

DISCOURSE AND PARTICIPATION IN ESL FACE-TO-FACE AND WRITTEN ELECTRONIC CONFERENCES

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ABSTRACT

This study was a comparative investigation of face-to-face and written electronic conferences. The participants were advanced English as a second language (hereafter: ESL) students. The two types of conferences were compared in terms of textual features and participation. There was no statistically significant difference in the total number of words that students produced in an equivalent amount of time in the two types of conferences. The discourse in written electronic conferences displayed greater lexical range, and students in these conferences produced more discourse demonstrating interactive competence. The statistically significant finding of increased lexical range in written electronic conferences persisted even when the interactive discourse was eliminated from the conference transcripts and the transcripts were reanalyzed. This finding suggests that, during written electronic conferences, students were better able to use and practice a wider range of vocabulary related to the topics. For one of the groups, participation in written electronic conferences was more balanced among students, while for the other group participation was about equally balanced regardless of the conference setting. This last finding came as a surprise and points to a need for further research into variables that might mediate balanced participation in face-to-face and written electronic conferences.

INTRODUCTION

Written electronic conferences are discussions in which students interact with each other by typing and viewing messages while seated at the computer.¹ This study was a comparative investigation of the patterns of participation and the features of discourse produced by students in written electronic and traditional face-to-face conference discussions. The use of written electronic conferences as an alternative to face-to-face conferences has not been unmotivated. Research suggests that written electronic conferences shape patterns of student participation and discourse in ways that may be beneficial to second language students' learning. However, much of the research that compares participation patterns and discourse in written electronic and face-to-face conferences in the second language classroom has been anecdotal, and the empirical studies that have been conducted have remained unreplicated. As a result, the rationale for my current study was derived from a need for further research.

Researchers have begun to address how underlying communicative features in written electronic conferences seem to affect the communication process. For instance, because written electronic conferences are synchronous, yet do not take place in the oral mode, researchers have noted that there is no need for participants to take temporally sequential turns because interruption, in the traditional sense, is impossible (Beauvois, 1992, 1998; Kelm, 1992; Kitade, 2000). However, in another sense, students "interrupt" each other quite often. This sort of interruption does not mean competing for the floor: It means that since everyone can contribute to the discussion at the same time, the conversation results in discourse composed of interleaved multiple parallel threads (Herring, 1999; Simpson, 2005; Smith 2003). Moreover, since communication in written electronic conferences takes place in a graphic-only form, reading and writing (i.e., typing) skills, as well as skills that allow participants to accurately express and

interpret attitudes expressed in graphic form – through emoticons or explicit written language – are central to the interaction (Beauvois, 1992, 1998; Kelm, 1992; Kiesler, Siegel & McGuire, 1984). In the context of this study, the term *graphic-only* means that in the written electronic conferences, students communicate only through typed messages. In addition, since participants cannot see or hear each other, participants lack the aural and visual paralinguistic cues that in the face-to-face setting nonlinguistically signify the listener's orientation to the discourse: for example, annoyance, agreement, or indifference (Kiesler et al., 1984). Furthermore, conventional aural and visual paralinguistic methods of dramaturgically conveying meanings through such acts as taking the head seat, speaking loudly, staring, or gesturing, are impossible (Kiesler et al., 1984). Finally, since there is no aural or visual paralinguistic information, it may be impossible to distinguish social status and position cues such as gender, race, ethnic background, or socioeconomic status, especially if participants use pseudonyms (Hayne, Rice, & Licker, 1994; Marjanovic, 1999; Selfe & Meyer, 1991; Sullivan, 1998).

As a result of the different conditions underlying the communication, the skills involved in expressing oneself and interpreting others in the written electronic environment are different from the skills required for communicative competence in the face-to-face milieu (Chun, 1994; Perkins & Newman, 1999). Communicative competence in the written electronic environment requires proficiency in strategies that enable participants to successfully communicate with others using a relatively limited or restricted conduit for communication and interaction (Chun, 1994; Perkins & Newman, 1999).

The words *limited* and *restricted* in the previous paragraph are not meant to imply that communication in the written electronic setting is inherently inferior, in the sense that some ideas cannot be communicated at all. However, these words are used to suggest that information in face-to-face communication that is ordinarily communicated through aural or visual paralinguistic cues — attitudes like boredom, curiosity, or agreement, for instance — must be expressed in explicit written language or with graphic paralinguistic cues such as emoticons (Kiesler et al., 1984), although in this study, students were not given the option of using emoticons. The terms *limited* or *restricted* are also misleading because, as shall become evident in a moment, especially for second language students, communication in the written electronic medium seems to be *opened up* in comparison with communication in the face-to-face milieu (Beauvois, 1992, 1998; Chun, 1994; Cooper & Selfe 1990; Neuwirth, Palmquist, Cochran, Gillespie, Hartmen, & Hajduk, 1993; Pennington, 1996; Sullivan, 1998; Warschauer, 1996; Warschauer, Turbee, & Roberts, 1996).

The literature has begun to reveal how the formal characteristics underlying communication in written electronic conferences shape the patterns of student participation in ways that may be beneficial to second language students' learning (Beauvois, 1992, 1998; Braine, 1997, 2001; Chun, 1994; Kelm, 1992; Kern, 1995; Slatin, 1998; Sullivan & Pratt, 1996; Warschauer, 1996; Warschauer et al., 1996). For example, Chun (1994) found that second language students interacted directly with each other rather than mainly with the teacher, and that students displayed more interactive competence in comparison with students in face-to-face classroom discussions. Speech acts such as greetings and leave-takings, constructing and expanding on topics, taking turns, capturing attention, steering or avoiding topics, starting and ending conversations, requesting confirmation or clarification, apologizing, and giving feedback are components of communicative competence known as interactive competence (Chun, 1994). Chun's conclusion that second language students display more interactive competence in the written electronic medium is consistent with the findings of other researchers (e.g., Kelm, 1992; Kern, 1995; Sotillo, 2000; Sullivan & Pratt, 1996). For example, Slatin (1998) noted that even at the initial stages of foreign language learning, students who participate in written electronic discussions make more of these higher order communications.

