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**IMPACT OF SYNCHRONOUS COMPUTER-MEDIATED
COMMUNICATION ON EFL LEARNERS'
COLLABORATION: A QUANTITATIVE ANALYSIS**

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Abstract

For the last two decades, computers have entered people's lives in an unprecedented manner in a way that almost everybody considers life without them rather impossible. In recent years, researchers and educators have been trying to discover how computers and the Internet technology can maximize the quality of language instruction. As such, the present experimental study sought to investigate the impact of Synchronous Computer-Mediated Communication (SCMC) on Iranian EFL learners' collaboration. To this end, 26 upper-intermediate female students were randomly chosen from a language institute and then they were randomly assigned to one control (Face-to-Face) and two experimental groups (Internet Relay Chat and 2 Dimensional modes). Then, they were taught how to write for ten sessions. The two experimental groups were instructed over the net with two different SCMC modes while the control group was given instruction in a conventional classroom context. Quantitative data regarding the students' collaboration were collected via Haythornthwaite's (2000) three-part Likert-scale questionnaire after being tested for its reliability and validity for the present context. The results of one-way ANOVA showed no statistically significant differences between the experimental and control groups in terms of collaborative learning, class interaction, and students' impression. The results also suggested that mode of instruction might not be a determining factor as far as the amount of students' collaboration, interaction and impressions are concerned.

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1. Introduction

Early work with microcomputers began to increase in 1980s that involved teams of language teachers, designers, and programmers. Hubbard (2009) names MIT's Athena Language Learning Project as one of the most ambitious undertakings in the history of language teaching with its attempt to bring together interactive videodisc and Artificial Intelligence applications in order to revolutionize language learning.

According to Goda and Yamada (2013), "Computer-Supported Collaborative Learning (CSCL) has been used to help learners acquire higher-level cognitive thinking skills and adopt the constructivism, social-cognitive, and situated-learning theories" (p. 1). They also believe that in the EFL context, there has been an increase in the use of CSCL because it enables the students to apply and practice the materials they have learned. In addition, Jeong (2011) has stated that due to a shift in the focus of second language learning and teaching to enhance communicative ability and creativity in self-expression in a social context, there has been a growing interest in the interaction and negotiation of meaning, which are considered among the most important factors in successful second language acquisition. Additionally, she defines the concept of interaction as meaning negotiation and believes that "its context has been expanded from face to face classroom interaction to possibly more feasible computer-supported interaction and network-based communication" (p. 51).

A large body of research has investigated the effect of CMC on language learning and teaching (Asterhan & Eisenmann, 2009; Becker-Beck, Wintermantel & Borg, 2005; Darhower, 2002; Puri, 2012; Rezai & Zafari, 2010; and many others). As a result of these studies, numerous advantages have been uncovered for on-line communication as opposed to the face to face (F2F) interaction. For instance, Kelm (1992) enumerated the benefits of using a type of synchronous CMC program (Daedalus Interchange): a) increasing participation from all members working in a group, b) allowing students to speak without any interruption, c) reducing

anxiety that is usually part of oral conversations, d) rendering honest and candid expression of emotions, e) providing personalized identification of TL errors, f) creating substantial communication among L2 learners, and g) demonstrating a significant decrease in specific grammatical errors over time (cited in Darhower, 2002). Some other researchers also reported advantages for the use of SCMC (Abe, 2005; Chun, 1995; Colon, 2011; Darhower, 2002; Kern, 1994; La Pointe, 2003; Rezai & Zafari, 2010; Warschauer, 1996). On the other hand, a small number of researchers referred to some potential disadvantages to chatting, among which are the problems of limited skills in using the keyboard, slow speed, and less amount of coherence (Bump, 1999; as cited in Darhower, 2002).

Conventional F2F oral classes are the reason for some problems for both teachers and learners. For example, Rezai and Zafari (2010) refer to learner problems as being hesitant, cautious and passive, avoiding taking part in classroom discussions, which result in creating a main concern in the teacher as how to activate such students in the classroom. They also refer to some teacher problems, such as a large number of students in the classes, a limited time available for the teacher to pay enough attention to all the students and cover the syllabus efficiently, which may lead to a chaos in the class as well as the teacher's inability to control group work discussions. Colon (2011) also mentioned other F2F classroom's deficiencies including little exposure to the target language, few opportunities for using the new language, and limited opportunities for communicating authentically using the target language in various physical and sociolinguistic settings. He believes that having access to computers in the classroom provides language learners with opportunities that are beyond the traditional classroom environment.

