%</td>
<td>1 D 5%</td>
<td>+5%</td>
</tr>
<tr>
<td>Working on a group project is usually not worth the time and effort.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 A 5%</td>
<td>5 A 26%</td>
<td>+21%</td>
</tr>
<tr>
<td></td>
<td>10 N 53%</td>
<td>11 N 58%</td>
<td>+5%</td>
</tr>
<tr>
<td></td>
<td>8 D 42%</td>
<td>3 D 16%</td>
<td>-26%</td>
</tr>
<tr>
<td>In a group, usually one person ends up doing most of the work.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 A 47%</td>
<td>9 A 47%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>6 N 32%</td>
<td>6 N 32%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>4 D 21%</td>
<td>4 D 21%</td>
<td>0%</td>
</tr>
<tr>
<td>Feedback from my peers is not as useful as feedback from the instructor.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 A 37%</td>
<td>10 A 53%</td>
<td>+16%</td>
</tr>
<tr>
<td></td>
<td>6 N 32%</td>
<td>4 N 21%</td>
<td>-11%</td>
</tr>
<tr>
<td></td>
<td>6 D 32%</td>
<td>5 D 26%</td>
<td>-6%</td>
</tr>
<tr>
<td>Group members should not be given the same grade on a project.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 A 37%</td>
<td>8 A 42%</td>
<td>+5%</td>
</tr>
<tr>
<td></td>
<td>7 N 37%</td>
<td>5 N 26%</td>
<td>-11%</td>
</tr>
<tr>
<td></td>
<td>5 D 26%</td>
<td>6 D 32%</td>
<td>+6%</td>
</tr>
<tr>
<td>Working in groups is a good way to gain different perspectives on an issue.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 A 89%</td>
<td>18 A 95%</td>
<td>+6%</td>
</tr>
<tr>
<td></td>
<td>1 N 5%</td>
<td>1 N 5%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>1 D 5%</td>
<td>0 D 0%</td>
<td>-5%</td>
</tr>
<tr>
<td>It's very hard to distribute the workload fairly in a group project.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 A 53%</td>
<td>10 A 53%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>6 N 32%</td>
<td>9 N 47%</td>
<td>+15%</td>
</tr>
<tr>
<td></td>
<td>3 D 16%</td>
<td>0 D 0%</td>
<td>-16%</td>
</tr>
<tr>
<td>I would not hesitate to complain to the instructor if a member of my group was not contributing his/her fair share to a project.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 A 37%</td>
<td>8 A 42%</td>
<td>+5%</td>
</tr>
<tr>
<td></td>
<td>10 N 53%</td>
<td>5 N 26%</td>
<td>-27%</td>
</tr>
<tr>
<td></td>
<td>2 D 11%</td>
<td>6 D 32%</td>
<td>-21%</td>
</tr>
</tbody>
</table>

The numbers indicate that students' opinions were quite dispersed. 14 out of 19 (74%) seem to be in agreement that feedback from peers is usually helpful, but that it is not as useful than feedback from the instructor (7 students, or 37%, on the pre-survey and 10, or 53%, on the post-survey agreed with that). 10 out of 19 students (53%) agreed that it is hard to fairly distribute workload between group members. In addition, it is worth noting that only 3 students (16%) disagreed with this statement in the beginning of the semester, and nobody disagreed with it at the end. This result might be due to the students' limited experience in collaborative work. Two students (11%) in the beginning of the semester and 6 students (32%) at the end expressed their hesitation to complain to
the instructor if other group members were not doing their share of the work. This result might be indicative of the students' increased willingness to resolve conflicts within the group without the help of the instructor.

Summarized in the above tables are the results to the multiple-choice sections of both pre-semester and post-semester surveys that provided general information on students' attitudes to computer-mediated work and collaboration. A different type of information was received from the take-home part of the post-semester survey that addressed students' experiences and attitudes in an open-ended format.

**Post-semester survey: open-ended responses**

The take-home part of the post-semester survey consisted of four open-ended questions that asked the students to relate specific positive and negative experiences with collaborative work in the class, as well as to comment on the role of technology in facilitating and hindering collaborative activities. More specifically, the questions were as follows:

I  Tell us about a specific assignment/activity when your collaboration with other students in this class worked well. What happened?

II Tell us about a specific assignment/activity when your collaboration with other students in this class did NOT work well. What happened?

III Tell us about a specific time when *Connect.Net* facilitated collaborative work in this course. How and why do you believe the technology helped?

IV Tell us about a specific time when *Connect.Net* seemed to hinder collaborative work in this course. How and why do you believe the technology interfered?
Table 4.16 below summarizes the responses to the open-ended questions of the post-semester survey (a total of 12 students filled out the survey). In the section following the table, the students' responses will be discussed at more length.

Table 4.16 Responses to the open-ended part of the post-survey

| I Collaboration worked | websites analysis (5 students, 42%)  
on-line discussions (4 students, 21%)  
never (2 students, 11%)  
am always (1 student, 5%) |
|------------------------|--------------------------------------------------------------------------------|
| II Collaboration did not work | problems with group members (5 students, 26%)  
always worked (3 students, 16%)  
technical problems (2 students, 11%)  
no answer (1 student, 5%) |
| III Computers helped your work | ideas from on-line discussions (6 students, 32%)  
never (2 students, 11%)  
am always (1 student, 5%)  
no answer (1 student, 5%) |
| IV Computers hindered your work | never (4 students, 21%)  
technical problems (2 students, 11%)  
anonymous discussions (1 student, 5%)  
typing speed (1 student, 5%) |

Before discussing the results shown in the table, it must be noted that one of the assignments mentioned by the students in their responses to the survey -- the rhetorical analysis of websites -- was not discussed in this study, and not analyzed as part of this project. This assignment was the first assignment of the semester, the purpose of which (in terms of the present study) was mainly to get the students acquainted with their group members, and comfortable with the use of collaborative technology.

As seen in Table 4.16, in their answers to question I that asked the students to relate specific examples of when collaboration worked well, the students noted collaborative rhetorical analysis of websites (42%), and group discussions (21%). More specifically,
noting the positive aspects of group discussions for collaboration, the students made the following comments:

- **small group discussion**: it gave a chance to learn what other people think and exchange opinions;

- **using computers was useful**: when we think about a problem, we tend to see it from one aspect. When we discussed problems through computers with classmates, I could notice other aspects of the problem;

- **group discussions**: we can talk and share our opinions about the essays. It also helped me improve my writing and my reading;

- **I got several good ideas** from discussions about capital punishment and "are criminals made or born?"

The students made the following comments on the positive aspects of collaborative work on group rhetorical analysis of websites:

- **Website analysis**: we divided the work so that every person in the group talks about one site. Then we met together to make an overview, and to write the introduction and conclusions. Each group member did his/her best to come up with an effective essay. All collaborative essays worked well;

- **the first collaborative essay**, since we could do our parts separately, and other people in the group could express their suggestions;

- **the first collaborative essay (analyzing websites)**. We used e-mail to communicate, and we exchanged opinions through e-mail, that saved us a lot of time;
• It was a good experience. The work was divided evenly and we got the most benefits from the work.

The students' responses indicate that the students took initiative in dividing the workload in their groups and used various methods of collaboration (face-to-face meetings and e-mail). Another comment that a student made indicates the perceived benefits of technology for collaboration and the student's positive attitude to the role of technology: "even though we did not have much time to meet and work on assignments, we used computers to contact each other, and we all divided the work and worked well with each other." Overall, the students' reactions (as seen in the answers to the open-ended questions) were not only positive, but also reflected the goals for the use of computer-mediated discussions as set by the course instructor: to share opinions with peers, to increase opportunities for meaningful interaction, and to help the students improve their reading and writing skills.

Looking at the opposite side of this issue and analyzing the instances when collaboration did not work well (question II), the students noted problems with a group member (26%), and technical problems (11%). More specifically, the students stated that equal division of work was problematic, as illustrated by the following comments:

• one guy from our group did not do any work and did not show up, but it really didn't bother me and we could complete the project;

• the second collaborative essay: one student doesn't do anything, and this is terrible since the other student and I felt that we had to use something from her essay, but
what she contributed was one paragraph copied from our essay and full of grammar mistakes.

One student noted that "to be creative in writing, I need to work by myself," which indicates a personal preference for individual rather than group work. Another student named whole class discussions as activities where collaboration did not work well: "too much to read, too little time. Too many questions, and too little time. Hard to choose what to answer and how to interact if other people choose different questions to answer."

These reactions may be indicative of certain personal learning preferences that have not been accommodated by the computer-mediated learning environment used in this class. Further research is needed to find ways of incorporating CMC in L2 writing classes that would create a comfortable and effective learning environment for all students.

Regarding the facilitative role of Connect.Net for collaboration in class (question III), the students noted the benefits of getting ideas from on-line discussions (32%), as illustrated by the following comments:

- During class time. In a regular discussion, it is sometimes hard to express your whole idea due to interruptions by others. In a computer discussion, it is easy to express all of it;
- Connect.Net is very helpful because we can write our essays, share opinions, and see other students' drafts;
- Connect.Net was helpful for small group and whole class discussions, both anonymous and non-anonymous;
• *Connect.Net* helped me discuss with my classmates who were the sources of opinions I used in my Rhetorical Analysis;

• *Connect.Net* is very helpful because it lets me know ideas of others. It teaches me to work in a group.

Among the problems the students experienced when collaborating with the help of *Connect.Net*, a number of students (11% in question II, and 11% in question IV) noted technical difficulties. This comment is quite understandable in light of the various problems experienced in the lab over the course of the semester. The technical difficulties are an important issue as they can interrupt the flow of classroom communication and dynamics and discourage students (and the instructor) from using and/or experimenting with technology. In this particular case, the technical difficulties were perceived and experienced by the students and the instructor very differently. The students experienced one major problem at the beginning of the semester when the network crashed and none of the computers in the lab were usable for that class period. After this incident, the students experienced a few minor computer glitches that were resolved on the spot. For the students, these problems did not interfere with their participation in on-line discussions. At the same time, the students were unable to work on their collaborative essays with the help of *Connect.Net*, and used e-mail for this purpose.

This picture, however, was not nearly as positive for the researcher (who was also the instructor in this class). The reasons behind the first major crash were never established, although attempts were made on the part of the researcher and the COHlab technical support personnel to investigate them. The possibilities included a hard to detect virus in
the network, incompatibility of software applications in the network that led to the crash, hacker activity, and others. The inability to establish specific reasons led to the instructor's lack of confidence in the system after the initial crash. It also made the instructor prepare at least two lesson plans for each class meeting conducted in the COHlab: one lesson plan that included the use of technology, the other that did not. Before each session, the instructor also had to consider the situation where some computers would work, and others would not, and plan accordingly. This elaborate planning and preparation was not only due to the first major crash, but due to the fact that such system crashes continued to occur outside of class time. The students were unaware of these crashes, as the system was back in operation by each class period. The instructor and the COHlab technical support personnel, however, had to put in a significant amount of time and effort each week to keep the network running and functional. These problems had an obvious negative effect on the teaching and learning environment, as the instructor had to spend a considerable amount of time resolving technical problems instead of focusing on teaching. On the other hand, these technical problems may have had a positive effect on the pedagogical environment, due to the instructor's higher level of involvement with the course material: the instructor had to develop multiple ways to present the material to the students, to design alternative ways to fulfill the course goals and objectives, and to be flexible in her teaching.