In addition to interactive competence being a valuable objective for second language learning in and of itself, researchers have investigated how the written electronic setting can facilitate language acquisition when second language learners must use their interactive language skills working together or with native speakers. Of special interest has been interactive discourse involving negotiation of meaning arising from

some misunderstanding during the communication, and how that might benefit students' language development (e.g., Blake, 2000; Fernandez-Garcia & Martinez-Arbelaz, 2002; Kitade, 2000; Lee, 2002, 2004; Smith, 2003; Toyoda & Harrison, 2002). Rooted in an interactionist view of second language acquisition, these studies suggest that in the written electronic setting, tasks involving negotiation of meaning tend to lead to incidental interactions in which students are asked to clarify and rearticulate what they have written in the target language. These incidental interactions tend to direct learners' attention to either a discrepancy between their interlanguage and the target language, or to an area of the target language about which they are in much need of knowledge. Thus, particularly when second language learners are interacting with a native speaker, learning may take place during the negotiated interaction, or the interaction might serve as an initial step to raise students' awareness of areas for further study (Pica, 1994).

Researchers' observations of student participation in written electronic conferences have led many to suggest that the environment facilitates communication for second language students. As an example, Marjanovic (1999) and Sullivan (1998) have observed that the anonymity of the network can empower second language students to participate more fully in discussions with native English speakers. They reported that second language students in their studies communicated more because they found themselves defined by their communicative skills in a particular type of discussion, rather than by their race or native language background. By obscuring names, as well as aural and visual paralinguistic cues, the written electronic conference environment can facilitate anonymous interaction, thus removing a disadvantage that minority students often face when attempting to get included into a discussion with native speaker participants (Marjanovic, 1999; Sullivan, 1998). In conference groups that did not contain native speakers, and that did not use pseudonyms, others (e.g., Beauvois, 1992, 1998; Bohlke, 2003; Chun, 1994; Kelm, 1992; Kern, 1995) have also reported more balanced participation in written electronic as opposed to face-to-face conferences. The term *more balanced* means that in written electronic conferences, rather than the discussion being dominated by a few members, participation tends to be more equally distributed among participants.

Rather than attributing the more balanced participation in written electronic conferences to anonymity associated with obscured social status and position cues, Kelm (1992) and Beauvois (1992, 1998) proposed that more balanced participation may have been due to the lack of need for consecutive turn-taking patterns. Students in written electronic conferences need not wait for others to finish writing before beginning to express themselves, but can begin to do so even while other participants are writing. Thus, assuming the pace of the written electronic conference is not too overwhelming, students in written electronic conferences may have more time to compose and evaluate their contributions in the midst of interaction, thus tending to reduce the fear of interruption or failure often experienced by less orally fluent students during an oral exercise (Beauvois, 1992, 1998; Kelm, 1992).

Like the studies just mentioned, Warschauer (1996) also noted more balanced participation in written electronic conferences compared to face-to-face conferences. In fact, by using the gini coefficient (i.e., a measure of inequality; see [Appendix A](#)), he was able to demonstrate that, on average, participation was more balanced for his small groups of ESL students in written electronic compared to face-to-face conferences. In addition to participation being more balanced, Warschauer (1996) also noted that the discourse in written electronic conferences was more lexically complex. Warschauer based this claim on a comparison of the type-token ratios of conferences. Type-token ratios are defined as the total number of unique words, or types, divided by the total number of words, or tokens (Scott, 1998; Warschauer, 1996). A higher type-token ratio indicates that a text has greater lexical complexity, or in other words, has a greater lexical range (Ortega, 1997). As Warschauer and others (e.g., Ortega, 1997) have noted, the need for more studies with groups of various sizes that include measures such as the gini coefficient and type-token ratios would be very helpful towards constructing a theory of communication in written electronic conferences. Accordingly, both of these measures are included in the current study.

As Ortega (1997) and Warschauer (1996) have suggested as a direction for future research, this study compares the textual features and participation patterns of face-to-face and written electronic conferences. In particular, this study addresses several research questions. First, will students tend to generate more discourse in one of the two conference settings given equivalent amounts of time? Second, will discourse be more lexically complex in one of the two types of conferences? Third, will students in the written electronic conferences demonstrate more interactive competence? Finally, will more balanced participation in written electronic conferences be evident with larger groups of students? Although the total number of students in this study (i.e., 27 students) is not decisively larger than the total number of students in Warschauer's study (i.e., 16 students), my conferences take place with more students in each group: The current groups contain 13 and 14 students, while Warschauer's groups contained 4 students each.

PARTICIPANTS

The participants in this study were high intermediate to advanced ESL students who were placed in level 4 of the Intensive English Language Program (hereafter: IELP) at Brock University based on their Michigan Test scores at the beginning of the term. The range of Michigan scores for these students was from 56 to 77. The average Michigan test scores for classes A and B were 68.72 and 68.50, respectively. These reported scores are the average of the listening and grammar/reading components of the Michigan Test. Subjects were not randomly assigned to groups for this study; the groups of students were intact class groups. The assignment of individual students to class groups was a decision made by the administration of the IELP, and as such, was beyond the control of the researcher. These particular class groups were chosen to participate in this study because they were at the desired proficiency level.

In addition to being balanced for overall language proficiency; as can be seen in [Table 1](#), the two class groups, classes A and B, were approximately balanced in terms of number of students, gender, and language and cultural background.

Table 1. Composition of Class Groups

Characteristic	Class A	Class B
Total Students	13	14
Males	8	7
Females	5	7
Korean (South Korea)	5	4
Japanese	2	3
Russian	2	1
Spanish (Mexican)	2	4
French (Quebecois)	1	1
Taiwanese	1	0
Cantonese	0	1

Although the usual classroom teacher of class A and the usual classroom teacher of class B attended all the conferences, they did not take part in the conference discussions. The two teachers were not asked to participate because research has shown that a teacher's style of leading face-to-face and computer-mediated class discussions, as well as his or her level of computer proficiency, and his or her attitude towards the use of computers in writing, may influence the quality and quantity of students' participation (Yagelski & Grabill, 1998). As a result, in order to keep experimental conditions consistent between classes, it was decided that the researcher, rather than the regular classroom teachers, would lead all the conference discussions.