As Chou (2002) and Jeong (2010) have stated, most research on CMC focuses on the asynchronous mode of interaction and therefore a wide gap is noticed in the field of synchronous CMC; in fact, more research is required to provide a more comprehensive outlook into this issue. As such, this study sought to investigate whether or not SCMC is more beneficial in enhancing Iranian EFL learners' collaboration in comparison to the conventional F2F classroom environment.

2. Literature Review

There has been an increasing trend in research on educational communication and information technology in using a variety of forms of CMC for interpersonal communication (Harstinski, 2006). Numerous studies have been conducted with regard to the effect of different forms of CMC on the learners' collaboration (Abe, 2005; Fjermestad, 2003; Hoven, 2006; Ziegler, 2013, among many others). Chou (2002), for example, made a comparative content analysis of students' interaction in synchronous and asynchronous learning networks. He used the content analysis method to analyze transcripts from both synchronous and asynchronous conference modes of discussion. The data were collected from computer conferences that were held weekly on WebCT bulletin boards and chat rooms. The findings of the study showed that the synchronous mode of interaction generated a higher percentage of social-emotional interactions in comparison to the asynchronous mode. Furthermore, the results showed that "constructivist-based instructional activities, such as student-moderated discussion and small group cooperative learning, are conducive to interaction" (p. 1).

In another study, Abe (2005) examined the Japanese EFL learners' patterns of interaction in two synchronous modes of discussion, F2F and text-based SCMC. The study was conducted on 77 undergraduate EFL learners performing group tasks in one of the two modes of discussion. The purpose of the study was to reveal the patterns of group work. The results of this investigation showed that the collaborative pattern was more predominant in both modes. The findings has also suggested that the SCMC mode can be a tool for facilitating meaning negotiation in the target language as well as facilitating the process of language acquisition through encouraging interaction and collaborative writing construction among participants.

Asterhan and Eisenmann (2009) investigated secondary school students' experiences and preferences with regard to two different discussion formats, SCMC and F2F, in co-located classroom settings. They also differentiated between active participants in F2F classroom discussions and the passive ones. Participants were 23 students in the ninth grade and 10 students in the eleventh grade of high school in Jerusalem. All students filled

out a questionnaire on their experience of F2F and online classroom discussions. In addition, four 9-grade students (2 active and 2 silent) were chosen based on the teacher's evaluation of the most active and the most silent students in F2F classroom discussions; they participated in short, individual structured interviews on this subject. The results of their study indicated that blending online discussion tools in co-located settings could affect practices in the classroom in a positive way.

Because turn-taking is not necessary and a lot of non-verbal signals are not conveyed, it may result in promoting more democratic participation on the part of students, free expression of ideas, and increased peer interaction. It also avoids some of the undesirable phenomena of distant, anonymous CMC, such as social and learning disturbances. Furthermore, silent and active students were reported to act differently in the CMC environment; students that were known as silent seemed to have begun to develop discussion practices as *active* participants and identified the advantages of online peer discussions, while the active ones, though acknowledging the advantages for their silent classmates, received the new communication format with reservations due to having well-founded discussion practices.

On the other hand, a number of other studies showed no difference between the online and F2F modes of instruction. For example, Fjermestad (2003) analyzed the results of 145 experiments that used communication mode as an independent variable in an attempt to provide an analysis of communication mode in a Group Support Systems (GSS) research. The results showed no difference in the modal outcome between the GSS and F2F modes but the overall percentage of positive effects was higher for the GSSs than for the F2F. They also showed that the use of GSS improved the quality of decision, depth of analysis, participation equality, and satisfaction over manual methods. A more detailed analysis also showed that task type, GSS type and the interaction of both had a moderating effect on adaptation and outcome factors. On the other hand, F2F groups showed higher levels of consensus and perceived quality, more communication, and more efficiency in the sense that they required less time to complete a task. In addition, no differences were observed in the students' satisfaction and usability between the GSS and F2F groups.

