Analysis of Mean Length of Utterance in Computer-Mediated Communication

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1. Purpose

The purpose of this chapter is to investigate whether or not our students can make progress in MLU for a period of one term by taking part in synchronous Computer-mediated Communication (CMC).

2. Subjects and Data

	Waseda students	Korea University students
The Number of subjects	17	17
The background of Ss	English major=1 Non-English major=16	English major = 17
Period of Communication	Oct-Sep in the year 2002	
The medium of communication	English	
Length of one session	About 45 min.	
Frequency	Once a week	
Sessions analyzed	7 sessions	

The subjects are Waseda University and Korea University students who participated in Cross-Cultural Distance Learning (CCDL) project in the academic year 2000. They engaged in synchronous CMC through the use of the software called CU-SeeMe. They had a weekly chat not in groups but on the basis of one-on-one communication. They met the same partners at their specified time and enjoyed chatting for the period of 45 minutes throughout one term. The first 7 sessions of each student are analyzed so that we can track student's development by calculating MLU of each student in each session

3. Method

According to Roger Brown (1973:53), *"MLU (Mean Length of Utterance) is an excellent simple index of grammatical development because almost every new kind of knowledge increases length."* Therefore, MLU in words is used in this study in order to examine students' progress in terms of grammatical development.

We can also analyze learners' data by the use of mean length of T-unit and sentence length called MTUL and MSL, respectively. Meunier (1998) mentions that MTUL is a more accurate

index but points out its difficulty for automatic calculation. Since in our data fragmental sentences commonly occur because of the nature of synchronous CMC and Interlanguage, sometimes we have difficulties in recognizing where the sentence begins and ends. For these reasons, we decided to use MLU in words and we defined one utterance by the duration of time when learners start typing and finish it by pressing the enter key.

First, we would like to see how we counted students' MLU in this study. Fig.1 shows one example of chat data generally called "Log". The data is extracted in the first CMC session Maki and Sojin undertook.

Waseda Edu#6: Hello! Are you SoJin Kim? < One utterance >
Korea Lit#3: Are you Maki? < One utterance >
Waseda Edu#6: Yes, I am very glad to see you. < One utterance >
Korea Lit#3: Yes I am Sojin. Nice to see you. < One utterance >

Fig. 1 Sojin and Maki's interaction

The data is separated in order to calculate individual MLU as shown in Fig. 2 for Miki and in Fig. 3 for Sojin.

Waseda Edu#6: Hello! Are you SoJin Kim?
Waseda Edu#6: Yes, I am very glad to see you.

Fig. 2 Miki's chatting data

Korea Lit#3: Are you Miki?
Korea Lit#3: Yes I am Sojin. Nice to see you.

Fig 3 Sojin's chatting data

Hello! Are you SoJin Kim? Yes, I am very glad to see you.	Are you Miki? Yes I am Sojin. Nice to see you.
The number of words -> 13 The number of utterances -> 2 Miki's MLU= 13/2=6.5	The number of words -> 11 The number of utterances -> 2 Sojin's MLU= 13/2=5.5

Fig. 4 How to measure individual MLU.

After we delete such user ID as "Waseda Edu#6:" or "Korea Lit#3", we calculate the total number of words and utterances. And MLU is calculated by the total number of words / the total number of utterances, as shown in Fig.4.4.

4. MLU development of Makiko and Taesang

First, we shall see MLU development of one couple, Makiko from Waseda University (WU) and Taesang from Korea University (KU). Table 1 shows how Makiko's MLU increases in

each session. Table 2 is for Taesang. We can obviously find Makiko's MLU increasing session by session; however, Taesang's MLU tends to vary. Therefore, we shall see the schematized figure, as shown in Fig. 5.

Table 1 Makiko's MLU in each session

	Session1	Session2	Session3	Session4	Session5	Session6	Session7	Mean
Words	94	125	90	110	120	133	160	118.86
Utterance	21	20	15	18	18	18	18	18.29
MLU	4.48	6.25	6	6.11	6.67	7.39	8.89	**6.54**

Table 2 Taesang's MLU

	Session1	Session2	Session3	Session4	Session5	Session6	Session7	Mean
Words	183	226	163	221	191	184	245	201.86
Utterance	34	22	17	24	19	21	20	22.43
MLU	5.38	10.27	9.59	9.21	10.05	8.76	12.25	**9.36**

Fig. 5 represents their MLU development in each session. The two lines are the approximated regression lines. (x=the number of sessions, y=MLU) Therefore, we can suppose in one sense that the greater the slope of the line segment is, the more MLU develops. R^2 is measure of strength of relationship and shows how the line can be reliable. From the information we can assume that their MLU increases for the reason that the slopes of the two approximated lines are positive. This indicates that both Makiko and Taesang increased their MLU as they engaged in chatting sessions.