Another possible problem hindering on-line communication, mentioned by one student, was slow typing speed. This is definitely an important issue to consider when designing curriculum involving the use of technology, as it presents a significant barrier
to the flow of on-line communication. Another student noted that "in anonymous discussions, sometimes people would get off the topic and act rudely."

Course evaluation comments

As mentioned in Chapter Three, only the students' answers to the open-ended questions from the course evaluations were used in this study, as follows: What is your overall rating of this course? What is your overall rating of the instructor's teaching effectiveness? What was your overall experience in this course? Out of 15 students who filled out course evaluations, only 9 chose to answer open-ended questions. Table 4.17 below provides a brief summary of the major themes that emerged from the evaluations.

Table 4.17 Course evaluation comments

<table>
<thead>
<tr>
<th>Main themes</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usefulness of in-class discussions</td>
<td>7 students (47%)</td>
</tr>
<tr>
<td>Usefulness of instructor's explanations</td>
<td>6 students (40%)</td>
</tr>
<tr>
<td>Technology problems</td>
<td>2 students (13%)</td>
</tr>
</tbody>
</table>

The first column in Table 4.17 above identifies the major themes established by the researcher upon examination of the course evaluation comments. The second column refers to the number of students who made comments that fall under these themes; percentages are calculated from the total number of students (15) who filled out course evaluations, although only 9 chose to answer open-ended questions.

When reviewing end-of-semester course evaluation comments, the researcher noted the students' overall positive reactions to the course and its use of technology. Upon closer examination, two major themes emerged from these comments: the students'
positive reactions to in-class discussions (7 students, or 47%, noted that), and the
students' positive evaluation of the instructor's explanations of material (6 students, or
40%, noted that). The following is a summary of students' positive comments regarding
discussions:

• Discussions are very useful;

• We touch upon sensitive issues and do full research on it, this course encourages us to
  share our views and improve our English;

• Good in class discussion, and good interaction with teacher and students.

Two students (13%) provided the following criticism of computer-mediated collaborative
work:

• The course is designed well. But the computer lab should be more upgraded because
  the Connect.Net sometimes does not work at all;

• I just disliked collaborative essays because it is nonsense!

The second theme, the instructor's explanations, is worth commenting on because
according to the instructor's self-observations, she spent much less time on explanations
than in previous semesters, and more time with hands-on practice of the material to be
studied. Such discrepancy is interesting, as it might indicate that the students perceive
the effectiveness of explanations based on the result (i.e. whether they know how to apply
what was taught or not). In other words, by getting more hands-on practice, combined
with brief explanations and clarifications by the instructor in a collaborative atmosphere
with feedback from their peers and the instructor, the students learned to apply what was
taught better than if it were delivered by lecture alone.
To summarize, the qualitative analysis performed to answer research question 3 (Is there a change in the students' attitudes to collaborative assignments, and to the use of computers in class from the beginning and to the end of semester?) indicated that the students expressed generally positive attitudes to the use of computers in this class and in the future, both in the beginning and at the end of semester. However, there were a few changes in the students' attitudes that are worth mentioning here. First of all, at the end of the semester more students (68% at the end of the semester vs. 32% at the beginning) felt that they can write better essays on the computer than by hand, and more students (84% at the end of the semester vs. 42% at the beginning) believed that using a computer gives them more chances to read and write. In terms of collaborative activities, a large number of students (74% both at the beginning and at the end of the semester) believed that feedback from peers was helpful. Most (89% at the beginning of the semester, 95% at the end), think that group work helped them gain different perspectives on an issue. However, the students still valued feedback from the instructor more from their peers. At the end of the semester, slightly more students (53% at the end of the semester vs. 37% at the beginning) agreed with the statement that "Feedback from my peers is not as useful as feedback from the instructor." At the same time, most students recognized the challenges of group work in terms of work division: 53% both at the beginning and at the end of the semester agreed that "It is very hard to distribute the workload fairly in a group project."

CONCLUSION

The purpose of this chapter was to investigate the differences between the students' participation in small group and whole class anonymous and non-anonymous
discussions, as well as to examine the students' attitudes to collaborative work and to the use of computers in the beginning and at the end of the semester. This chapter presented the results of the three major research questions, briefly summarized below:

Research Question One: Does student participation in on-line synchronous discussions vary (a) in different configurations of discussions, and (b) for students of internal and external thinking styles?

Participation in on-line discussions was operationalized by the following variables: discussion content, amount of communication, and interaction dynamics. The term "different configurations" of discussions refers to whole class vs. small group discussions, and anonymous vs. non-anonymous discussions. Both qualitative and quantitative analysis were performed to answer this question. The results of the analyses indicated no difference in the discussion content, amount of communication, or interaction dynamics between the discussions of different configurations.

The results of analysis of the comparison of discussion content, amount of communication, or interaction dynamics between the students of internal and external thinking styles indicated no difference. However, some interesting trends were found in the direction of correlation between the preferred thinking style and the dependent variables. For example, it was found that the students with higher scores on internal style expressed fewer positive reactions, and wrote fewer task-related questions and answers than those who scored lower on internal style. They also tended to express more negative reactions. At the same time, the students with higher scores on external style tended to express more reactions (both positive and negative) but asked and answered fewer task-
related questions and answers than those with lower scores on external style. They also tended to agree more than those who scored lower on either of the two styles.

**Research Question Two:** Does writing performance vary between collaborative and independent tasks?

To answer this question, both computerized analysis and evaluation by human raters were used. In the computerized analysis, writing performance was operationalized through the following four variables: lexical diversity, lexical density, grammatical accuracy, and syntactic complexity. Two types of statistical analyses (repeated measures MANOVA and independent measures MANOVA) were used to answer this question. The results of the analyses indicated that there was no difference in writing performance between collaborative and independent essays.

Human raters used both holistic and analytic categories in their analysis of the students' writing performance. Analytic rating categories included the following: the effectiveness in addressing the writing task, organization, the development of ideas, sentence structure, the use of vocabulary, grammar and mechanics. The results of the analysis indicated that the ESL raters evaluated collaborative essays higher than independent essays for all the rating categories mentioned above.

**Research Question Three:** Is there a change in the students' attitudes to (a) collaborative writing tasks, and (b) the use of computers from the beginning to the end of the semester?

Qualitative analysis was performed to answer this question. The results of the analysis indicated that, in general, the students' attitudes to the use of computers have improved over the course of the semester. As for their attitudes to collaborative writing
tasks, even though most students viewed collaborative activities as useful throughout the semester, more students at the end of the semester than at the beginning realized the difficulty of fair workload distribution in a group. At the end of the semester, more students than at the beginning stated that they viewed feedback from their peers as less useful than that from the instructor.

This chapter, Chapter Four, presented the results of data analysis in response to the research questions. The concluding chapter of the dissertation, Chapter Five, will present the discussion of results, their implications for future research and L2 pedagogy, as well as limitations of the present study.
CHAPTER FIVE
DISCUSSION AND CONCLUSION

INTRODUCTION

As stated in Chapter One, the two main purposes of this study were to examine the use of network communication in an advanced ESL composition class, and to evaluate the effects of collaborative computer-mediated projects on the students' writing performance. More specifically, the study investigated the patterns of students' participation in different configurations of on-line discussions (anonymous vs. non-anonymous and whole class vs. small group), and compared writing performance in collaborative and independent essay assignments. A minor purpose of the study was to analyze the students' attitudes towards collaborative assignments and the use of computers in class in the beginning and at the end of the semester. Another minor purpose of this study was to explore pedagogical implications of the use of network communication and collaborative writing in an advanced ESL writing class.

Chapter One of this dissertation presented the background, purpose and potential significance of this study, Chapter Two addressed the body of research literature that deals with the issues of L2 writing, and the use of computer-mediated communication in L2 writing classrooms. Chapter Three provided information on the subjects and instructional context, as well as outlined data collection methods, described the measurement of variables and explained the choice of methods used for quantitative and
Chapter Four presented the findings of the study, based on the theoretical rationale and the methodology outlined in preceding chapters.

The closing chapter of the dissertation, Chapter Five, will discuss the findings of the study in their application to a broader theoretical and practical context. It will outline pedagogical implications, the limitations of the study, and provide recommendations for future research.

STUDENT PARTICIPATION IN ON-LINE DISCUSSIONS OF DIFFERENT CONFIGURATIONS

In a face-to-face situation, group size, group work, and group collaboration in a classroom has been a pedagogical and research issue for quite a few years (Bruffee, 1993; DiPardo and Freedman, 1988; Mangelsdorf, 1992; George, 1984). More recently, the research began to include studies that compare computer-mediated and face-to-face classroom interaction. The results of these studies indicate that computer-mediated communication (CMC) "encourages participation from students who do not usually speak in class" (Meunier, 1997, p. 27), and that CMC can provide the less dominant students with an equal chance at participation in discussions (Phinney, 1996, p. 151). According to studies on group support systems done by Nunamaker et al. (Nunamaker, 1998), in face-to-face meetings "fewer than 20% of the participants do more than 80% of the talking," (Nunamaker, 1998, p. 6) whereas people in group support systems "participate nearly equally, and produce many more contributions" (Nunamaker, 1998, p. 7). In her discussion of the possible benefits of computer-mediated classroom instruction, Ortega (1997) posits that the more equal participation pattern in on-line discussions as compared
to face-to-face discussions may be attributed partly to "reduction of static and dynamic social context cues" (Ortega, 1997, p. 86) and partly to "the absence of oral interaction constraints such as fear to interrupt or of being interrupted, need to manage the floor and the transfer of speakership, and need for interlocutors to co-orient to the production of sequentially relevant discourse" (Ortega, 1997, p. 86). Other issues that are especially relevant to ESL situations are pronunciation issues that may inhibit efforts at oral communication in the target language (Ortega, 1997).

The current study takes a different approach to the analysis of discussions and limits the research of discussion patterns to one medium -- that of classroom-based synchronous computer-mediated discussion. Such an approach shifts focus from the cross-medium comparison to a more detailed examination of one medium only, enabling the researcher to evaluate the effects of various types of discussions, i.e. whole class vs. small group discussions, and anonymous vs. non-anonymous discussions, on the students' participation. The results of the study indicate that there is no statistical difference in the discussion content or the amount of communication, between anonymous and non-anonymous on-line discussions or small group and whole class discussions. These results do not contradict previous findings, in that they indicate the students' nearly equal participation in on-line classroom discussions of different configurations. Possible explanations for such lack of differences are provided below.

In terms of anonymity, according to Connoly, Jessup and Valacich (1990), the lack of effect could be explained by "temporary, low-stakes, stranger-to-stranger work groups" (Connoly, Jessup and Valacich, 1990, p.700). In other words, the effect of
anonymity is very likely to be context dependent (Delbecq, 1975), i.e. such effect will be more likely to manifest itself in a group of "established colleagues with complex personal histories, alliances, political agendas and hierarchical relationships to one another" (Connoly, Jessup and Valacich, 1990, p.700). Explaining the effects of anonymity in work place-based on-line groups, Nunamaker et al. (1998) state that "there is less sting in anonymous electronic criticism than in a direct rebuke during a face-to-face meeting... as the screen buffers the negative emotions that may accompany such criticism" and "people criticize the idea rather than the person who presented it" (Nunamaker, 1998, p. 7).