In another study, Colon (2011) looked into a highly popular Web 2.0 tool as a means for enhancing students' motivation as well as practicing what had been learned in class in a more natural environment. He investigated the introduction of a social network site in an FL classroom in order to see if the virtual social interaction that the students experienced could help them to improve their L2 reading comprehension and writing skills. The study followed a mixed method approach including both qualitative and quantitative data collected through a pre-test, a post-test, and, after the post-test, a survey and an interview. In addition, the instructor and teacher assistant were also interviewed in order to gain an insight into the quantitative data. Participants were forty 100-level cadets divided randomly into an experimental and a control group. The experimental group attended classes and completed assignments as scheduled; however, they had to maintain a virtual conversation through a social network site called Orkut. The control group also had to attend the regular classes and complete the assignments as scheduled, without the need to attend virtual conversations. The results of the study showed no significant difference between the two groups in terms of reading comprehension and writing skills, as well as their motivation to continue their foreign language education as a group.

The theoretical support for SCMC in language learning is provided by Krashen's (1970) *Input Hypothesis*. According to Krashen (1985), "the Input Hypothesis claims that humans acquire language in only one way— by understanding messages or by receiving 'comprehensible input' (p. 80). It puts primary importance on the 'input' that the learner receives, that is, one step above his/her current level of linguistic competence. Therefore, the input that the learners receive, whether it includes a new piece of information or a task to complete, it should be at one level above the learner's current linguistic competence in order for acquisition to take place. Numerous studies have investigated the impact of comprehensible input on language learning (Chapman Parr & Krashen, 1986; Krashen, 1991, 1996; Lantolf, 2009; Little, 1995; Mangubhai, 2001; Rodrigo, Krashen & Gribbons, 2004).

In light of what has been mentioned, the present study attempts to answer the following question:

- Is SCMC more effective in generating more collaboration in learning than the conventional face-to-face (F2F) environment?

Subsequently, the following null hypothesis was formulated:

- H_0 . SCMC is not more effective than the traditional F2F environment in generating more collaboration in learning.

3. Method

A quantitative method of data collection and analysis was followed in the present study. Two different SCMC modes of interaction, Internet Relay Chat (IRC) and 2 Dimensional (2D), formed the experimental groups and one conventional oral classroom (F2F) formed the control group in this study.

3.1 Participants

Twenty-six upper-intermediate female students from a private language institute in Ahwaz, Khuzestan province participated in the present study. The institute was chosen based on convenience sampling. The participants were randomly selected and they were randomly assigned to two experimental (IRC: $n = 8$; 2D: $n = 8$) and one control (F2F: $n = 10$) groups. The sampling procedure was of simple random sampling type. That is to say, each member of the selected level had an equal chance of being selected. The participants' average age was 20.73 and all of them had already taken at least three years of English instruction in the same institute, with an average grade of 75, which was the pass score at the aforementioned institute. All of the participants' first language was Persian.

3.2 Instruments

The instruments utilized in the present study included a background questionnaire, a placement test, a collaboration questionnaire, and two kinds of SCMC programs (IRC and 2D).

In order to control the possible effect of the level of proficiency, a placement test (Appendix A) was given to the participants. To this end, the English Language Proficiency Exam (ELPE) of the University of Waterloo in Canada was administered to them. This test is for the applicants to take upon their registration in the university to inform them of whether or not

they are at the required level of English proficiency. It is a 70-minute hand-written essay exam in which the students are given a set of data and are asked to respond to a question relevant to the data in the form of a 4-5 paragraph essay. Then, the students' essays are scored based on a number of components including essay organization, clarity of argument, paragraph and sentence structure, and grammar and mechanics.

The exam markers use ELPE Rubric to evaluate the essays and there are multiple checks to ensure ongoing consistency. Based on the Rubric, each piece of writing is evaluated on the basis of four main criteria (content, organization, style, and application of conventions) with some details according to which the writings are graded. Each of the four main criteria has 2, 3 or 4 explanatory details for scoring. For example, with regard to the content of the writing, one of the explaining details for scoring is that if the student mostly supports his/her arguments using facts, evidence and/or data rather than simply copying or transferring data, the writing should be scored as meeting expectations (65). The topic of the essay was chosen from a sample test from the site of University of Waterloo (<http://www.ford.com/compare/>). To ensure that the scoring is reliable, the essays were graded by three raters and the grades were then analyzed by Kohen's Kappa Coefficient. The inter-rater correlation coefficient was reported at .90. Furthermore, the reliability of this test was measured by Cronbach's Alpha and the results showed an alpha coefficient of .83 indicating a good index of reliability (Clark & Watson, 1995).