PROCEDURES

The students participated in the conferences as part of their regular writing class requirements. Face-to-face conferences for each class were held in that class's usual classroom at the university. All written electronic conferences were held in each class's usual computer lab. All conferences lasted for 20 minutes of the 50 minute class period. In the remaining 30 minutes of class time, students individually began to draft essays based on the conference discussion. The drafts that students wrote after participating in the conferences are not considered in the current study. The computer software used for the written electronic conferences was WebCT. The topics used each week were selected from a number of possible topics by the class teachers based upon the teachers' estimate of overall interest to the students. Copies of the topics selected by the teachers and used in this study are included in [Appendix B](#).

A graphic representation outlining the two groups' scheduled participation can be found in [Table 2](#). Table 2 shows that there was a total of 4 weeks of observations in the study, and groups alternated from one conference setting to the next, week-by-week. For instance, during weeks 1 and 3, class A was in the written electronic setting, while class B was in the face-to-face setting. On the other hand, during weeks 2 and 4, class B was in the written electronic conference setting, while class A was in the face-to-face conference setting.

Table 2. Scheduled Participation

Conference Setting	Week 1	Week 2	Week 3	Week 4
Written Electronic	Class A	Class B	Class A	Class B
Face-To-Face	Class B	Class A	Class B	Class A

In the face-to-face conferences, the students and the researcher discussed the writing topic while seated around a table, face-to-face, as a whole-class discussion. On the other hand, in the written electronic conferences, although the students and the researcher also discussed the writing topic as a whole-class discussion, they did so by typing messages that could be viewed by all other participants while each participant was seated at his or her own computer in a computer laboratory. In the written electronic conferences, it was not possible to use the WebCT software to communicate outside the main conference window, for instance by sending private messages. As a result, all the students' messages were recorded in the transcripts.

All of the observations took place between January and April 2000. The 4 weeks of observations (i.e., weeks 1 to 4 in [Table 2](#)) were held during the 9th, 10th, 12th, and 13th weeks of the term, respectively. These particular weeks were chosen in consultation with the instructors of the two classes.

One of this study's key concerns was to ensure that procedures remained consistent between class groups, conference settings, and weeks of the study. Since conference setting was the only independent variable of interest in this study, I wanted to make sure that all other possible variables, such as differences between class groups or weeks of the study, were controlled or eliminated. One important threat to my ability to control possibly confounding variables was brought to attention through the work of Yagelski and Grabill (1998). These researchers found that conference participation is related to the way the instructor frames and manages the use of computer-mediated communications technologies. As a result, several steps were taken to minimize the possibility that student participation in the two types of conferences would be different because of the way the conferences were viewed by participants.

First, as discussed, students were informed that their regular classroom teacher would attend but not participate in the conferences, and that the regular classroom teacher, rather than the researcher, would retain responsibility for assigning all marks. To make sure that both class groups would have similar experiences during all of the conferences, the researcher, rather than the regular class teacher, led all the

conferences. Although this decision introduced a threat to internal validity in the form of a researcher effect, this was deemed preferable to the alternative. See the [external and internal validity](#) section for a more detailed discussion of the expected researcher effect. In other words, given Yagelski and Grabill's (1998) findings, a researcher effect was considered preferable to the amount of variability that would have been introduced into the study if the two teachers had introduced the activities and lead the conferences.

Second, to make certain that students in both classes would be prepared to use the written electronic conferencing software, particularly at the beginning of the study, each class group was taken into the computer lab for an introductory session on the computer. During this training session, students learned how to log in and out of the system, and a short rehearsal conference was held so that students could practice sending and receiving messages. Although it is possible that some students had previous experience using written electronic conferencing software, and thus more proficiency in this task than other students, the training session was designed to give all the students enough proficiency to participate effectively in the conferences.

Third, to ensure that all conference groups would be equally prepared to discuss each of the assigned topics, a written copy of the writing topic for the week was given to the students in each class by the classroom teachers the day before each of the pre-writing conferences. At that time, the teachers reviewed the topic with the class to ensure that students understood the vocabulary and general meaning. At this time, the classroom teachers also reminded students that on the following day, they would be required, as a whole-class activity, to discuss the issue for approximately 20 minutes, after which they would have about 30 minutes to individually begin writing a first draft that would be due for homework on the following day. However, as mentioned, the drafts written by students after the conferences are not considered in the current study.

Fourth, to ensure that all conference groups knew what was expected of them, at the beginning of each conference, students were reminded that they had 20 minutes to discuss the topic as a class, after which they were to individually write first drafts. The researcher also reminded students that they would be required to complete the drafts for homework, and that the drafts would be collected in class on the following day.

Finally, in order to maintain consistency in my role in the conference discussions, I took the following approach. I decided that I would facilitate the discussions by restating the assigned topic and questions, as well as by summarizing students' contributions and requests for clarification when necessary, but as far as was possible, I would attempt to restrain myself from offering new ideas or giving examples about the topic. My participation in the conferences is not considered in the current study.

RESEARCH DESIGN AND INSTRUMENTATION

Measures

Several dependent variables were considered in comparisons between conference settings. The way in which these variables were operationalized as measures is described in this section. Details about the statistical tests used are reserved for the data analysis section.

To determine if both types of conferences would allow students to produce an equivalent amount of discourse in an equivalent amount of time, the total number of words contributed by all the students collectively in each conference was calculated. This information was then used to compare the total amount of discourse produced by students in each of the two types of conferences.

To see if students in one type of conference tended to repeat the same words more than they did in the other type of conference, the standardized type-token ratios (Scott, 1998) of students' discourse in each conference was computed. Standardized type-token ratios were calculated by using Wordsmith Tools (Scott, 1998) to determine the ratio of unique words to total words for the first x words, and then again for

the next x words, until the end of the transcript. The mean of the obtained ratios was then recorded as the standardized ratio (Scott, 1998). For this study, since the conference transcripts ranged in length between 1,041 and 2,508 words, the standardized type-token ratios of conferences were based on 100 word intervals (i.e., $x = 100$).

To compare the amount of discourse demonstrating interactive competence, all the conference contributions were analyzed into t-units, and coded in a manner similar to that employed by Chun (1994). For an explanation of the t-unit analysis and a summary of how student discourse was coded, see [Appendix C](#).

To determine if participation was equally balanced among students in both types of conferences, the number of words contributed by each participant was first calculated. Then, the number of words contributed by each participant during each conference was used to calculate gini coefficients of inequality for each conference. For an explanation of the meaning and calculation of gini coefficients, see [Appendix A](#).