The results of the current study do not support the same conclusions, as no difference was found in the number of positive or negative reactions expressed during anonymous vs. non-anonymous discussions. The lack of complex relationships between the subjects of the current study and low-stakes interaction (i.e. the students were not required to come up with solutions or consensus on the issues being discussed) may partially explain the lack of anonymity effect. Nunamaker's study was conducted in a business environment where hierarchical positions of the participants were clearly outlined and became obvious in the non-anonymous mode. In this case, the anonymous mode could be used by the participants to put forth their ideas without the fear of being identified. The environment of the present study is quite different, as there are no major differences in status among students, and such absence of differences in status may explain the lack of anonymity effect.
The lack of difference between student participation in groups of different sizes may be explained by what Hawisher and Moran (1997) refer to as the paradox of on-line communication being "public as well as intimate" (Hawisher and Moran, 1997, p. 118). The text of the message is usually produced by one person working one-on-one with a computer but, in a synchronous discussion, it is made instantly available to all participants in a discussion. Such dual nature of on-line texts produced by the students in a writing classroom may partially account for the lack of difference between the students' participation in discussions with different numbers of participants. There is no obvious difference between a small group and a large group in a computer-mediated discussion, in contrast to a face-to-face discussion where such difference is quite obvious.

In terms of the study results, the only detected difference between small group and whole class discussions was in the greater number of references to specific people made by students in whole class discussions. This difference may be due to the greater number of messages and participants in whole class discussions, as compared to small group discussions that sometimes lead to misunderstandings and to the need for clarification. Such a difference may indicate that the students were aware of a larger number of participants in whole class discussions, and made attempts to facilitate discussions by providing such references.

To summarize, the results of the study indicate that the students' participation patterns (measured by discussion content and amount of communication) are the same across different modes (anonymous and non-anonymous) and configurations (whole class and small group) of discussions. In terms of interaction dynamics, qualitative analysis of
communication networks indicated no subgrouping or recitative patterns, and a small number of dialogues. In other words, there were no individuals or subgroups (including pairs) that became the focus of a discussion, and most messages were directed at the group rather than at specific individuals. Such pattern is characterized by Jones, Barnlund and Haiman (1980) as a flow of communication from person to person, according to whoever is moved to speak or whoever has relevant information to contribute, and is labeled by them as multilateral. According to Jones, Barnlund, and Haiman (1980), multilateral communication pattern indicates a mature group.

**WRITING PERFORMANCE IN COLLABORATIVE AND INDEPENDENT TASKS**

The results of the study did not indicate any difference in the writing performance between collaborative and independent tasks as measured by a computerized text analysis program. However, a difference was found, as indicated by the results of the ESL raters' evaluation. The discrepancy between the results of computerized analysis and evaluation by ESL raters' could be explained by the difference in evaluation criteria used by the computer and by the human raters: the computerized analysis focused on discrete-point grammatical and mechanical items, whereas human evaluation focused more on development of ideas, as well as the students' ability to critique texts and put their ideas in writing.

The correlational analysis between ESL raters' and computer evaluations performed for compatible categories (grammar and mechanics, and the use of vocabulary) indicated correlations between them at 0.10 level of significance. More specifically, the computerized analysis categories "number of errors per sentence" and
"number of errors per word" were correlated with the ESL raters' category "grammar and mechanics"; and the computerized analysis categories "lexical diversity" and "lexical density" were correlated with the ESL raters' category "use of vocabulary." Correlation was found between the computerized analysis and ESL raters' evaluation of the students' grammar usage. For the use of vocabulary, correlation was found between the ESL raters' evaluation and "lexical diversity."

As described in Chapter Four, the results of the ESL raters' evaluation indicate that the scores assigned by the ESL raters for collaborative essays were higher than those for independent essays, for both the holistic part and all the variables (effectiveness in addressing the task, organization, the development of ideas, sentence structure, vocabulary, grammar and mechanics) in the analytic part. At the same time, no correlation was found between the students' independent and collaborative writing performance. In other words, according to the ESL raters' evaluation, the quality of collaboratively written essays was higher than that of independently written essays. At the same time, the students' performance in a collaborative essay did not serve as an indicator of these students' performance in independent essays, and vice versa.

There could be a number of explanations for these results. The quality of collaborative essays could be higher than that of independent essays, due to the contributions of the group members based on their strengths, i.e. each student worked on the part of the essay that was representative of his/her strength in writing, such as skills in the general organization of ideas, details of analysis, editing for spelling and grammar problems and others. In the pedagogical sense, this explanation would be a desirable one,
as it would imply that all students were equally engaged with the task, put in their best
effort, and used their strongest skills. In this case, it was effective collaboration and
effective group processes that resulted in a better final product. However, another
possible explanation is that the most proficient student in the group did most of the
revision work, thus, raising the overall quality of the essay. This possibility is also an
interesting one from the teaching perspective, as it implies a division of work that is very
different from the one that was intended by the theorists of collaborative work. In this
case, such collaboration may have negative effects on the development of writing skills
of the less proficient writers in a group, due to their reliance on the more proficient
students. These negative effects may include the limited writing and revision practice the
less proficient writers may get while working on the collaborative essay, lower
motivation to work on the assignment, and even lower self-esteem as a result.

These explanations could also partially account for the lack of correlation
between the quality of independent and collaborative essays. In other words, one
possibility is that collaborative essays incorporated the strengths of all students in the
group and minimized their weaknesses, whereas independent essays included both
strengths and weaknesses of an individual student. Students' discussions of ideas and
possible ways to organize them in an essay could also affect the quality of essays: a
collaborative essay could include more ideas than an independent one due to
contributions from all group members. An alternative explanation could be that most
ideas in a collaborative essay could be suggested either by the best writer in a group or by
the student with the most dominant personality. It is also possible that the student who is
the most proficient and/or the most competitive could assume the role of the leader in a
group, and contribute more than others to ensure an adequate grade for him/herself,
knowing that all group members receive the same grade for their collaborative essay.

To summarize, the ESL raters evaluated the quality of the students' writing in
collaborative essays higher than that of independent ones. At the same time, no
correlation was found between the students' writing performance independently and in
collaboration with others. In other words, according to the ESL raters' evaluation, the
students tend to perform in collaboration with others better than on their own. At the
same time, a student's writing performance in an independent essay may not serve as an
indicator of his/her performance in a collaborative essay and vice versa. The findings of
this study about students' group interaction and task division during classroom-based
collaborative writing assignments pose questions that need to be researched further.

STUDENTS' ATTITUDES TO COLLABORATIVE ASSIGNMENTS AND TO THE
USE OF COMPUTERS IN CLASS

The results of the study indicate the students' general positive attitudes to the use
of computers in class, with the majority of the students maintaining their positive
attitudes throughout the semester. Attitudes to collaborative work were more dispersed.
Table 5.1 below provides a brief summary of the most interesting results of the pre-
semester and post-semester surveys.
### Table 5.1 Summary of pre-semester and post-semester survey results

<table>
<thead>
<tr>
<th></th>
<th>pre-survey</th>
<th>post-survey</th>
<th>change</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can write better essays when I do them on the computer.</td>
<td>6 A, 11 N, 2 D</td>
<td>13 A, 4 N, 2 D</td>
<td>+36%</td>
</tr>
<tr>
<td>Using a computer gives me more chances to read and write.</td>
<td>8 A, 7 N, 4 D</td>
<td>16 A, 3 N, 0 D</td>
<td>+42%</td>
</tr>
<tr>
<td>If I have an urgent question or comment, I would rather contact my teachers in person than by e-mail.</td>
<td>10 A, 6 N, 3 D</td>
<td>5 A, 9 N, 5 D</td>
<td>-27%</td>
</tr>
<tr>
<td>I want to continue using a computer in my classes.</td>
<td>17 A, 2 N, 0 D</td>
<td>18 A, 0 N, 1 D</td>
<td>+10%</td>
</tr>
<tr>
<td>The feedback on my work I get from peers is usually helpful.</td>
<td>14 A, 5 N, 0 D</td>
<td>14 A, 4 N, 1 D</td>
<td>-5%</td>
</tr>
<tr>
<td>Feedback from my peers is not as useful as feedback from the instructor.</td>
<td>7 A, 6 N, 6 D</td>
<td>10 A, 4 N, 5 D</td>
<td>+16%</td>
</tr>
<tr>
<td>I would not hesitate to complain to the instructor if a member of my group was not contributing his/her fair share to a project.</td>
<td>7 A, 10 N, 2 D</td>
<td>8 A, 5 N, 6 D</td>
<td>+5%</td>
</tr>
<tr>
<td>It's very hard to distribute the workload fairly in a group project.</td>
<td>10 A, 6 N, 3 D</td>
<td>10 A, 9 N, 0 D</td>
<td>+15%</td>
</tr>
</tbody>
</table>

As seen from the Table 5.1 above, at the end of the semester 68% of students state that they can write better essays on the computer than on paper, whereas only 32% agreed with that statement at the beginning of the semester. Another important change is in the students' reaction to the statement, "Using a computer gives me more chances to read and write": in the beginning of the semester, only 42% agreed with it, whereas at the end this number doubled (84%). It is interesting to note that there was a change in the students' preferences for the way to communicate with their teachers. In the beginning of the semester, 53% stated that they would rather contact their teachers in person than by e-mail with an urgent question or comment, whereas at the end of the semester this number dropped to 26%. These changes may be due to the specific focus of the course on the use
of computers for interaction, as well as for development of reading and writing skills. The students' attitudes remained consistent as to their willingness to use the computer in their classes (89% at the beginning of the semester, and 95% at the end).

The students' attitudes to collaborative work were quite varied. Both at the beginning and at the end of the semester, 74% of students stated that feedback from peers is helpful. At the same time, 37% of students in the beginning of the semester and 53% at the end noted that such feedback is not as useful as that from the instructor. This finding is not surprising, considering that the students who participated in the study were just entering the academic environment, did not have enough experience critiquing their peers' work, and were used to relying on feedback from the instructor more than on feedback from their peers.

Approximately half of the students (53% both at the beginning and at the end of the semester) stated that it is hard to distribute the workload fairly between group members. It is also interesting to note that in the beginning of the semester only 11% expressed their hesitation to complain to the instructor if other group members were not doing their share of the work, whereas at the end of the semester this number increased to 32%. This change might indicate that collaborative experience increased the students' willingness to resolve problems on their own, without the involvement of the instructor.

LIMITATIONS OF THE STUDY

In light of the research findings, it is important to identify several limitations of this study that could have affected its results.
The first limitation is that of sample size. Due to the fact that only one section of experimental English 107 course was taught by the researcher, only 20 subjects participated in the study. A larger sample size could have provided more variability to evaluate the effects of students' different thinking styles on interaction patterns, as well as to detect differences in their interaction patterns across different types of discussions. According to Shavelson (1996, p.536), in order to examine a large number of independent and dependent variables, ideally there should be a minimum of ten subjects per independent variable. In this study, it was necessary to limit the number of independent variables analyzed due to small sample size, especially in regard to thinking styles. A larger number of subjects would enable the researcher to analyze other important learner differences that could affect their thinking styles, such as age, college major, personality types and others.