A background questionnaire, adopted from Yilmaz (2007) and appropriated in a pilot study for the context of this study, was administered to get information about the participants' familiarity with computers (Appendix B). The reliability of the questionnaire was measured via Cronbach's Alpha, the results of which showed an alpha coefficient of .78.

The collaboration questionnaire that was utilized in the present study was a questionnaire based on two telephone interviews developed by Haythornthwaite (2000). The questionnaire includes two main parts: A) collaboration on class work, and B) class interaction and impressions, that is further divided into two sub-parts: B1) focusing on students' impressions of the class and B2) focusing on students' future interactions. Part A is a three-item Likert-scale questionnaire containing questions about how often (daily,

weekly, and monthly) the students were engaged in the following exchanges with each member of the class:

- “1) Collaboration on class work,
- 2) Giving or receiving information or advice about class work,
- 3) Socializing, and
- 4) Giving or receiving emotional support (described as help in a major or minor upset)” (p. 202).

Part B1 is also a five-point Likert-scale that was used to examine students’ class interaction. It is a short questionnaire with three questions asking the students about their impressions of the class:

- 1) Whether they felt the class worked together.
 - 2) Whether they felt the class included social interaction.
 - 3) Whether they felt they were part of the class
- (Haythornthwaite, 2000).

Part B2 is another short questionnaire with only two questions that ask the students “whether they would like to: 1) work and 2) socialize with each other member of the class less or more in the future” (p. 203).

In order to ensure that the questionnaire is reliable, the collaboration questionnaire was piloted on 25 upper-intermediate students with the same characteristics as the target sample before being used for the experiment.

The Cronbach Alpha reliability coefficients of Part A (collaboration on class work), Part B1 (students’ impressions) and Part B2 (future interactions) were calculated in this study and were found to be .732 (good), .660 (acceptable), and .878 (good), respectively (Clark & Watson, 1995). The item-total statistics was also obtained via Pearson Correlation for Part A and Part B1. The column labeled *Corrected Item-Total Correlation* shows the correlations between each item and the total score from the scale. See Table 1 and Table 2.

Table 1. Item-total statistics of collaboration on class work (Part A)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
q1	4.8846	2.506	.380	.406	.759
q2	5.3077	1.902	.679	.557	.568
q3	5.5769	2.654	.461	.588	.706
q4	5.5769	2.414	.616	.668	.627

Table 2. Item-total statistics of students' impressions (Part B1)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item- Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
qq1	7.8846	1.866	.442	.197	.600
qq2	8.5000	1.460	.492	.248	.548
qq3	8.3846	1.926	.499	.250	.540

In fact, all items should correlate with the total in a reliable questionnaire. A value less than .30 means that the item is weak and it does not correlate well with the overall scale (Clark & Watson, 1995). In Table 1 and Table 2, the correlations values are all above .30.

Inter-item correlation for the future interactions part which consisted of two items was found to be .858, suggesting a scale of high reliability (Clark & Watson, 1995). See Table 3.

Table 3. Summary-item statistics of future interactions questionnaire (Part B2)

	Mean	Min.	Max.	Range	Max. / Min.	Variance
Item Means	262.154	230.50	293.808	63.308	1.275	2003.932
Item Variances	570.211	336.42	804.002	467.582	2.390	109316.248
Inter-Item Correlation	.858					

The two SCMC programs that were used in the present study were IRC and 2D. Internet Relay Chat (IRC), an older type of SCMC services, enables the users to chat in pairs or groups by means of written texts on screens visible to all the participants. A common IRC software is *Yahoo Messenger*, which was chosen for the present study because it is convenient and common among almost all of the participants, and also because it does not require a high internet bandwidth.

2 Dimensional (2D) is a rudimentary form of virtual reality and a more recent type of SCMC. In this environment, the users are able to use more sophisticated than text-only facilities to communicate with each other. The background can be a conference room, a hall, a classroom, a tavern or any other virtual place where the students can convey a real-like discussion or conversation. Moreover, this virtual world usually has more than one room and the students can navigate from room to room, and “if it has been structured well, the navigation becomes part of the educational experience along with the visual backgrounds and the conversations” (Ingram, Hathorn & Evans, 2000, p. 22). The 2D program utilized in this study was *Palace Chat* (<http://www.palacechat.org>). It is a palace with a large number of rooms, a hall, an office, a laboratory, a club, etc. Users can also add their own room, assign a name to it and even lock it to enjoy more privacy. This program also doesn't require a high internet bandwidth and it is hence useful even in low internet speeds.