Data Collection and Recording

The face-to-face conferences were videotaped and transcribed and the written electronic conferences were saved as a file and printed out so that verbal communications could be subjected to analysis. Detailed information about the transcription of written electronic and face-to-face conferences can be found in [Appendix D](#).

Data Processing and Analysis

In this section, a brief description of how conference scores were tabulated will help to clarify how missing data were handled. An extract of conference data is presented in [Table 3](#). The data for student 21 in [Table 3](#) illustrate the difference between making no contribution while being physically present at a conference (i.e., week 1), and not being there at all (i.e., week 3). When a student did not attend a conference, his or her scores were simply left out of the analysis for that week.

Table 3. Extract of Conference Data

ID	Week	Setting	Number of T-Units	Number of Words
21	1	Face-To-Face	0	0
	2	Written Electronic	43	312
	3	Face-To-Face		
	4	Written Electronic	35	221

External and Internal Validity

With regard to external validity, since this study made use of a relatively small sample size, the results of this exploratory study were not expected to carry a great deal of external validity, although the results were expected to be applicable to similar groups of students studying under similar conditions.

Several possible threats to internal validity were predicted in the methodology of this study. A practice effect was predicted because as participants gained experience participating in conferences, their skill was predicted to improve. Moreover, since students were aware that they were being observed, this awareness was expected to result in an observation effect (e.g., students might feel more shy or inhibited). Furthermore, because the researcher rather than the classroom teacher led the conferences, a researcher effect was predicted (e.g., students might either feel more shy or inhibited, or work harder to please the researcher). Finally, since students discussed various topics that may have been more or less motivating for them, a topic effect was predicted.

While the practice effect was expected to increase over the 4 weeks of the study, the researcher and observation effects were expected to decrease due to students' increased familiarity with the experimental conditions and the new personality facilitating class discussions. However, since comparisons in this study were only made across classes and conference settings for the same weeks and topics, these effects should have had an equivalent impact on both groups and conference settings during each week of the study, and no adverse impact on the validity of comparisons. Similarly, since each topic was likely equally motivating or less motivating, on average, to both groups of students during each week of the study, any topic effect should not have had an adverse effect on the validity of the comparisons across conference settings for the same week and topic.

DATA ANALYSIS

Total Words

To determine if there was a difference in the total number of words generated by students in the two types of conferences, it was necessary to obtain totals of words contributed by students for each conference and run a matched-sample *t* test on the totals by conference condition. The totals are presented in [Table 4](#); class is indicated in parenthesis.

Table 4. Comparison of Total Words and T-Units across Conference Conditions

Week	Total Words	
	Written Electronic	Face-to-Face
1	1183.00 (A)	1406.00 (B)
2	2012.00 (B)	1041.00 (A)
3	1343.00 (A)	2508.00 (B)
4	1575.00 (B)	1505.00 (A)
Mean	1528.00	1615.00
Standard Deviation	360.42	627.88

The test on total number of words in the conferences revealed no statistically significant main effect across conference condition, $t(3) = -1.13$, $p > 0.05$ (two-tailed). In other words, the total number of words generated by students was not found to differ between the written electronic ($M = 1528.00$, $SD = 360.42$) and face-to-face ($M = 1615.00$, $SD = 627.88$) conferences. The difference in the means for total words between the two types of conferences over all 4 weeks was only 87 words, a mere 5.7% and 5.4% of the total words in the written electronic and face-to-face conferences respectively. In addition, the total number of words was higher in the face-to-face conferences for weeks 1 and 3 of the study; and higher in the written electronic conferences for weeks 2 and 4. All of this suggests that the groups of students did not consistently tend to produce a larger number of words in one type of conference compared to the other.

Lexical Range

To determine if one type of conference tended to be more lexically complex, or to exhibit greater lexical range, the standardized type-token ratios for the conferences were calculated. These are presented in [Table 5](#); class is indicated in parenthesis.

Since previous research had revealed higher type-token ratios in written electronic conferences (Warschauer, 1996), a one-tailed test was planned. The matched-sample *t* test revealed a statistically significant difference across conference conditions, $t(3) = 4.89$, $p < 0.01$ (one-tailed), suggesting that the discourse produced in written electronic conferences ($M = 320.25$, $SD = 18.01$) was more lexically

complex, or in other words, exhibited a greater lexical range, than the discourse produced in face-to-face discussions ($M = 270.50$, $SD = 5.57$).

Table 5. Comparison of Standardized Type-Token Ratios across Conference Conditions

Week	Standardized Type-Token Ratios	
	Written Electronic	Face-to-Face
1	340.00 (A)	268.00 (B)
2	315.00 (B)	271.00 (A)
3	328.00 (A)	265.00 (B)
4	298.00 (B)	278.00 (A)
Mean	320.25	270.50
Standard Deviation	18.01	5.57

Interactive Competence

To determine if students in written electronic conferences displayed more interactive competence than in face-to-face conferences, the percentages of student contributions² demonstrating interactive competence (i.e., as a percentage of the total number of student contributions) were first determined for each conference and then compared across conference conditions. Since previous research (Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Slatin, 1998) had found more statements demonstrating interactive competence in written electronic conferences, a one-tailed test was planned. The matched-sample *t* test revealed a statistically significant difference across conference conditions, $t(3) = 2.36$, $p < 0.05$ (one-tailed), suggesting that the discourse produced in written electronic conferences contained a higher percentage of statements demonstrating interactive competence ($M = 18.70\%$, $SD = 0.06$) than the discourse produced in face-to-face conferences ($M = 7.35\%$, $SD = 0.06$).

Equality of Participation

To determine if participation was equally balanced among students in both types of conferences, gini coefficients were calculated for each of the conferences. The number of words per student was used to calculate the participation percentage per speaker, which was then used to determine the gini coefficient for each group. Coefficients obtained for participation in the two types of conferences are presented in [Table 6](#). Classes are indicated in parentheses.