The second limitation is the short duration of the study. Over the 15 weeks during which the study was conducted, the students had to spend some time learning a new piece of software and adjusting to the experimental nature of the class. Due to the short duration of the study, the results could have been affected by the novelty of the experience of working in groups and by the novelty of participation in on-line discussions. Had the students had more time and practice in both, their patterns of participation in collaborative writing groups and in on-line discussions could have changed to reflect their styles and personalities more than their reaction to a new experience. The factor of novelty, enhanced by the short duration of the study, may have reduced the possibility of finding significant differences between the various discussions.
Also, one semester may be too short a period of time to yield noticeable results in learning outcomes, such as in the writing performance in collaborative and independent essays. An enhanced research design would include a longitudinal study over the course of an academic year, or even several years of ESL on-line writing experience. It is possible that with time and practice in group work, as the students learned to recognize their own strengths and weaknesses in writing, greater difference would emerge between collaborative and independent essays.

The third limitation of the study is in the use of the computerized text analysis program for the comparison of several features of collaborative and independent essays, especially for the comparison of syntactic features. The basis of the syntactic complexity score was formed by sentence-based features, such as the number of coordinating and subordinating conjunctions, and average sentence length. A more precise evaluation of syntactic features of the essay should also include an analysis of syntactic features on the level of the paragraph, and on the level of the essay.

**IMPLICATIONS FOR FUTURE RESEARCH AND FOR L2 PEDAGOGY**

As computer-mediated instruction is gaining a more and more prominent place in L2 teaching and learning, it is becoming increasingly important to conduct research that would determine the best uses for computer-mediated work in the L2 writing classroom. Effective use of computers in the classroom requires a variety of skills on the part of the instructor and the students that go beyond the immediate goals and objective of the course. Even in the best-case scenario when no technical problems are experienced, the students and the instructor might have to spend considerable time learning to use the
specific software applications for the course. This would include some class time and some time outside of class, both for the students and the instructor.

It might be argued that the immediate benefits of the use of computer-mediated work in a writing classroom do not outweigh the effort and the time involved in getting the technology to work efficiently for the purposes of a given course, and in learning the software application. However, while the use of technology requires extra time and effort both from the students and from the instructor, it is necessary to consider the teaching/learning situation outside the immediate boundaries of a given course to fully appreciate the knowledge and skills that the students gain with the use of technology. In the current study, one of the main emphases was placed on the use of on-line discussions in the writing classroom. The development of written interaction skills, the acquisition of the rules of on-line etiquette, and the exposure to a multitude of viewpoints that the students experienced in the course will undoubtedly be beneficial to them outside the L2 writing classroom and outside the university environment.

The introduction of computer-mediated communication into the writing classroom has affected both our perception and the practice of L2 learning and teaching. CMC facilitates L2 students' written interaction and collaboration among themselves, with the teachers, as well as with the native speakers of the target language. Such collaboration and increased reliance on each other for learning is beneficial not only within the confines of a specific course that uses computer-mediated communication, but in a broader learning context as well. Participation in such collaborative work may help the students develop their critical thinking skills and become more independent learners.
CMC can also provide the less dominant students with an equal chance at participation in discussions. There is more opportunity for L2 practice, as "more students are producing more language" (Phinney, 1996, p.151) in the on-line classroom environments.

The present study investigated some of the issues related to the use of computer-mediated communication in an L2 writing class, and, while it provided some answers, it also raised a number of questions for further research. These questions will be identified in the following section of this chapter.

Research with a focus on individual differences and composition is still in its infancy. Jensen and DiTiberio (1984) suggest that an intriguing research question would be to investigate how each MBTI dimension affects writing, as 16 personality types can potentially identify 16 different writing processes. However, the feasibility of such a study might pose a problem for researchers, as a considerable number of subjects would have to be involved in order to obtain sufficient data for each of the 16 types. Another important issue that could be researched using a measure of personality types (such as MBTI), or thinking styles (such as the Sternberg's Thinking Styles Instrument), is the effect of teaching styles on writing instruction and evaluation of writing. Carrell and Monroe (1993) also suggest that investigation of the interaction of teachers' styles with the styles of ESL students could bring interesting results with important pedagogical implications.

A possible research agenda addressing the issues of the effects of personality types on L2 writing in a computer-mediated environment might include the following questions:
• In on-line discussions, are there patterns of participation exhibited by L2 students that can be related to differences in those students' personality types or thinking styles?

• What are the linguistic characteristics of texts produced in discussion mode as compared to texts produced in essay mode (measured by text analysis facilitated by a computer concordance program)?

While this study found no difference in the on-line interaction patterns between students of different thinking styles, the issue of individual differences and their effects on the teaching and learning environment remains an important one, both in on-line and face-to-face environments. One of the possible explanations for such lack of effect of individual differences on the students' interaction patterns in the on-line discussions: the computer-mediated discussion context in which the study was conducted, which provided the students with opportunities for more equal participation (as compared to a face-to-face environment where individual differences may be more pronounced).

Another explanation is linked to the instruments used to measure individual differences: Sternberg's Thinking Styles Questionnaire used in the present study, as well as other instruments (e.g. MBTI) were designed to measure individual differences in a face-to-face context. It seems reasonable to suggest than individual differences manifest themselves differently in a computer-mediated environment than in a face-to-face environment and, therefore, should be measured differently. Awareness of the possible effects of individual differences, both in on-line and face-to-face environments, can have a significant effect on our teaching, as it can help teachers understand and accept individual writing approaches. It can also make teachers aware of possible personality
differences between themselves and their students. Such an understanding can aid teachers in helping their students to develop their strengths as writers, and improve their skills.

The current study analyzed students' interaction patterns in synchronous discussions only. As asynchronous discussions provide the students with more opportunities for self-paced participation and more time to reflect upon the content of the discussion, another issue that could be investigated further would be that of possible differences in communication patterns between synchronous and asynchronous discussions. Such differences could manifest themselves in the number and the length of messages sent by students in the two types of discussions. It would also be interesting to look into the issue of the effects of individual differences on students' interaction styles in such discussions. It is possible that students show preferences for different thinking styles during on-line communication in synchronous vs. asynchronous discussions. In that case, teachers need to consider the possibility and the benefits of incorporating both types of discussions in the course to provide participation opportunities for students with different learning styles and preferences.

On-line discussions can also be analyzed in terms of possible differences in the depth of discussion and the number of issues discussed between small group and whole class discussions. Possible research questions would be: Is there a difference in the number of issues being discussed in small group discussions vs. whole class discussions? Is there a difference in the depth of discussion between small group and whole class discussions? If such differences are found, the use of small group and whole class discussions could be
adjusted to a specific pedagogical purpose. It would be interesting to research the best uses for each of these two types of discussion, if indeed such differences exist: the discussions where more issues are raised may be more useful during the brainstorming stage, and the more in-depth discussions may be beneficial during other stages that require more detailed analysis of an issue.

Another research possibility is to create a more open-ended interaction environment by providing more general discussion questions (in contrast to the specific questions used in this study). Such an environment will allow the researcher to examine which students initiate interaction, and to investigate whether such students share specific personality traits, and whether language proficiency affects students' interaction. From the pedagogical standpoint, such research would help teachers better understand the individual learning preferences and personality differences that may affect the learning process. This understanding could help teachers create ways to accommodate such learning differences and maximize the effectiveness of the teaching/learning process for all students.

It is worth mentioning here that a number of studies in the past (Kern, 1995b; Meunier, 1995, 1997; Sullivan and Pratt, 1996) examined the issue of individual differences and on-line writing. These studies (including the present one) used a variety of different instruments, such as the Myers-Briggs Type Indicator, Student Learning Styles Questionnaire, Kolb's Learning Styles Inventory, Sternberg's Thinking Styles Questionnaire, and others. While all these instruments have been designed for, tested and used to identify individual differences in face-to-face environments, none of them were
originally intended to be used in on-line environments. The use of these instruments with the purpose of identifying individual differences in on-line writing environments may lead to inconclusive or incomplete results, due to the discrepancy between the original intention of an instrument and its current use. Future studies need to closely examine the various instruments used to assess individual differences and identify those that best reflect such differences as manifested in on-line writing environments.

CONCLUSION

This dissertation was intended to contribute to the larger dialogue of L2 teachers, students and researchers aimed at developing a clearer model of the use of computerized instruction in L2 writing classes. More specifically, it examined the differences in the students' interaction patterns between on-line synchronous small group and whole class discussions, as well as between anonymous and non-anonymous discussions. The study also looked into the issue of collaborative and independent writing performance, and the effects of individual differences (more specifically, internal and external thinking styles) on the students' participation in on-line discussions.

After presenting the results of the study, as well as discussing its limitations and implications for future research and L2 pedagogy, it is important now to see its place among other studies that research the use of computer-mediated instruction in L2 classrooms. This study found few differences in on-line communication of students of different thinking styles, as well as few differences in students' interaction patterns between anonymous and non-anonymous discussions or small group and whole class discussions. As discussed earlier, such lack of differences could be accounted for by the
specific nature of the on-line communication environment that provides the students with more equal opportunities for participation for all students. It could also be accounted for by the fact that the instrument used to measure individual differences in this study was developed for a face-to-face environment, and may not be capturing the kinds of individual differences that may be manifesting themselves in an on-line environment.

If the study is replicated with a larger number of subjects, it may yield broader conclusions. Ortega (1997) notes that computer-assisted classroom discussions studies which "focus on participation patterns and amount and quality of linguistic output will be most useful when well-motivated and well-established categories and measures are employed for the analysis of language and interaction" (Ortega, 1997, p.92). Ortega (1997) also emphasizes the importance of moving research in the direction of explaining how computer-mediated discussions "can be used in ways that may have differential consequences for L2 learning by principled manipulation of the array of activity types and task configurations" (Ortega, 1997, p. 92) that are based in interactionist SLA theory. The steps in this research direction taken by the present study need to be continued to further investigate the effects of computer-mediated classroom discussions on the teaching/learning process. Outlining possible future research directions, Ortega (1997) states the importance of establishing more explicit links between different types of data collected for a study, such as "self-reported and observed behaviors and linguistic outcomes" (Ortega, 1997, p. 92). This approach is an important one, as it may help link the students' and teachers' perceptions of the learning process with specific learning
outcomes. Such a connection may tap into the differences in such perceptions that may interfere with the learning process.

Finally, the results of the study indicate that the majority of students have positive attitudes towards the use of computers for computer-mediated communication and writing. However, the reasons behind such positive attitudes need to be researched further: Is it a factor of the novelty of the use of computers in a classroom that makes the students more interested in learning with the help of computers? Do these positive attitudes reflect current cultural values that highly regard information technology? Or do such attitudes reflect the students' awareness of the new possibilities for learning that were not available in the past? However, despite the reasons behind such positive attitudes, this finding is important, as previous research (Gardner, 1988; Oxford and Shearin, 1994) has shown that positive attitudes lead to increased motivation, and increased motivation, in its turn, leads to more favorable learning outcomes in an L2 classroom.
APPENDIX A: English 107 course syllabus

Spring 1999
First Year Composition
Engl 107, Section 4, 11:00-12:15PM TR
Location: Tuesday Modern Languages 435
           Thursday Modern Languages 412

Julia Gousseva
Office: Babcock 3111
Office hours: TBA
Mailbox: ML 445 (English Department)
e-mail: jgousseva@usa.net

Required texts:


Course Purpose and Goals

First-year composition courses treat writing as a negotiation between writers and readers that is shaped by specific purposes, expectations, and situations. Students practice writers as a way of thinking, learning, and discovering knowledge, as well as means of communicating it. Composition courses emphasize both the processes and the products of writing, including both personal and academic writing. Students develop their rhetorical abilities to assess situations in order to decide what kind of writing will work well in those contexts. Through rhetorical analyses of texts by professional and student writers, students learn strategies to improve their writing and their reading. Composition courses are workshops in which students work through drafts and revisions with the help of their classmates and the instructor, in some cases publishing their writing for others.