3.3 Procedure

After supplying sufficient information to the participants, the instructor obtained informed consent from them to participate in the experiment. Then, the placement test was given to them. According to the guidelines of the administration of this test, it had to start with a brief explanation of how to be taken, and then the questions were distributed among the participants. They were placed in an imaginary situation of being a trainee for becoming a salesperson in Ford Company, and were provided with a table giving them information about three models of Ford automobiles and had to answer a question that asked them to explain which model would be the best choice for a young family. The essay had to begin with an introduction and thesis statement, and then in the body they had to explain why a young family

would benefit from the car which they were promoting. Finally, they had to finish the essay with a conclusion. When the writings were evaluated based on the ELPE Rubrics, all the scores fell between 60-65 which indicated that all the participants were at the same level of proficiency.

To control the possibility of low internet skills, the participants in the two experimental groups spent four one-hour practice sessions before the experiment. In the first session, they were given information about computer and typing. In the second session, Dropbox was introduced to them along with its application. In the third session, installation and use of Yahoo Messenger (for IRC group) and Palace Chat (for 2D group) and their facilities were introduced and practiced. Finally, in the fourth session, the whole materials that had been taught in the three previous sessions were reviewed.

3.3.1 Treatment

After the practice sessions, the three groups were given the course schedule and requirements. All groups had to meet two sessions per week. The IRC group and the 2D group used “Yahoo Messenger” and “Palace Chat” respectively, while the control group attended a conventional F2F class at the institute. All the materials were the same for the three groups. The only difference among the experimental and control groups was the medium of instruction. Before the beginning of the classes, the instructor invited the two experimental groups to a folder entitled ‘Academic Writing Course’ inside Dropbox. It was the main shared folder among all the students of the virtual classes and the instructor. It enabled the instructor to place a Power Point of the main topic and the materials to be taught each session in addition to the authentic essays in Dropbox a day prior to each session to prepare the students for the lesson that was going to be worked on in the class. At the end of each session, the teacher placed the homework assignments to be completed by the students in the Dropbox with a deadline for their submission, and the students, in return, put their completed assignments back in the same folder for the instructor to collect.

The three groups attended classes for 10 sessions (5 weeks) during which they were all taught general academic writing, including the basic structures of academic texts, paragraph writing, sequence markers,

connectives, etc. They were also taught how to use some essential structures for writing their post-test letter, for example, the types and uses of different patterns of development, such as classification, exemplification, and comparison and contrast. The tenth session was a review session of all the materials discussed, problem shooting, further feedback from the students and also the instructor, and finally, a complete explanation about the post-test essay which they had to write and submit in line with the materials they had learned.

With regard to collaboration, the students of each group were divided into pairs (IRC: $n = 4$; 2D: $n = 4$; F2F: $n = 5$) at the beginning of the course and remained intact until the end of the course in order for the instructor to follow closely any changes in each pair. During the course, they were given three tasks in sessions 3 (a short composition), 6 (sentence completion) and 9 (editing), and were asked to complete them in pairs through discussion and cooperative work. Then, they reported their results to the class and exchanged feedback with each other and also with the instructor. The experimental groups did their pair work in private rooms and after they finished their work, they returned to the main room. On the other hand, the control group did their pair work in the classroom at separate desks and then joined each other and shared ideas with the whole class.

At the end of the experiment, the collaboration questionnaire was distributed among the participants of all three groups to. Then, they were collected and compared statistically to see which group had a more collaborative learning experience.

3.4 Data analysis

For the quantitative analysis of the students' patterns of collaboration, following Haythornthwaite's (2000) exploratory study, the relationships of online learners were examined in terms of "the size and composition of individuals' networks" and "the range of online ties" (p. 197). The participants' interactions were analyzed on the basis of the range and amount of closeness in their relationships as well as the purpose for their connections with each other throughout the course. To this end, a three-part Likert-scale questionnaire based on the original study's telephone interviews was used.