Table 6. Comparison of Equality of Participation across Conference Conditions

Week	Gini Coefficients	
	Written Electronic	Face-to-Face
1	0.438 (A)	0.498 (B)
2	0.301 (B)	0.446 (A)
3	0.445 (A)	0.578 (B)
4	0.300 (B)	0.419 (A)
Mean	0.371	0.485
Standard Deviation	0.081	0.070

Since previous research (Warschauer, 1996) had revealed lower gini coefficients (i.e., more equality) for written electronic conferences, and since single scores were being compared for the analyses of balanced participation among the students, a one-tailed matched-sample *t* test was planned. The matched-sample *t* tests revealed a statistically significant difference in gini scores across conference conditions $t(3) = -6.02$, $p < 0.01$ (one-tailed). This suggests that, while participation in the written electronic conferences ($M = 0.371$; $SD = 0.081$) was more equally distributed among the students, during the face-to-face conferences ($M = 0.485$; $SD = 0.070$), a small number of students tended to dominate the discussion.

However, [Table 6](#) reveals that the variance in gini coefficients for class B was much greater than the variance for class A. In fact, Levene's test of the coefficients across classes yielded a p value of 0.002, indicating a statistically significant difference in variances across classes. To understand and visualize this effect more easily, these data have been plotted in [Figure 1](#). In [Figure 1](#), the data labels WE and FTF stand for written electronic and face-to-face conferences, respectively.

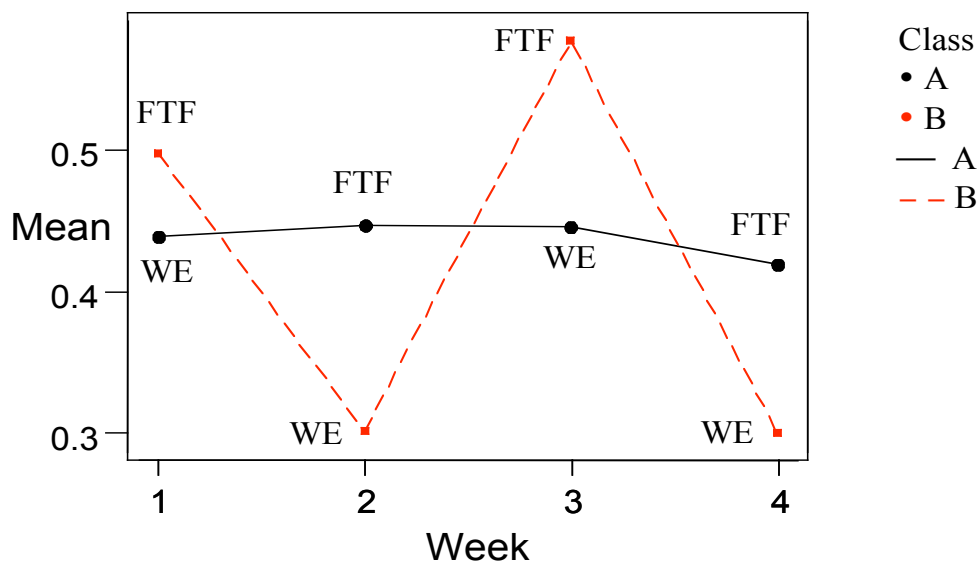


Figure 1. Gini by class

As [Figure 1](#) depicts, the effect of conference condition on equality of participation interacted with the variable *class*. Specifically, this figure suggests that the effect of conference condition on equality of participation was greater for class B than for class A. To put it another way, for class B, participation was considerably more balanced among students in the written electronic conferences. On the other hand, for class A, the type of conference had little influence on how balanced participation was among students.

CONCLUSIONS

Amount of Discourse

Analysis revealed no statistically significant difference in the total number of words produced by students in the two types of conferences. This result may seem surprising for two reasons. First, one might have predicted that students would produce more words in the face-to-face conferences since one would expect that students could speak more quickly than they could type. However, the result of no statistically significant difference in total number of words is understandable since students in written electronic conferences did not need to take temporally sequential turns (Beauvois, 1992, 1998; Kelm, 1992). Since students did not need to wait for their turn to contribute, students could contribute as much as they wanted to, whenever they wanted to.

Second, no statistically significant difference in the total number of words may seem surprising since Kern (1995) found a different result. In his study, he found that the average number of words produced by students in written electronic conferences was higher than the average number of words produced by

students in face-to-face conferences. However, this may have been due to the design of his study rather than a consequence of the different conference settings. In his study, students discussed the same topic twice: first in a written electronic conference, then in a face-to-face conference. As a result, as Kern admits, students may have felt "talked out" about the topic by the time they began the face-to-face discussion (Kern, 1995: 463-464). In addition, although the mean number of words produced by students in Kern's study was higher in the written electronic conferences, no analysis was offered to show that the difference was statistically significant. In fact, if Kern had used the same type of statistical analysis that was used in this study, he would have found no statistically significant difference in the average number of words produced by students in the written electronic ($M = 223.00$, $SD = 9.90$) and face-to-face ($M = 124.00$, $SD = 18.38$) conferences, $t(1) = -4.95$, $p > 0.10$ (two-tailed).³ In sum, although the current results of no difference in total number of words may at first seem surprising in light of previous research, upon reflection, these results can be seen as quite consistent with Kern's.

Lexical range

In confirmation of previous research (Warschauer, 1996), analysis revealed that the discourse in written electronic conferences had a statistically significantly higher proportion of new words to total words than discourse in face-to-face conferences, while discourse in the face-to-face setting contained more lexical repetition. This result suggests that, compared to the oral discussions, when students were in the written electronic conference setting, they were better able to produce and practice a wider range of vocabulary. I will return to this finding in the next section on interactive competence.

Interactive Competence

The results in this section provide further support for other researchers' findings which suggest that second language students in written electronic conferences display more interactive competence, or in other words, more control of the discussion (Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Slatin, 1998). This was likely at least partially the case because of the lack of paralinguistic cues in the written electronic conferences. In written electronic conferences, information that in face-to-face conferences can be communicated through paralinguistic cues, attitudes like boredom, curiosity, or agreement for instance, must be expressed in explicit language (Kiesler et al., 1984).