Collaborative writing and Connect.Net: Connect.Net is a collaborative writing software we will be using this semester both in and out of class for writing collaborative and independent essays, conducting online discussions and peer reviews. Connect.Net can help us establish a rich context for language development in terms of writing collaboratively, communicating in English through the electronic medium, and receiving additional input and producing additional output in English. Collaborative writing in a computer-mediated environment can help the students to establish a written conversation with the peers and the instructor about a topic of their choice, providing a very specific audience/reader and a purpose for communication.
Written assignments: Each essay will be written through a process of at least 2 drafts, Connect.Net discussions, and workshop analysis. Revision should show significant changes in purpose, audience, organization or evidence. Final copies should be typed, double-spaced and titled. Drafts must be turned in with all essays.

Course policies

Grading policies: Students must complete all assignments and the final exam in order to pass the course. We will discuss specific requirements and grading criteria for each essay in class. The criteria include evaluation of the following aspects of the essays: purpose, audience, content, expression, organization, development of ideas, mechanics and maturity of thought.

Attendance: Attendance is mandatory because composition classes are workshop classes which include in-class writing, peer group work, discussions and conferences. If you miss more than 2 classes, you can receive an administrative drop from this course. An administrative drop results in the grade of E. For more information regarding attendance and the drop policy, check the Student's Guide.

Late Essays: Late essays will be penalized. One-half of a letter grade will be deducted for each class period an essay is late.

Academic Dishonesty and Plagiarism: All UA students are responsible for upholding the Code of Academic Integrity, available through the Office of the Dean of Students. Read carefully the synopsis of the code published in The Student's Guide and the discussions about plagiarism and the relationships between writing and research.

Conferences: Individual or small group conferences with the teacher will be scheduled during the semester. Students should go to conferences prepared to discuss their current work. A missed conference counts as one class absence.

Resources: You are always welcome to come to my office hours (or schedule another time convenient for both of us) to discuss your writing. Besides, there are other resources available on campus to help you improve your writing. They are the Writing Center, the Writing Skills Improvement Program and SALT. In addition to completing class assignments, you are required to attend one session of "UA Resources for Writing" Speaker Series for Spring 1999 (the dates are January 27, Feb 17, March 10).

Class Conduct: All UA students are responsible for upholding the Code of Academic Integrity, available through the office of the Dean of Students. Read carefully the summary of the Code of Conduct in the Student's Guide.
Major Assignments

<table>
<thead>
<tr>
<th>Essay</th>
<th>Due date</th>
<th>% of the final grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhetorical analysis (independent)</td>
<td>In class, Thu, Jan 21</td>
<td>10%</td>
</tr>
<tr>
<td>Rhetorical analysis of websites (collaborative)</td>
<td>Draft - Thu, Feb 4</td>
<td>Draft - required</td>
</tr>
<tr>
<td></td>
<td>Final - Thu, Feb 11</td>
<td>Final - 15%</td>
</tr>
<tr>
<td>Rhetorical analysis of an essay from &quot;Conversations&quot; (collaborative)</td>
<td>Draft - Thu, Feb 25</td>
<td>Draft - required</td>
</tr>
<tr>
<td></td>
<td>Final - Thu, Mar 4</td>
<td>Final - 15%</td>
</tr>
<tr>
<td>Rhetorical analysis of an essay from &quot;Conversations&quot; (independent)</td>
<td>Draft - Thu, Mar 25</td>
<td>Draft - required</td>
</tr>
<tr>
<td></td>
<td>Final - Thu, Apr 1</td>
<td>Final - 20%</td>
</tr>
<tr>
<td>Contextual essay (independent)</td>
<td>Draft - Thu, Apr 22</td>
<td>Draft - required</td>
</tr>
<tr>
<td></td>
<td>Final - Thu, Apr 29</td>
<td>Final - 20%</td>
</tr>
<tr>
<td>Final exam (independent)</td>
<td>(In-class) Fri, May 7, 8-10am</td>
<td>20%</td>
</tr>
</tbody>
</table>

Weekly syllabus

Note: This syllabus provides an outline of class activities and includes some reading and writing assignments. I will announce additional assignments as we go along.

Week One (Thu, Jan 14)

Theme: *Introduction to rhetorical analysis*

Readings: *Websites about rhetorical analysis* (see addresses on the rhetorical analysis assignment sheet)

Writing: *Rhetorical analysis*

Connect.Net: *Introduction to the concept of collaborative writing, forming writing groups*

Week Two (Tue, Jan 19 – Thu, Jan 21)

Theme: *Introduction to rhetorical analysis* (cont'd)
    *Connect. Net and collaborative writing*

Readings: *Websites about rhetorical analysis* (see addresses on the rhetorical analysis assignment sheet)

Writing: *Rhetorical analysis (independent): in class, Thursday, Jan 21*

Connect.Net: *Software introduction*
Week Three (Tue, Jan 26 -- Thu, Jan 28)

Theme: Connect.Net and Internet research
Readings: Websites of your choice (see assignment)

Connect.Net writing: Rhetorical analysis of web sites (collaborative)

Week Four (Tue, Feb 2 -- Thu, Feb 4)

Theme: Internet research

Readings: Websites of your choice (see assignment)


Week Five (Tue, Feb 9 -- Thu, Feb 11)

Theme: Censorship and the Internet

Readings: TBA (to be announced)

Writing: Rhetorical analysis of an essay from "Conversations" (collaborative). Final draft due Thursday, Feb 11.

Connect.Net: Small group non-anonymous discussion of readings

Week Six (Tue, Feb 16 -- Thu, Feb 18)

Theme: Capital punishment

Readings:
A Hanging by G. Orwell (pp. 899-904, "Conversations")
Death and Justice by E. Koch (pp. 904-909, "Conversations")
This is Your Death by J. Weisberg (pp. 909-918, "Conversations")

Writing: Rhetorical analysis of an essay from "Conversations" (collaborative).

Connect.Net: Whole class anonymous discussion of readings

Week Seven (Tue, Feb 23 -- Thu, Feb 25)

Theme: Genetics or society: Do women and men think differently?

Readings:
Brain Sex by A. Moir and D. Jessel (pp. 406-415, "Conversations")
The Search for His and Her Brains by LeAnne Schreiber (pp. 415-424, "Conversations")
Women's Brains by S.J. Gould (pp.424-432, "Conversations")

Writing: Rhetorical analysis of an essay from "Conversations" (collaborative). First draft due Thursday, Feb 25.

Connect.Net: Small group anonymous discussion of readings

**Week Eight (Tue, Mar 2 — Thu, Mar 4)**

Theme: Euthanasia, Life and Death

Readings:
- It's Over, Debbie by Anonymous (pp.1015-1016, "Conversations")
- It's Not Over, Debbie by Ch. Colson (pp. 1016-1019, "Conversations")
- Active and Passive Euthanasia by J. Rachels (pp.1019-1026, "Conversations")
- Thanatos Palace Hotel by A. Maurois (handout)

Writing: Rhetorical analysis of an essay from "Conversations" (collaborative). Final draft due Thursday, Mar 4.

Connect.Net: Small group non-anonymous discussion of readings

**Week Ten (Tue, Mar 16 — Thu, Mar 18)**

No classes. Spring break.

**Week Eleven (Tue, Mar 23 — Thu, Mar 25)**

Theme: Should Drugs be Legalized?

Readings:
- A War for the Surgeon General, Not the Attorney General by K. Schmoke (pp. 919-926, "Conversations")
- Should Drugs Be Legalized? by W.Bennett (pp. 926-931, "Conversations")
- Prohibition and Drugs by M. Friedman (pp. 931-934, "Conversations")

Writing: Rhetorical analysis of an essay from "Conversations" (independent). First draft due Thursday, Mar 25.

Connect.Net: Whole class non-anonymous discussion

**Week Twelve (Tue, Mar 30 — Thu, Apr 1)**

Theme: Should Abortion Be Legal?

Readings:
- A Pro-Life View from the Left by M.Meehan (pp. 746-752, "Conversations")
Our Choices, Ourselves by S. Quinn (pp. 752-757, "Conversations")
A Pox on Both Your Houses by M. Royko (pp. 758-760, "Conversations")

Writing: Rhetorical analysis of an essay from "Conversations" (independent). Final draft due Thursday, Apr 1.

Connect.Net: Whole class anonymous discussion

Week Thirteen (Tue, Apr 6 — Thu, Apr 8)

Theme: Should Guns Be Regulated?

Readings:
Gun Control Sprouts from Racist Soil by R. Innis (pp. 826-828, "Conversations")
Women and Handguns by E. Swazey (pp. 829-831, "Conversations")
Constitutional Law and the Second Amendment by P. Lawton (pp. 834-838, "Conversations")
Gun Control is Constitutional by R. Goldwin (pp. 839-842, "Conversations")

Writing: Contextual essay (independent).

Connect.Net: Whole class non-anonymous discussion

Week Fourteen (Tue, Apr 13 — Thu, Apr 15)

Theme: Genetics or society: What causes crime?

Readings:
Are Criminals Made or Born? by R.J. Herrnstein and J.Q. Wilson (pp. 872-882, "Conversations")
Why Aren't There More Women Murderers? by A. Bass (pp. 894-899, "Conversations")
Address to the Prisoners in the Cook County Jail by C. Darrow (pp. 862-872, "Conversations")

Writing: Contextual essay (independent).