Data from the first part of the questionnaire (Part A) were analyzed via one-way ANOVA to examine the differences in the amount of collaboration among the three groups throughout the experiment, and also to see which medium of instruction had more influence on the students' collaboration. The second and third parts of the questionnaire's data (parts B1 & B2) were also analyzed in order to examine the students' amount of interaction and their perceptions towards future interactions with each other in each group. As such, the results were compared statistically through one-way ANOVA with the degree of significance measured at $p < .05$.

4. Results

The data were first analyzed for their normality of distribution (Table 4).

Table 4. Kolmogorov-Smirnov test for collaboration (pre-intervention)

		Total				
N		26	26	26	26	26
Normal Parameters ^{a,b}	Mean	1.7788	7.1154	8.4231	12.3846	12.8846
	Std. Deviation	.49156	1.96625	1.39063	1.83471	1.96625
Most Extreme Differences	Absolute	.177	.177	.179	.121	.177
	Positive	.167	.167	.128	.121	.177
	Negative	-.177	-.177	-.179	-.118	-.167
Kolmogorov-Smirnov Z		.904	.904	.914	.619	.904
Asymp. Sig. (2-tailed)			.388			

a. Test distribution is Normal.

b. Calculated from data

As Table 4 shows, according to Kolmogorov-Smirnov Z-test statistics, the p-value was not statistically significant ($p > .05$); hence, the sample can be argued to be normally distributed.

Next, the pre-experiment data from the three groups were analyzed by one-way ANOVA to make sure that the groups were similar in terms of

collaboration before the intervention. Table 5 shows the results of one-way ANOVA before the experiment:

Table 5. One-way ANOVA analysis of collaboration of the three groups (pre-intervention)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.324	2	.162	.651	.531
Within Groups	5.717	23	.249		
Total	6.041	25			

As table 5 shows, there were no statistically significant differences among the three groups before the experiment, $F(2, 23) = .651, p = .53$.

4.1 Collaboration on class work (Part A)

To analyze collaboration on class work, first, the descriptive statistics of the data from the first part of the questionnaire (Part A) are given in Table 6.

Table 6. Descriptive statistics of the groups' collaboration on class work (Part A, post-experiment)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.
					Lower Bound	Upper Bound	
IRC	8	12.3750	1.99553	.70553	10.7067	14.0433	10.00
2D	8	13.5000	1.30931	.46291	12.4054	14.5946	11.00
F2F	10	12.8000	2.39444	.75719	11.0871	14.5129	10.00
Total	26	12.8846	1.96625	.38561	12.0904	13.6788	10.00

Next, one-way ANOVA was conducted to see whether there was a statistically significant difference among the three groups after the experiment. Table 8 shows the results of the one-way ANOVA:

Table 7. One-way ANOVA for collaboration on class work (Part A, post-experiment)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.179	2	2.589	.651	.531
Within Groups	91.475	23	3.977		
Total	96.654	25			

As Table 7 shows, the results of the one-way ANOVA, $F(2, 23) = .651$, $p = .53$, for the first part of the questionnaire (Part A) showed no significant difference among the three groups in terms of collaborative learning after the experiment.

4.2 Class interaction (Part B1)

Descriptive statistics of the three groups' post-test results from the second part of the questionnaire are given below (Table 8):

Table 8. Descriptive statistics of the groups' class interaction (Part B1, post-experiment)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.
					Lower Bound	Upper Bound	
IRC	8	12.3750	2.19984	.77776	10.5359	14.2141	8.00
2D	8	13.0000	1.60357	.56695	11.6594	14.3406	11.00
F2F	10	11.9000	1.72884	.54671	10.6633	13.1367	10.00
Total	26	12.3846	1.83471	.35982	11.6436	13.1257	8.00

Table 9 shows the results of one-way ANOVA for the three groups' class interaction after intervention (Part B1).

Table 9. One-way ANOVA for class interaction (Part B1, post-experiment)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5.379	2	2.689	.785	.468
Within Groups	78.775	23	3.425		
Total	84.154	25			

The results of the one-way ANOVA of the second part (part B1), Table 10, also showed no significant difference among the three groups in terms of class interaction, $F(2, 23) = .78, p = .46$.

4.3 Student impressions (Part B2)

The data from the third part were also analyzed descriptively (Table 10) and then were analyzed through one-way ANOVA for the significance of the differences in terms of student impressions.