The finding in this section is related to the finding about lexical range because one might suppose that the increased lexical range in written electronic conferences might have been due to the increased amount of interactive discourse. Since the written electronic conferences contained a greater variety of interactive language functions, one might suppose that the written electronic conferences had a greater lexical range because students used a greater variety of words that were not lexically related to the topic of discussion. In addition, one might suppose that the increased lexical range was because students tended to refer to each other by name much more frequently in the electronic conferences. This increased tendency to refer to other participants by name in written electronic conferences has been noted in other studies (e.g., Herring, 1999; Simpson, 2005). However, after eliminating contributions that displayed interactive competence, as well as any references to student names from the transcripts, post-hoc analysis still revealed that the written electronic conferences had higher standardized type-token ratios ($M = 68.07$, $SD = 0.63$) than the face-to-face conferences ($M = 61.27$, $SD = 1.53$) to a statistically significant extent ($t(3) = -7.13$, $p < 0.01$; one-tailed). This suggests that even when the increased diversity of vocabulary due to the increased variety of language functions in electronic written conferences is taken into account, the discourse in electronic written conferences still has a greater lexical range. In other words, compared with face-to-face conferences, students in written electronic conferences tend to use a wider variety of vocabulary related to the topic.

Equality of Participation

Previous research had found that participation in written electronic conferences is more balanced among students than participation in face-to-face conferences (e.g., Beauvois, 1992, 1998; Chun, 1994; Kelm, 1992; Kern, 1995; Warschauer, 1996). In partial confirmation of these research findings, my analysis revealed that participation was significantly more balanced among students in written electronic conferences. However, when the classes were considered separately, analysis revealed that while for class B, participation in the written electronic conferences was considerably more balanced, for class A, conference setting had almost no impact on the degree to which participation was balanced among students. Although it was not possible to evaluate this finding with a formal statistical test, examination of the means strongly support this conclusion. This finding suggests that conference setting was not the only factor influencing balanced participation in conferences.

As discussed, the groups in this study were intact class groups. As such, the students had already had the chance to get to know each other quite well before this study began, and as a result, the group dynamic was already established. A difference in established group dynamics might help to explain the observed difference in patterns of participation. For instance, class B may have had a group dynamic in which members often vie for control of the discussion. On the other hand, class A may have had a group dynamic that supported a more egalitarian approach to the group communication process in which members were more concerned with encouraging balanced participation. If this were so, then class A would likely have carried their egalitarian group dynamic through, regardless of the conference setting. In other words, in both conference settings, students would likely have been concerned with regulating their conversations so that everyone had a chance to participate.

On the other hand, if class B had a dynamic in which the inclusion of quieter members was not a concern, it would have been easier for a small number of members to take over the face-to-face conferences since they could have occupied most of the discussion time without allowing other students to take a turn. On the other hand, in the electronic conferences it would have been more difficult for a small number of students to dominate the discussion since turn taking was unnecessary (Beauvois, 1992, 1998; Kelm, 1992). I will return to this point in my discussion of the implications for further research.

Implications for Practice

My research revealed three features that differentiate written electronic conferences from face-to-face conferences. First, students in written electronic conferences expressed more interactive language functions. By expressing interactive language functions, students took more control of the discourse, or in other words, displayed more interactive competence. Not only is the development of interactive competence considered to be an important part of learning to communicate in a second language (Chun, 1994; Kelm, 1992; Kern, 1995; Slatin, 1998; Sullivan & Pratt, 1996); interactive discourse that leads to negotiated interactions with a focus on form is also theorized to have a beneficial influence on other aspects of second language acquisition such as vocabulary and syntactic development (e.g., Blake, 2000; Fernandez-Garcia & Martinez-Arbelaz, 2002; Kitade, 2000; Lee, 2002, 2004; Pica, 1994; Smith, 2003; Toyoda & Harrison, 2002). Second, written electronic conferences supported patterns of participation that were, if not more balanced, at least as balanced as participation in face-to-face conferences. Finally, the finding of increased lexical range in written electronic conferences suggests that these conferences provide students with a better opportunity to use and practice a wider range of vocabulary related to the topic under discussion.

Implications for Theory

Many second language teachers have come to be enthusiastic about using written electronic conferences in their classrooms because research has identified several relatively consistent aspects of written electronic conferences that have generally come to form a theoretical base to justify and promote the use

of written electronic conferences. For instance, research has come to show that the written electronic mode of communication facilitates balanced participation among students, and enables students to take control of the discourse (e.g., Beauvois, 1992, 1998; Braine, 1997, 2001; Chun, 1994; Kelm, 1992; Kern, 1995; Slatin, 1998; Sullivan & Pratt, 1996; Warschauer, 1996; Warschauer et al., 1996). The results of my study tend to provide further support for this theoretical position.

In light of this general consensus regarding communication in written electronic conferences, use of these conferences has been tied to a social-constructivist theoretical orientation to pedagogy (Beauvois, 1998; Peterson, 1997; Warschauer, 1996; Warschauer et al., 1996). A social-constructivist orientation stresses a social and collaborative view of learning. Because communication in written electronic conferences is more balanced among students, and because students in written electronic conferences display more control over the discourse, it is not difficult to see why researchers and teachers interested in a social-constructivist approach to education have been quite enthusiastic about using written electronic conferences in second language classrooms.

Implications for Further Research

An important direction for further research comes from the finding that for one of the groups (i.e., class B), participation in written electronic conferences was much more equally distributed among the students than participation in face-to-face conferences; while for the other group (i.e., class A), conference setting had little impact on how balanced student participation was. This finding is not completely consistent with the findings of other researchers. Previous research has generally concluded that participation in written electronic conferences is more balanced among students than participation in face-to-face conferences (e.g., Beauvois, 1992, 1998; Chun, 1994; Kelm, 1992; Kern, 1995; Warschauer, 1996).

One exception to this generally accepted conclusion occurs in Warschauer (1996), who found that for one of his four groups of students, participation was more balanced in the face-to-face discussion.

Warschauer attributed this finding to the fact that the three groups whose discussions were more balanced in the written electronic setting all contained Japanese students who "...barely participated in the face-to-face discussions but participated much more equally in electronic mode" (Warschauer, 1996, p. 21).

Warschauer suggests that cultural factors may have caused the Japanese students to contribute much less in the face-to-face discussions, but more in the written electronic discussions, leading to more balanced participation in the written electronic conferences for the groups that contained Japanese students.

Warschauer (1996) also noted that shyness, a lack of confidence in oral fluency, and a feeling of discomfort in expressing opinions were also related to students' tendency to participate less in face-to-face discussions, and more in written electronic discussions.