Connect.Net: Small group anonymous discussion of readings

Week Fifteen (Tue, Apr 20 — Thu, Apr 22)

Theme: Review
Writing: Contextual essay (independent). First draft due Thursday, Apr 22.
Connect.Net: Peer reviews
Week Sixteen (Tue, Apr 27 – Thu, Apr 29)

Theme: *Preparation for the final exam*
Readings: *Final Exam Packet*
Writing: *Contextual Essay (independent).* Final draft due Thursday, Apr 29

Week Seventeen (Tue, May 4 – Fri, May 7 – FINAL EXAM)

Theme: *Preparation for the final exam*
Readings: *Final Exam Packet*
Final exam: Friday, May 7, 8-10 am. Room to be announced.
APPENDIX B: COHLab Student Survey—Pre-survey, Spring 1999

Class ___________ section ___________ Year in College ___________
Major ___________    ___F___ M

1. Please indicate both your experience (1=a lot of experience, 2=some experience, 3=a little experience, 4=no experience) and your comfort level (1=very comfortable using, 2=moderately comfortable; 3=would need some help to feel comfortable, 4=would need lots of help to feel comfortable) with the following computer technologies and activities:

<table>
<thead>
<tr>
<th>Technology/Activity</th>
<th>Experience</th>
<th>Comfort Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail/listservs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conferencing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word processing software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOO/MUDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative writing software (e.g. Norton Connect.Net, Daedalus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEB/Internet searching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEB page design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreadsheets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Databases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphical applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation software (e.g. PowerPoint)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypermedia/Multimedia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. From where do you primarily access a computer? ___ home ___ dorm ___ campus lab ___ work ___ library ___ other

3. What basic hardware do you have? (check all that apply) ___PC ___ Mac ___ CD-Rom ___ zip drive ___ modem ___ ethernet connection

4. Do you have Internet access from this location? ___ yes ___ no If no, where do you go for Internet access? __________

5. How convenient is your access to a computer? ___ quite convenient ___ moderately convenient ___ moderately inconvenient ___ quite inconvenient

6. How convenient is your access to Internet/WWW? ___ quite convenient ___ moderately convenient ___ moderately inconvenient ___ quite inconvenient

7. Do you use a graphical WEB browser? ___yes ___ no If yes, which one (Netscape, Microsoft Explorer, other)? __________

8. How would you rate your typing skills (overall proficiency)? ___ excellent ___ good ___ adequate ___ hunt-and-peck

For each of the following statements, please indicate your agreement/disagreement:

9. I can write better essays when I do them on the computer.  ___ Strongly agree ___ Agree ___ Neither agree nor disagree ___ Disagree ___ Strongly disagree
<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. I enjoy writing my papers by hand more than by computer.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>11. I enjoy using the computer to communicate with my classmates.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>12. I am more comfortable contacting my classmates in person rather than by e-mail.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>13. If I have an urgent question or a comment, I would rather contact my teachers in person than by e-mail.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>14. E-mail helps people learn from each other.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>15. Writing to others by e-mail helps me develop my thoughts and ideas.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>16. Using a computer gives me more chances to read and write.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>17. I want to continue using a computer in my classes.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>18. Using a computer is not worth the time and effort.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>19. I enjoy the challenge of using computers.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>20. Learning how to use a computer is important to my career.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>21. Computers keep people isolated from each other.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>22. Computers are usually very frustrating to work with.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
</tr>
</tbody>
</table>
23. Please indicate both your experience (1=a lot of experience, 2=some experience, 3=a little experience, 4=no experience) and your comfort level (1=very comfortable, 2=moderately comfortable; 3=would need some help to feel comfortable, 4=would need lots of help to feel comfortable) with the following collaborative activities:

<table>
<thead>
<tr>
<th>Collaborative Activity</th>
<th>Experience</th>
<th>Comfort Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer editing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brainstorming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer question/answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative writing (to produce a single &quot;product&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer reviews (assessment/evaluation/grade)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group projects (with a group grade)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group projects (with different individual grades)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For each of the following statements, please indicate your agreement/disagreement:

24. Studying with a group usually helps me get better grades on tests.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

25. The feedback on my work I get from peers is usually helpful.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

26. Working on a group project is usually not worth the time and effort.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

27. In a group, usually one person ends up doing most of the work.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

28. Feedback from my peers is not as useful as feedback from the instructor.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

29. Group members should not be given the same grade on a project.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

30. Working in groups is a good way to gain different perspectives on an issue.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree

31. It's very hard to distribute the workload fairly in a group project.  
   Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
32. I would not hesitate to complain to the instructor if a member of my group was not contributing his/her fair share to a project.

33. The quality of work produced by a group is usually better than what I can produce on my own.

This section asks you to rate your perceived abilities on a variety of thinking skills. Consider your strengths and weaknesses, and rate your ability not in comparison with your classmates but against the set of criteria you think make up the skill.

<table>
<thead>
<tr>
<th>Skill</th>
<th>1 (extremely poor)</th>
<th>2</th>
<th>3</th>
<th>4 (neither skilled nor unskilled)</th>
<th>5</th>
<th>6</th>
<th>7 (superior)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. Brainstorming for solutions to a problem.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Listing the positive, negative, and the &quot;interesting&quot; aspects of various solutions.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. Visualizing yourself as a &quot;part&quot; of the problem to &quot;see&quot; it from other perspectives.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. Identifying premises and conclusions.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. Restating a problem and/or goal in order to consider different sorts of solutions.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. Understanding visual representations of a problem.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. Using visual representations to explain a problem.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly disagree</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
41. Evaluating the consequences of various alternatives.  
1 (extremely poor)  
2 3 4 (neither skilled nor unskilled)  
5 6 7 (superior)

42. Recognizing what might be missing from an argument.  
1 (extremely poor)  
2 3 4 (neither skilled nor unskilled)  
5 6 7 (superior)

43. Recognizing the use of emotional language.  
1 (extremely poor)  
2 3 4 (neither skilled nor unskilled)  
5 5 7 (superior)

44. Recognizing the assumptions upon which a particular position or argument rests.  
1 (extremely poor)  
2 3 4 (neither skilled nor unskilled)  
5 6 7 (superior)
APPENDIX C: COHLab Student Survey—Post-survey, Spring 1999

Class________________ section __________ Year in College________
Major________________ ____F ____M

1. Please indicate both your *experience* (1=a lot of experience, 2=some experience, 3=a little experience, 4=no experience) and your *comfort level* (1=very comfortable using, 2=moderately comfortable; 3=would need some help to feel comfortable, 4=would need lots of help to feel comfortable) with the following computer technologies and activities:

<table>
<thead>
<tr>
<th>Technology/Activity</th>
<th>Experience</th>
<th>Comfort Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-mail/listservs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conferencing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word processing software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOO/MUDs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative writing software (e.g. Norton Connect.Net, Daedalus)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEB/Internet searching</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEB page design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreadsheets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Databases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphical applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation software (e.g. PowerPoint)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simulation programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypermedia/Multimedia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. skip (same as pre-survey)
3. skip (same as pre-survey)
4. skip (same as pre-survey)
5. skip (same as pre-survey)
6. skip (same as pre-survey)

For each of the following statements, please indicate your agreement/disagreement:

7. I can write better essays when I do them on the computer.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
8. I enjoy writing my papers by hand more than by computer.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
9. I enjoy using the computer to communicate with my classmates.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
10. I am more afraid to contact people by e-mail than in person.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
11. If I have an urgent question or a comment, I would rather contact my teachers in person than by e-mail.  Strongly agree  Agree  Neither agree nor disagree  Disagree  Strongly disagree
12. E-mail helps people learn from each other.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

13. Writing to others by e-mail helps me develop my thoughts and ideas.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

14. Using a computer gives me more chances to read and write.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

15. I want to continue using a computer in my classes.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

16. Using a computer is not worth the time and effort.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

17. I enjoy the challenge of using computers.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

18. Learning how to use a computer is important to my career.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

19. Computers keep people isolated from each other.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

20. Computers are usually very frustrating to work with.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

21. Please indicate both your experience (1=a lot of experience, 2=some experience, 3=a little experience, 4=no experience) and your comfort level (1=very comfortable, 2=moderately comfortable; 3=would need some help to feel comfortable, 4=would need lots of help to feel comfortable) with the following collaborative activities:

<table>
<thead>
<tr>
<th>Collaborative Activity</th>
<th>Experience</th>
<th>Comfort Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer editing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small group discussion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brainstorming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer question/answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaborative writing (to produce a single &quot;product&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peer reviews(assessment/evaluation/grade)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group projects (with a group grade)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group projects (with different individual grades)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For each of the following statements, please indicate your agreement/disagreement:

22. Studying with a group usually helps me get better grades on tests.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**

23. The feedback on my work I get from peers is usually helpful.  
   **Strongly agree**  
   **Agree**  
   **Neither agree nor disagree**  
   **Disagree**  
   **Strongly disagree**
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Working on a group project is usually not worth the time and effort.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>25. In a group, usually one person ends up doing most of the work.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>26. Feedback from my peers is not as useful as feedback from the instructor.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>27. Group members should not be given the same grade on a project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>28. Working in groups is a good way to gain different perspectives on an issue.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>29. It's very hard to distribute the workload fairly in a group project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>30. I would not hesitate to complain to the instructor if a member of my group was not contributing anything to a project.</td>
<td>Strongly agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
</tr>
</tbody>
</table>
APPENDIX D: Assignments for On-line Discussions

Capital Punishment (February 18, 1999)

Today we will have an online discussion about capital punishment. Please use your background knowledge and information from this week's readings to argue your points. Below you will find a summary of main arguments from the essay Death and Justice; use it in your discussion.

Main questions for discussion:

1) What is your view on the death penalty -- should it be allowed? Why or why not? Explain.
2) What is your reaction to the essay This is Your Death by J. Weisberg? What is Weisberg's position on the death penalty? Why do you think so? What are his main writing strategies? Are they effective for his purpose?

Death and Justice by Ed. Koch

<table>
<thead>
<tr>
<th>Argument</th>
<th>Counter-argument</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) The death penalty is &quot;barbaric&quot;.</td>
<td>The opponents consider &quot;barbaric&quot; the death itself, not the method. We may not like the death penalty but it must be available to punish crimes of cold-blooded murder, cases in which any other form of punishment would be inadequate and, therefore, unjust.</td>
</tr>
<tr>
<td>2) No other major democracy uses the death penalty.</td>
<td>No other major democracy has a murder rate as high as that in the United States.</td>
</tr>
<tr>
<td>3) An innocent person might be executed by mistake.</td>
<td>If government functioned only when the possibility of error didn't exist, government wouldn't function at all.</td>
</tr>
<tr>
<td>4) Capital punishment cheapens the value of human life.</td>
<td>On the contrary, death penalty strengthens the value of human life. When we lower the penalty for murder, it signals a lesser regard for the value of the victim's life.</td>
</tr>
<tr>
<td>5) Thou Shall Not Kill (The Bible).</td>
<td>The US constitution condemns cruel and inhuman punishment, but does not condemn capital punishment.</td>
</tr>
<tr>
<td>6) The death penalty is a state-sanctioned murder.</td>
<td>The state has rights that the private individual does not. In a democracy, these rights are given to the state by the electorate.</td>
</tr>
</tbody>
</table>
Genetics or Society? (February 25, 1999)

Today we will have a SMALL GROUP DISCUSSION of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you need to address both essays in your group discussion. Good luck and have fun!

The Search for His and Her Brains by Le Anne Schreiber?

1) What is the main purpose of the essay The Search for His and Her Brains by Le Anne Schreiber?
2) What are the main writing strategies that the author uses to get her point across? Be specific, provide references to paragraph numbers.
3) How is organization used to convey the main message?
4) What tone is used? Is it effective for the author's purpose?
5) How are ethos, pathos, and logos used to get the main point across? Be specific, provide references to paragraph numbers.

Women's Brains by S.J. Gould

The main concern of this essay is mismeasure of "women's brains", specifically the studies of 19th century surgeon Paul Broca.

1) Why is this discussion still of interest to today's readers? What can it tell us about scientific evidence? Can it be an example of a scientific "fact" that was refuted later?
2) Can you think of any examples of long-held scientific truths that changed as new facts were discovered?
3) Is it likely that more research will have to be done before we make the final decision about the existence of biological differences between male and female brains, if such differences exist?

Euthanasia (March 4, 1999)

Today we will have a whole class anonymous discussion, in which you will be assigned a number instead of your name. I will have access to your real names.