Table 10. Descriptive statistics of the three groups' impressions (Part B2, post-experiment)

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.
					Lower Bound	Upper Bound	
IRC	8	8.3750	1.40789	.49776	7.1980	9.5520	6.00
2D	8	8.1250	1.55265	.54894	6.8270	9.4230	6.00

Table 11 shows the results of one-way ANOVA for students' impressions in the three groups (Part B2) after the experiment.

Table 11. One-way ANOVA for three groups' impressions (Part B2, post-experiment)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.496	2	.748	.367	.697
Within Groups	46.850	23	2.037		
Total	48.346	25			

According to Table 11, no significant differences were found among the three groups in terms of students' impressions after the experiment, $F(2, 23) = .36, p = .69$.

All in all, statistical analyses of the data indicated no statistically significant difference between the experimental groups and the control group in terms of collaborative learning, class interaction and student impression. The results suggest that mode of instruction does not affect the amount of student collaboration and interaction or impressions in the English classroom.

5. Discussion

The present study was an attempt to examine the effect of SCMC mode of instruction on the students' collaboration in comparison to the conventional F2F classroom environment. Data were gathered by a 3-part Likert-scale questionnaire adopted from Haythornthwaite's (2000) study. Results suggested no statistically significant difference between the experimental groups (IRC and 2D) and the control group (F2F) in terms of collaboration. Interestingly, this finding is contrary to the findings of a large body of research that confirm the effect of SCMC mode of instruction on the students' collaboration in the classroom (Abe, 2005; Cho, 2011; Chou, 2002; Harstinski, 2007; Smith, Alvarez-Torrez & Zhao, 2003; Mahmoud & Auter, 2009). For example, Harstinski (2007) sought to find out how, why and when synchronous communication, as a complement to asynchronous communication, affected student participation in online education. He used various qualitative and quantitative methods of data collection in an attempt to assess both perceived participation and actual participation. The study was conducted on two offerings of an online undergraduate course and two series of online discussions on master level and by conducting focus group interviews with experienced practitioners. The findings indicated that synchronous CMC had the potential to enhance online student participation as a complement to asynchronous communication, by inducing arousal and motivation and increased convergence on meaning and social support relations, especially in smaller groups. Harstinski believed that synchronous communication appeared to be useful for supporting task and social support relations and for exchanging information with less complexity.

On the other hand, some other studies suggested that other factors, such as the task type or the nature of activity, had more effect on the learners' collaboration than the mode of instruction (Fjermestad, 2004; Pellettieri, 2010). For instance, Fjermestad (2004) conducted an analysis of communication mode in group support system (GSS) research. He summarized and analyzed the results of 145 experiments that used communication mode as an independent variable. In depth analysis of the data suggested that the type of task, GSS type, and the interaction of both had a moderating effect on 'adaptation and outcome factors'.

The findings of the present study are in line with those of Pellettieri (2010) who examined whether SCMC or the oral mode would engage learners (native speakers of English learning Spanish) in a more 'acquisition-rich' discourse. The participants were divided into four pairs who stayed unchanged throughout the course and were required to complete the same information-gap tasks once orally and once through SCMC. The results of the study showed that in both environments the students were likely to spend the same amount of interaction, suggesting that the nature of communicative activity had more effect on the discourse quality of L2 acquisition than the mode of interaction.

The results of the present study are also in line with Ziegler's (2013) research that evolved a synthesis and meta-analysis of the relative effectiveness of interaction in SCMC and F2F contexts. The findings of the study suggested a positive impact for both contexts on L2 development, and a small, though non-significant, effect for interaction in SCMC with regard to the measures of the L2 learning outcomes.

6. Conclusions

Long's (1996) *Interaction Hypothesis* places special importance on the role of peer interaction in learning a second language. This is also the case with Vygotsky's (1978) *sociocultural theory* which "provides a basic foundation for understanding learning as a process of social negotiation or collaborative sense making, mentoring and joint knowledge construction" (Zhu, 1998; as cited in Pui-Shan, 2003, p. 29).