Although my groups were balanced in terms of cultural background, it is possible that class A may have had students who were more orally proficient or outgoing than the students in class B, which may have been responsible for the observed effect. For instance, in comparison with class A, perhaps class B had a larger number of students who were shy, introverted, or less orally proficient. If so, one might expect that as in Warschauer's study, these students may have contributed less in the face-to-face conferences, and more in the written electronic conferences, leading to more balanced group participation patterns in the written electronic conferences compared with the face-to-face conferences. Unfortunately, measures were not available to test this hypothesis. Nevertheless, it would be helpful if future studies that compare participation patterns in ESL written electronic and face-to-face conferences would assess factors such as speaking fluency, shyness, and introversion as dependent measures.

I have also suggested that the established group dynamic may help to explain why the equality of participation among group members remained relatively consistent across the two different conference settings for one of the groups in my study (i.e., class A). As discussed, a group with an egalitarian approach to group discussions may tend to regulate their participation so that everyone, even shy, introverted, or less orally proficient students can have a chance to contribute, regardless of the medium of

communication. As a result, it may be desirable for future studies to add an assessment of the group process and dynamic as a dependent measure. For instance, it may be particularly interesting to find out if groups of ESL students who already take an egalitarian approach to discussions in the face-to-face setting can maintain this approach in written electronic conferences. Conversely, it would be interesting to discover if ESL groups who have a very unbalanced approach to group discussions in the face-to-face setting would tend to have more balanced discussions in written electronic conferences.

APPENDIX A: MEANING AND CALCULATION OF THE GINI COEFFICIENT

The gini coefficient is a measure of inequality. Larger gini coefficients correspond to greater inequalities. Gini coefficients were first used to describe the distribution of wealth in human populations, but the underlying concept can be applied equally well to the distribution of words contributed by individuals in a conference.

The meaning of the gini coefficient can be illustrated by plotting a Lorenz curve. For the purpose of this study, the vertical axis of the Lorenz curve is the cumulative proportion of total number of words contributed in the conference, and the horizontal axis is the cumulative proportion of the total number of individuals in the conference (i.e., see [Figure 2](#)).

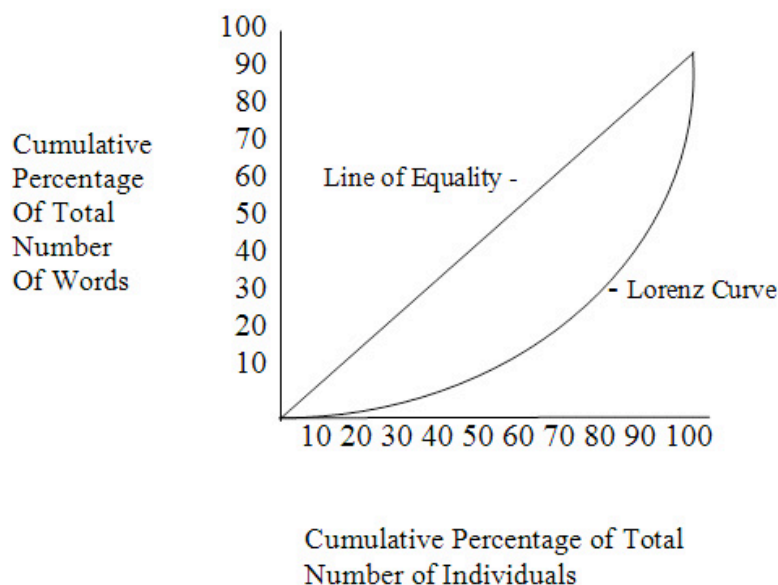


Figure 2. Graphic illustration of the gini coefficient

The first step is to rank individuals according to the number of words contributed (i.e., from least to most). If each student in the class contributed the same amount of words, each would contribute to the total number of words in the conference equally. As each successive student is added to the population, the cumulative proportion of the total number of words would increase linearly, resulting in the diagonal line (i.e., the line of equality in [Figure 2](#)). If there were inequality of numbers of words among individuals, however, the cumulative proportion of the total number of words would first grow very slowly. The curve would bow below the line of equality because the students who contributed the least would add little to the total number of words. Only when those who contributed the most were considered would the curve begin to bow up because these students contribute disproportionately to the

overall number of words. A greater degree of bowing would result from a greater inequality of contributions among individuals in the conference.

The gini coefficient is equivalent to the area between the diagonal "line of equality" and the Lorenz curve. It can be calculated from the following formula:

$$G_1 = \left(\frac{2}{n^2 \bar{x}} \right) \sum_{i=1}^n \left(\left(i - \frac{n+1}{2} \right) x_i \right)$$

where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

The explanation of the gini coefficient offered in this appendix was referenced from Koide and Shumway (1998).

APPENDIX B: TOPICS FOR DISCUSSION

Week 1 - Modern Medicine/Biotechnology

Once we have mapped the human genome, we can use our knowledge to control the sort of babies we have. We will be able to purchase medical treatments that will ensure our babies are healthy, "normal" in appearance, and intelligent. Biotechnology can be used to detect a genetic predisposition to certain diseases, and perhaps, to manipulate the DNA into a more desirable sequence. Biotechnology can also be used for more conventional purposes such as increasing food production and supply. Other possibilities include growing custom organs for transplant patients. What possible effects on society could this technology have? Should limits be placed on the use of this technology?

Week 2 - Cross-Cultural Marriages

The invention of the airplane and communication technologies have revolutionized travel and made the world a smaller place. People are coming together in ways that were never previously possible. These new opportunities for travel and communication have accompanied an increase in marriages among people from different cultural backgrounds. How do you feel about cross-cultural marriages? What may be the advantages and disadvantages of cross-cultural marriages for couples and for their children? Do you think cross-cultural marriages can work? Can a cross-cultural marriage be as successful as a marriage of people from the same culture? Under what conditions can and do these marriages work?

Week 3 - The Environment

We have heard much lately about the greenhouse effect. Carbon monoxide in the atmosphere is causing depletion of the layer of ozone that protects us from much of the harmful ultraviolet radiation from the sun. In addition, increased levels of carbon dioxide (as a result of industrial processes) are causing the world's temperature to increase, leading to more water in the atmosphere and more violent storms. Moreover, the population is increasing at an alarming rate. Can we feed, clothe, and provide medical care for all these people? Should governments and countries (continue to) take steps to control population growth? Are we headed for much more poverty and suffering in our world or will our technology solve our problems? What advice do you have for governments who face these problems?