The topic of today's discussion is this week's readings about euthanasia. Feel free to raise your own points, as well as address the following questions:

It's Not Over, Debbie by Ch. Colson

1) How do you understand the discussion between the priest and the psychiatrist (par. 22-28, p. 1019)? What is the significance of this discussion for the essay? Why did the author include it as part of his essay? How do you understand the last line of the essay "you're going to end up killing Jews"?
2) What is the author's main point in par. 16 (p. 1018)? Why does the author compare euthanasia to abortion? What is your opinion of such comparison?

Active and Passive Euthanasia by James Rachels

3) Why is the "distinction between active and passive euthanasia thought to be crucial for medical ethics" (p.1019)? What is your opinion on this distinction and on the issue of euthanasia in general?

4) What is the author's opinion on the distinction between active and passive euthanasia? Is he convincing in arguing his point? What strategies does he use to get his point across? Are these strategies effective for his purpose? Be specific, use examples from the text.

5) How can you describe the tone and language used in the essay? Who is the intended audience?

Other questions:

6) If an elderly person, a terminally ill patient (or even a healthy person) is rational and able by legal standards to make a life-or-death decision for him/herself, should this decision be honored? Explain your point of view.

7) Can the option of choosing death guarantee dignified life? Is this a paradox? Explain your opinion.

Should Drugs Be Legalized (March 25, 1999)

Today we will have a SMALL GROUP ANONYMOUS DISCUSSION (I will have access to your real names) of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you do need to address both essays in your group discussion. Good luck and have fun!

Should Drugs Be Legalized? by William Bennett

1) What is the main purpose of the essay Should Drugs Be Legalized? by William Bennett?
2) What are the main writing strategies that the author uses to get his point across? Be specific, provide references to paragraph numbers.
3) How is organization used to convey the main message?
4) What tone is used? Is it effective for the author's purpose?
5) How are ethos, pathos, and logos used to get the main point across? Be specific, provide references to paragraph numbers.
**Prohibition and Drugs by Milton Friedman**

The main argument of this essay is that "prohibition is an attempted cure that makes matters worse -- for both the addict and the rest of us" (p. 932, par. 5).

1) In your opinion, why does Friedman choose to define current drug problems in terms of economics rather than ethics? Why is the issue of ethics an unclear point to him? How would you define this problem: in terms of economics or ethics? Explain.
2) Is there enough evidence to support his argument and to make his essay convincing?
3) Do you think that tougher laws on drugs are restriction of personal freedom?
4) What should be the role of the government in controlling the drug problem? What should be the role of individuals? How is this issue dealt with in your country?

**Abortion (April 1, 1999)**

Today we will have a whole class anonymous discussion in which you will be assigned a number instead of your name. I will have access to your real names.

The topic of today's discussion is this week's readings about abortion. Feel free to raise your own points, as well as address the following questions:

*A Pro-Life View from the Left* by Mary Meehan

1) What strategies does the author use to convince her audience of her views? Is she addressing a conservative or a liberal audience? How did you react to her points? Be specific, don't focus only on the main message.

*Our Choices. Ourselves* by Sally Quinn

2) In her essay, Quinn asserts that being for abortion rights is a political position in favor of personal privacy -- being pro-abortion rights does not necessarily mean that one is for abortion. How does Quinn build this distinction? In your opinion, is she successful in making this distinction work for her readers?

*A Pox on Both Your Houses* by Mike Royko

3) Please read the final statement of the essay stating that women need to eat more "brain food" because of the 26 million abortions performed in the United States over the last 19 years. While this statement is certainly offensive to women, it also underlies a problem area of the essay: the essay is written from a narrowly male perspective that does not acknowledge the unique problems faced by women as childbearers and primary providers for children.

4) Could a 24-hour waiting period be a real problem for some women? Explain.
5) Does the author simplify or ignore certain problems in his discussion of the controversies surrounding abortion? Explain, give examples.

**Gun Control (April 8, 1999)**

Today we will have a whole class NON-ANONYMOUS discussion.

The topic of today's discussion is this week's readings about gun control. Feel free to raise your own points, as well as address the following questions:

*Gun Control Sprouts from Racist Soil by R. Innis*

1) What conclusions can you make about racism and gun control, especially given what you know about the historical and present status of minorities in American society? Can gun control advocates be racist if, as Innis also says, "with the influx of large numbers of Irish, Italian and Jewish immigrants into the country, gun laws now also targeted whites from the underprivileged classes of immigrants" (11)?

*Women and Handguns by E. Swazey*

2) Swazey's title indicates that women and guns are this essay's principal concern. How do the female students respond to her position? Would they be willing to buy a gun -- and use it, if necessary? What is the reaction of the male students to this question?

*Constitutional Law and the Second Amendment by P. Lawton*

3) Lawton states that the U.S. Constitution absolutely protects citizens' "right to bear arms". What are gun control laws of your countries?

*Gun Control is Constitutional by R. Goldwin*

4) Goldwin believes that "certain explanations were lost or buried in the legislative process" from Madison's original amendment proposal to the Senate's final draft; and although after the Senate's revision the Second Amendment no longer explicitly stated "that the right to bear arms meant the right to serve in the militia" (14), that public use of firearms nevertheless was and should be understood. Do you think that Goldwin's evidence is sufficient to suggest that the Second Amendment was intended to be understood exclusively in relation to service in the militia?
Are Criminals Made or Born? (April 15, 1999)

Today we will have a SMALL GROUP DISCUSSION of this week's readings (I have set up groups in advance). You don't have to answer all questions, but you need to address all three essays in your group discussion. Good luck and have fun!

Are Criminals Made or Born? by R.J. Herrnstein and J.Q. Wilson

1) Herrnstein and Wilson assert that while social factors contribute to criminal behavior, research increasingly shows that there is a strong biological basis for criminal behavior. In paragraphs 27-31, Herrnstein and Wilson discuss the problems inherent in asserting the dominance of biology in criminal behavior. Why do the authors choose to include this discussion of some of the problems after giving so much evidence supporting their position?

Why Aren't There More Women Murderers? by A. Bass

2) Bass frames her article with a discussion of an atypical female murderer. Why does she choose to do this -- is it to provide a vivid contrast to the composite portrait of the typical female murder that she explores in the body of her article? Does ending with the detailed description of the life of atypical murderess Aileen Wuornos add pathos to the piece? Why would Bass want to leave her readers on this note? What is accomplished?

Address to the Prisoners in the Cook County Jail by C. Darrow

3) Darrow's final recommendation is "Make fair conditions of life" in order to eliminate the conditions that make the existence of jails possible (36). By the end of the essay, Darrow is in essence suggesting a variation on Thoreau's assertion that the place of the honest man is in jail when those on the outside are corrupt. What are your opinions on this? Has Darrow convinced you of the validity of his position by the end of the essay? If so, what was most compelling about his argument? Least compelling? Are you persuaded by his point of view?

Sample essays discussion (April 22, 1999)

Today we will have a SMALL GROUP ANONYMOUS DISCUSSION of the two sample open letters -- one is about eating disorders, the other is about the death penalty. Please address the following questions in discussing the essays, and feel free to raise your own. Be specific, refer to paragraphs and pages in the essays to support your points.

Who is the intended primary audience?
What is the purpose?
How does the author establish his/her credibility?
What writing strategies does the author use to convey his/her message?
Are these strategies effective for the given purpose/audience?
What is the most effective strategy in each essay?
Least effective?
What suggestions for improvement would you give to each of the authors?
What questions do you have about this assignment?
APPENDIX E: Independent analysis of an essay from "Conversations" assignment

Write a comprehensive rhetorical analysis of the essay of your choice (any essay from "Conversations", but NOT the same one you analyzed in your collaborative project). Remember to discuss the writer's persona, audiences and intentions as reflected in the essay, as well as the rhetorical strategies (including the three appeals) used. Make sure to include (but not be limited to) the following points in your essay:

1. Understand and be able to **briefly** summarize the message your text is trying to convey to the readers,
2. Derive the writer's intended purpose from textual evidence (use quotations from the essay to support your claims),
3. Describe the characteristics of the target audience,
4. Describe the various strategies and appeals the author uses to achieve his/her purpose(s) and use examples from the text to illustrate the various appeals.
5. Comment on the appropriateness of tone used by the author, and the effectiveness of organization of the essay for the stated purpose and intended audience.
6. Evaluate how appropriate and/or effective the strategies for the stated purpose and audience.

Good luck!
APPENDIX F: Collaborative analysis of an essay assignment

Write a comprehensive rhetorical analysis of the essay of your choice (from "Conversations"). Remember to discuss the writer's persona, audiences and intentions as reflected in the essay, as well as the rhetorical strategies (including the three appeals) used. Make sure to include (but not be limited to) the following points in your essay:

1. Understand and be able to briefly summarize the message your text is trying to convey to the readers,
2. Derive the writer's intended purpose from textual evidence (use quotations from the essay to support your assertions),
3. Describe the characteristics of the target audience,
4. Describe the various strategies and appeals the author uses to achieve his/her purpose(s) and use examples from the text to illustrate the various appeals.
5. Evaluate how appropriate and/or effective the strategies the author is using are in convincing this particular audience.

For more specific suggestions applicable to each group, please see my comments on the final draft of the website project.

Good luck!
APPENDIX G: COHLab Student Survey—Post-survey, Spring 1999
TAKE-HOME PART

Class______________ section ____________ Year in College__________
Major______________ _____F _____M

The last section of the survey asks you to relate your positive and negative experiences with technology and collaborative learning in this course. Please answer the following questions:

1) Tell us about a specific assignment/activity when your collaboration with other students in this class worked well. What happened?

2) Tell us about a specific assignment/activity when your collaboration with other students in this class did NOT work well. What happened?

3) Tell us about a specific time when a particular technology (ConnectNet, OldPuebloMOO, etc.) facilitated collaborative work in this course. How and why do you believe the technology helped?

4) Tell us about a specific time when a particular technology (ConnectNet, OldPuebloMOO, etc.) seemed to hinder collaborative work in this course. How and why do you believe the technology interfered?
APPENDIX H: Evaluation form for ESL raters

5 = Excellent
4 = Very good
3 = Good
2 = Satisfactory
1 = Poor

**Part I**

<table>
<thead>
<tr>
<th>Holistic rating</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

**Part II**

1. Effectiveness in addressing the writing task
2. Organization
3. Development of ideas
4. Sentence structure
5. Use of vocabulary
6. Grammar and mechanics

| 1 | 2 | 3 | 4 | 5 |
APPENDIX I: Interest questionnaire

Spring 1999/English 107 section 4

Name:

Please rate the following topics of this semester's readings on a scale from 1 to 5, where:

1 is "not interesting at all"
2 is "not very interesting"
3 is "somewhat interesting"
4 is "very interesting"
5 is "extremely interesting"

<table>
<thead>
<tr>
<th>Topic</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do women and men think differently?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital punishment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euthanasia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug legalization</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abortion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gun control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are criminals made or born?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample essays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX J: Thinking Styles Survey

Julia Gousseva/Spring 1999
English 107 section 4

Name:
Native language:

The following survey will help ESL composition instructors in developing classroom activities. Thank you very much for your help in this important project. Please read each of the following statements, and then rate yourself on a scale from 1 to 7 by circling the appropriate number. Each rating corresponds to how well a statement describes you:

1. When making decisions, I tend to rely on my own ideas and ways of doing things.

2. When faced with a problem, I use my own ideas and strategies to solve it.

3. I like to play with my ideas and see how far they go.

4. I like problems where I can try my own way of solving them.

5. When working on a task, I like to start with my own ideas.

6. Before starting a new task, I like to figure out for myself how I will do my work.

7. I feel happier about a job when I can decide for myself what and how to do it.

8. I like situations where I can use my own ideas and ways of doing things.

9. When discussing or writing down ideas, I follow formal rules of presentation.

10. I am careful to use the proper method to solve any problem.

11. I like projects that have a clear structure and a set plan and goal.

12. Before starting a task or project, I check to see what method or procedure should be used.

13. I like situations in which my role or the way I participate is clearly defined.

14. I like to figure out how to solve a problem following certain rules.

15. I enjoy working on things that I can do following directions.
16. I like to follow definite rules or directions when solving problems or doing a task.  
17. When discussing or writing down ideas, I like criticizing others' ways of doing things.  
18. When faced with opposing ideas, I like to decide which is the right way to do something.  
19. I like to check and rate opposing points of view or conflicting ideas.  
20. I like projects where I can study and rate different views and ideas.  
21. I prefer tasks or problems where I can grade the design or methods of others.  
22. When making a decision, I like to compare the opposing points of view.  
23. I like situations where I can compare and rate different ways of doing things.  
24. I enjoy work that involves analyzing, grading, or comparing things.  
25. When talking or writing about ideas, I stick to one main idea.  
26. I like to deal with major issues or themes, rather than details or facts.  
27. When trying to finish a task, I tend to ignore problems that come up.  
28. I use any means to reach my goal.  
29. When trying to make a decision, I tend to see only one major factor.  
30. If there are several important things to do, I do the one most important to me.  
31. I like to concentrate on one task at a time.  
32. I have to finish one project before starting another one.  
33. I like to set priorities for the things I need to do before I start doing them.  
34. In talking or writing down ideas, I like to have the issues organized in order of importance.  
35. Before starting a project, I like to know the things I have to do and in what order.  
36. In dealing with difficulties, I have a good sense of how important each of them is and what order to tackle them in.  
37. When there are many things to do, I have a clear sense of the order in which to do them.  
38. When starting something, I like to make a list of things to do and to order the things by importance.
39. When working on a task, I can see how the parts relate to the overall goal of the task.

40. When discussing or writing down ideas I stress the main idea and how everything fits together.

41. When I undertake some task, I am usually equally open to starting by working on any of several things.

42. When there are competing issues of importance to address in my work, I somehow try to address them simultaneously.

43. Usually when I have many things to do, I split my time and attention equally among them.

44. I try to have several things going on at once, so that I can shift back and forth between them.

45. Usually I do several things at once.

46. I sometimes have trouble setting priorities for multiple things that I need to get done.

47. I usually know what things need to be done, but I sometimes have trouble deciding in what order to do them.

48. Usually when working on a project, I tend to view almost all aspects of it as equally important.

49. When I have many things to do, I do whatever occurs to me first.

50. I can switch from one task to another easily, because all tasks seem to me to be equally important.

51. I like to tackle all kinds of problems, even seemingly trivial ones.

52. When discussing or writing down ideas, I use whatever comes to mind.

53. I find that solving one problem usually leads to many other ones, that are just as important.

54. When trying to make a decision, I try to take all points of view into account.

55. When there are many important things to do, I try to do as many as I can in whatever time I have.

56. When I start on a task, I like to consider all possible ways of doing it, even the most ridiculous.

57. I like situations or tasks in which I am not concerned with details.

58. I care more about the general effect than about the details of a task I have to do.
59. In doing a task, I like to see how what I do fits into the general picture.

60. I tend to emphasize the general aspect of issues or the overall effect of a project.

61. I like situations where I can focus on general issues, rather than specifics.

62. In talking or writing down ideas, I like to show the scope and context of my ideas, that is, the general picture.

63. I tend to pay little attention to details.

64. I like working on projects that deal with general issues and not with nitty-gritty details.

65. I prefer to deal with specific problems rather than with general questions.

66. I prefer tasks dealing with a single, concrete problem, rather than general or multiple ones.

67. I tend to break down a problem into many smaller ones that I can solve, without looking at the problem as a whole.

68. I like to collect detailed or specific information for projects I work on.

69. I like problems where I need to pay attention to detail.

70. I pay more attention to the parts of a task than to its overall effect or significance.

71. In discussing or writing on a topic, I think the details and facts are more important than the overall picture.

72. I like to memorize facts and bits of information without any particular content.

73. I like to control all phases of a project, without having to consult others.

74. When trying to make a decision, I rely on my own judgment of the situation.

75. I prefer situations where I can carry out my own ideas, without relying on others.

76. When discussing or writing down ideas, I only like to use my own ideas.

77. I like projects that I can complete independently.

78. I prefer to read reports for information I need, rather than ask other for it.

79. When faced with a problem, I like to work it out by myself.

80. I like to work alone on a task or problem.

81. When starting a task, I like to brainstorm ideas with friends or peers.
82. If I need more information, I prefer to talk about it with others rather than to read reports about it.

83. I like to participate in activities where I can interact with others as a part of a team.

84. I like projects in which I can work together with others.

85. I like situations where I can interact with others and everyone works together.

86. In a discussion or report, I like to combine my own ideas with those of others.

87. When working on a project, I like to share my ideas and get input from other people.

88. When making a decision, I try to take the opinion of others into account.

89. I enjoy working on projects that allow me to try novel ways of doing things.

90. I like situations where I can try new ways of doing things.

91. I like to change routines in order to improve the way tasks are done.

92. I like to challenge old ideas or ways of doing things and to seek better ones.

93. When faced with a problem, I prefer to try new strategies or methods to solve it.

94. I like projects that allow me to look at a situation from a new perspective.

95. I like to find old problems and find new methods to solve them.

96. I like to do things in new ways not used by others in the past.

97. I like to do things in ways that have been used in the past.

98. When I'm in charge of something, I like to follow methods and ideas used in the past.

99. I like tasks and problems that have fixed rules to follow in order to complete them.

100. I dislike problems that arise when doing something in the usual, customary way.

101. I stick to standard rules or ways of doing things.

102. I like situations where I can follow a set routine.

103. When faced with a problem, I like to solve it in a traditional way.

104. I like situations where the role I play is a traditional one.
APPENDIX K: Grammatical error categories used by Grammatik

1. Adjective use
   Example: Her handwriting is beautifully.

2. Adverb use
   Example: Smith ran easy.

3. Article use
   Example: A apple is a fruit.

4. Comma splice or fused sentence
   Example: I spoke softly it still woke up the child.

5. Conjunction use
   Example: You need to choose between Tuesday or Thursday.

6. Double negative
   Example: She doesn't never call back.

7. Homonym
   Example: Its a good day today.

8. Incomplete sentences
   Example: Although he is a good student.

9. Incorrect verb form
   Example: Jane had begin reading on Saturday.

10. Misplaced modifier
    Example: Marching across the field, the fight song rang out for all to hear.

11. Noun phrase
    Example: This texts are hard to understand.

12. Object of verb
    Example: She came my friends' house with us.

13. Possessive form
    Example: It was hard to decipher one students handwriting.

14. Pronoun case
    Example: It is her who must be obeyed.
15. Pronoun number agreement
Example: You need to choose between these three text.

16. Relative pronoun agreement
Example: I surprised whoever were there.

17. Subject-verb agreement
Example: One of these houses are his.

18. Subordination
Example: After they came home, then they watched TV.

19. Tense shift
Example: The author analyzes the situation and came to an unusual conclusion.
APPENDIX L: List of function words in English (adapted from Li, 1998)

again, ago, almost, already, also, always, anywhere, back, else, even, ever, everywhere, far, hence, here, hither, how, however, near, nearby, nearly, never, not, now, nowhere, often, only, quite, rather, sometimes, somewhere, soon, still, then, thence, there, well, therefore, thither, thus, today, tomorrow, too, underneath, very, when, whence, where, whither, why, yes, yesterday, yet, am, are, aren't, be, been, being, can, can't, could, couldn't, did, didn't, do, does, doesn't, doing, done, don't, get, gets, getting, got, had, hadn't, has, hasn't, have, haven't, having, he'd, he'll, he's, I'd, I'll, I'm, is, I've, isn't, it's, may, might, must, mustn't, ought, oughtn't, shall, shan't, she'd, she'll, she's, should, shouldn't, that's, they'd, they'll, they're, was, wasn't, we'd, we'll, were, we're, weren't, we've, will, won't, would, wouldn't, you'd, you'll, you're, you've, about, above, after, along, although, among, and, around, as, at, before, because, below, beneath, beside, between, beyond, but, by, down, during, except, for, from, if, in, into, near, nor, of, off, on, or, out, over, round, since, so, than, that, though, through, till, to, towards, under, unless, until, up, whereas, while, with, within, without, a, all, an, another, any, anybody, anything, both, each, either, enough, every, everybody, everyone, everything, few, fewer, he, her, hers, herself, him, himself, his, I, it, its, itself, less, many, me, mine, more, most, much, my, myself, neither, no, nobody, none, nothing, other, others, our, ours, ourselves, she, some, somebody, someone, something, such, that, the, their, theirs, them, themselves, these, they, this, those, us, we, what, please, which, who, whose, you, your, yours, yourself, yourselves, much, really, more, away, rather, too, just, across, oh.
APPENDIX M: List of coordinating and subordinating conjunctions in English

**Coordinating conjunctions**

and, or, neither, nor, but, for, so, yet, as well as, neither...nor, both...and, either...or, not only...but also

**Subordinating conjunctions**

although, though, while, whereas, because, since, as if, as though, as far as, as long as, so as, when, whenever, before, after, till, until, once, where, wherever, in order that, in that, such that, so that, whether...or, if, lest, what, whatever, which, whichever, why, how, however, who, whom, whoever, unless, in case, in order that, given that, granted that, provide that, granting that, seeing that, supposing that, now that, rather than, sooner than, no matter what, when, how, which, where
APPENDIX N: List of Cohesive Conjunctions in English

Additive Conjunctions:

nor, or, furthermore, in addition, besides, alternatively, incidentally, by the way, in the same way, I mean, in other words, such, for example, for instance, thus, likewise, similarly, on the other hand, by contrast, in contrast, another

Adversative Conjunctions:

yet, though, but, however, nevertheless, despite, in fact, as a matter of fact, actually, at the same time, at that time, instead, rather, on the contrary, at least, in any case, in that case, in this case, in either case, in both cases, whichever, anyhow, at any rate

Causal Conjunctions:

so, then, hence, thus, therefore, consequently, because of this, for this reason, on account of this, as a result, to sum up, in summary, in conclusion, in consequence, for this purpose, with this in mind, for, because, it follows, on this basis, to this end, in such an event, under the circumstances, under any circumstances, under other circumstances, otherwise, in this respect, in this regard, with reference to this, in other respects, aside from this

Temporal Conjunctions:

next, after, then, just then, previously, before that, finally, last, at last, first, at first, in the end, at once, thereupon, soon, for the first time, next time, after a time, at that time, on another occasion, later, meanwhile, until then, at this moment, at that moment, secondly, in conclusion, now, up to now, from now on, at this point, here, to sum up, in short, briefly, to return to the point, to resume
REFERENCES


Ortega, L. (1997). Processes and outcomes in networked classroom interaction: defining the research agenda for L2 computer-assisted classroom discussion. Language Learning and Technology 1, 1, pp. 82-93.