Although the findings of this study showed no statistically significant differences between the SCMC and F2F modes of instruction in terms of

collaboration, this does not mean that SCMC is not beneficial for EFL learners (Pellettieri, 2010). Unlike F2F mode of interaction, one salient advantage of SCMC is that “it does not require that students be physically co-present to interact with each other, so FL learners can engage in L2 interaction outside of class time with classmates, with other learners across the globe, or even with native speakers” (p. 53).

From the results of the present study it can also be concluded that students' familiarity with the computer and internet technology is highly effective on the students' willingness to interact and cooperate with each other. Prior to the experiment, the students showed hesitation towards taking part in the SCMC classes due to their unconventional nature. They were not certain of being able to keep up with the demands of the online classes and the unfamiliar way of learning languages. However, after receiving instruction on how to use the required SCMC and computer programs, little by little, all their fears disappeared and even changed to eagerness and enthusiasm to take part in the SCMC classes and activities throughout the course.

On the institutional level, stakeholders and policy-makers are urged to pay due attention to the role of technology in designing the macro-level policies in a way that boosts learning opportunities through merging modern-day technology into the language teaching materials. Training instructors to have a better understanding of how technology can be implemented in language classes is also crucial. A last implication is that the findings indicated the students' willingness to use technology in their learning process due to its convenience and timeliness of communication, and most importantly for being less confrontational and stressful.

7. Suggestions for Further Research

Based on the limitations of the present study, some suggestions can be put forward for future studies. The short period of the experiment which took five weeks and the small sample which consisted of 26 participants have been two of the limitations. In addition, the participants were only female students at the upper-intermediate level of proficiency. It is quite probable that under other circumstances, the results might show more generalizable results. Thus, further research is required to obtain a more precise and

comprehensive insight of the role of SCMC in the learning and teaching EFL/ESL.

One suggestion for further research is that the study be conducted on a larger sample size and for a longer period of time. Another suggestion is that, since the study was conducted only on upper-intermediate female students, it should also be conducted on male students or a mixed-gender group in other proficiency levels to have a clearer picture of the impact of SCMC on language learners. Another suggestion is that the effect of task type and communication nature be examined in addition to the CMC mode of instruction. And finally, the last suggestion is that the effect of SCMC in its various forms be investigated on other language skills, i.e., speaking, listening, and reading, and their sub-components.

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Appendices

Appendix A: English Language Proficiency Examination

In training to be a part-time car salesperson for Ford, the company has provided you with a table of information and you have been asked to write a short essay. Use the following essay question to write your essay:

Explain which vehicle would be best for a young family. Start with an introduction and thesis statement. In the body of your essay, explain why members of a young family would benefit from the car you are promoting. Finish your essay with a conclusion.

	Cost	Number of Features	Fuel Economy Kilometers per liter in the city	Engine size in liters	Towing capacity in kg	Customer Reviews
Ford Fiesta	\$18,80	5 4-door Front-wheel Drive	11.6 city 16.2 highway	1.6L	0 kg	“I love this small car. It’s affordable and good on gas. It doesn’t have a ton of power, but it don’t need power anyways.”
Ford Mustang	\$26,61	4 2-door 6 speeds	7.7 city 12.5 highway	3.7L	0 kg	“Great vehicle. Looks great on the road, and it’s fun to drive. It consumes a lot of gas though, but I don’t mind.”

Ford Explorer	\$41,675	7	4-door All-wheel Drive	6.8 city 9.0 highway	3.5L	2267 kg	“This is the toughest vehicle on the road. All my kids can fit, and we can tow our boat easily.”
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(<http://www.ford.com/compare/>)

Appendix B: Background Questionnaire

1. Sex: female ___ male ___
2. Age: _____
3. Years of High School English _____.
4. What was your average grade in English in previous courses?

5. Have you ever studied in another country? _____ If yes, which country _____.
6. Have you ever studied another foreign language? _____ If yes, which language, when and for how long _____?
7. Do you have a computer at home? _____
8. Do you use a computer? _____
9. How often do you use a computer? _____
10. Do you feel comfortable using a computer? _____
11. How would you rate your typing skills? Circle one number. 1 2 3 4 5
12. Do you prepare your homework at computer? _____ If yes, how often? _____
13. Do you use instant messaging (chat) programs, such as ICQ, MSN Messenger or others? _____
If yes, how often? (a) every day (b) several times a week (c) rarely (d) never
Name the programs you use _____
15. Have you ever used a collaborative editing program such as Moon Edit?