Week 4 - Professional Sporting

Professional sports seem to have great popularity among people from many countries. Although the favoured game may differ, professional sporting events draw huge crowds. One may argue that the significance of professional sports is overrated, and that people would be better served either playing the sport themselves, or engaging in some other pastime. Others point out that professional athletes are outrageously overpaid and that the innocence of sporting has been lost; athletes no longer play for the love of the game, they play for the money. What positive side do you see to professional sporting that might justify its popularity? Do you think that professional sports are overrated or do you see value in these people and events? Explain.

APPENDIX C: T-UNIT ANALYSIS AND CODING

T-Unit Analysis

Comments in conferences were broken into t-units based on the KISS model of t-units (Vavra, 2000). T-units are defined as a main clause with all its subordinate clauses attached. In graphic conferences, a t-unit was defined as a comment made by a participant, up to one t-unit in length, concluded by the participant pressing the send key. Consecutive contributions by the same person in graphic conferences, even sentence fragments, were not combined into one contribution because, in this study, an orthographic fragment counted as a t-unit. Similarly, in proximate conferences, a t-unit was defined as a single conversational turn taken by a participant up to one t-unit in length.

In both types of conferences, where contributions were equal to or shorter than a main clause with all its subordinate clauses attached, or in other words, shorter than a t-unit, no manipulation of the conference transcript was necessary. Where contributions were longer than a main clause with all its subordinate clauses attached, the main clauses were separated into consecutive t-units made by the same participant.

Coding Student Discourse

In order to determine if students would demonstrate more interactive competence in one type of conference setting compared to the other, t-units were coded for interactive discourse. A t-unit was considered a demonstration of interactive competence if the t-unit performed one of the following language functions:

- 1) Requests or gives clarification of topic or task
- 2) Requests clarification of a statement made by a participant: statements, questions, tag-questions
- 3) Gives feedback to others: statements of unsubstantiated agreement or disagreement (e.g., I agree, yes, maybe, I do not think so, no way, etc.)
- 4) Social formulas: greetings and farewells; thanks and apologies
- 5) Meta-communications: Redirects to topic, admonitions, requests participation, states feeling about the discussion/topic (e.g., interest, boredom, etc.)

For each conference, the number of t-units that performed one of these language functions was tallied and calculated as an average of the total number of t-units for that conference. These averages were then compared across conference conditions (i.e., see the data analysis section).

APPENDIX D: CONFERENCE TRANSCRIPTION PROCEDURES

This appendix consists of two sections. In these sections, the conventions followed when transcribing written electronic and face-to-face conferences, respectively, are described.

Transcription of Written Electronic Conferences

For the most part, transcription of the written electronic conferences was very straightforward. After each conference, the log file from the WebCT server was saved to local disk as a word-processing file. The saved file contained a record of all messages, with information about who sent each message, and information about the order in which messages were sent. To protect the anonymity of the participants, the names of the participants who sent the messages, as well as the names of participants used in the body of the messages, were converted to numerical codes.

Next, mistakes in spelling in the conference transcript were corrected. Spelling mistakes were corrected to be consistent with transcription of the face-to-face conferences. Since the face-to-face conferences were transcribed by the researcher and subjected to a computer spell-check, to be comparable, it was felt that written electronic conferences should also be subjected to the spell-check. Also, since Corpus Linguistics analysis was used to compute the lexical range of the conferences, it was necessary to ensure that words were spelled consistently. Inconsistent spellings of words in the conferences would have flawed the lexical range analysis. For instance, if spelling mistakes had been allowed to stand, a misspelled word might have been incorrectly identified as a unique type when it was, in fact, a misspelled version of a repeatedly used token.

Transcription of Face-to-face Conferences

Face-to-face conferences were videotaped, and the videotapes were transcribed. As with the written electronic conferences, the name of the participant speaking and his or her comment, in the order in which comments occurred, were transcribed. Moreover, the names of the participants who produced the messages, as well as the names of participants used in the body of the messages, were converted to numerical codes.

Next, the transcriptions of face-to-face conferences were checked for spelling. During this spell-check procedure, speech words such as "gonna" were converted to standard written forms (e.g., going to). This was done for the same reasons discussed in the section on written electronic conference transcription. Inclusion of misspelled and non-standard words would have flawed the lexical range analysis. Moreover, in cases where the same word was repeated several times in a row, (i.e., when a participant stuttered) the repetitions were dropped. This was done because allowing such repetitions would have flawed the lexical range analysis.

Paralinguistic aspects of communication were not recorded in the conference transcripts. For instance, nodding or shaking the head were not recorded as yes or no in the conference transcripts. Nor were hand gestures, or the appearance of students (e.g., appearing interested or bored) recorded. One of the problems with trying to include an explicit linguistic reference to, for instance, a nod, is the difficulty in interpreting the gesture. For instance, a nod could be meant to express "yes, I agree," or, "very interesting," or even, "I understand what you are saying." As a result, I felt it would be better not to attempt such interpretation. One might argue that this decision may have biased comparisons of total amount of discourse to favour more communication in written electronic conferences. For example, for contributions such as *I agree*, or *yes*, to be communicated at all in written electronic conferences, they must be expressed in explicit language. However, such verbal contributions also occurred in the face-to-face conferences, and were counted in the calculation of total number of words.

Second, and perhaps more importantly, this study focused on measuring the number of words expressed in explicit linguistic communication. Although this study compared the total amount of participation, and the degree to which participation was balanced among participants in the two types of conferences, the focus of this comparison was on explicit linguistic communication rather than on communication through paralinguistic cues. In fact, such paralinguistic communication was understood to be a consequence of

participation in face-to-face conferences, which might have some impact on the amount of students' explicit verbal participation.

NOTES

1. Written electronic conferences are a synchronous text-based computer-mediated communication.
 2. I have used the word *contributions* to enhance the readability of this section. However, for the analysis of discourse demonstrating interactive competence, the discourse was really coded by t-units, not contributions. For an explanation of the coding procedures, see [Appendix C](#).
 3. I have used a two-tailed test under the assumption that Kern would not have predicted *a priori* in which conference setting students would produce a larger average number of words.
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