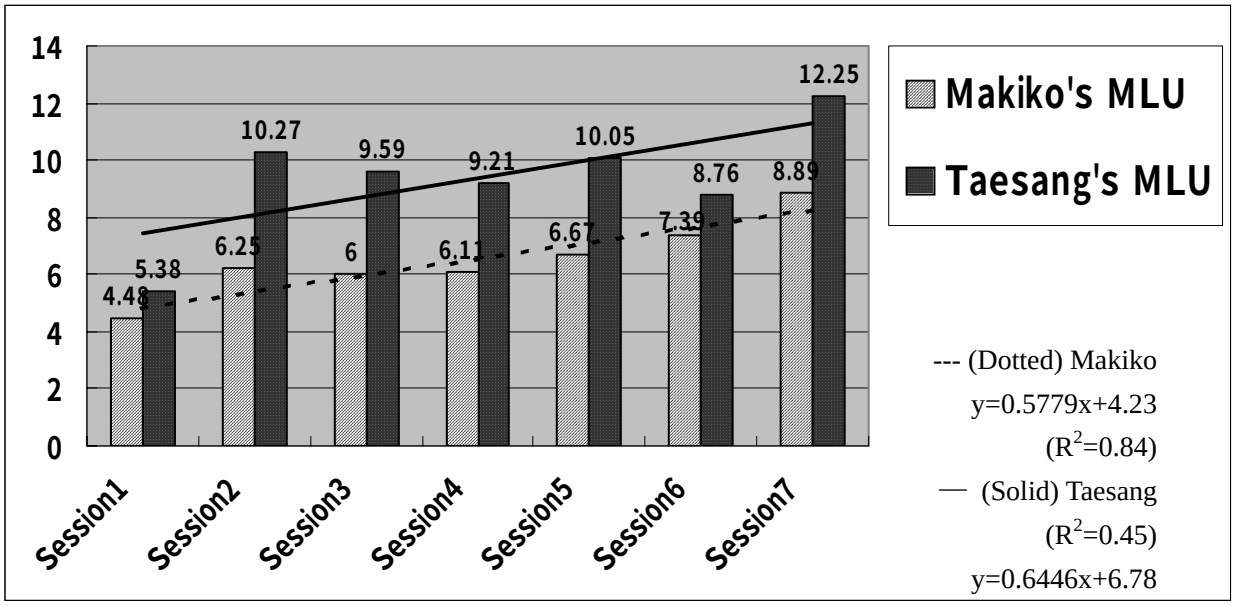

Fig. 5 MLU movement by sessions (Makiko and Taesang)

5. Data Analysis 1

We shall investigate Waseda University and Korea University students' MLU development in order to draw a conclusion that synchronous CMC contributes to the increase of learners' MLU.

Results for Waseda University students

As shown in Fig.6, 16 out of 17 Waseda University students made some progress in the MLU development as they engaged in synchronous Computer-Mediated Communication, for the reason that their regression lines are positively sloped, although some R^2 are defective as in Table 3.

Table 3 Approximated regression Lines: Waseda students' MLU

ID	EQUATIONS	R^2
Waseda01	y=0.7689x+7.4171	0.4444
Waseda02	y=1.0075x+3.9143	0.7397
Waseda03	y=0.2643x+7.51	0.1131
Waseda04	y=0.0861x+3.5886	0.1935
Waseda05	y=0.2818x+6.6843	0.1335
Waseda06	y=0.1232x+4.29	0.2331
Waseda07	y=0.0279+3.5229	0.0971
Waseda08	y=0.0814x+5.2457	0.0784
Waseda09	y=-0.0143x+3.6986	0.0175
Waseda10	y=0.0175X+5.0629	0.0028
Waseda11	y=0.0557x+5.0986	0.0648
Waseda12	y=0.4236x+3.2129	0.6071
Waseda13	y=0.5779x+4.23	0.8449
Waseda14	y=0.5607x+4.54	0.7124
Waseda15	y=0.2293x+2.5914	0.6057
Waseda16	y=0.2382x+4.0443	0.6074
Waseda17	y=0.0896x+6.7271	0.0428

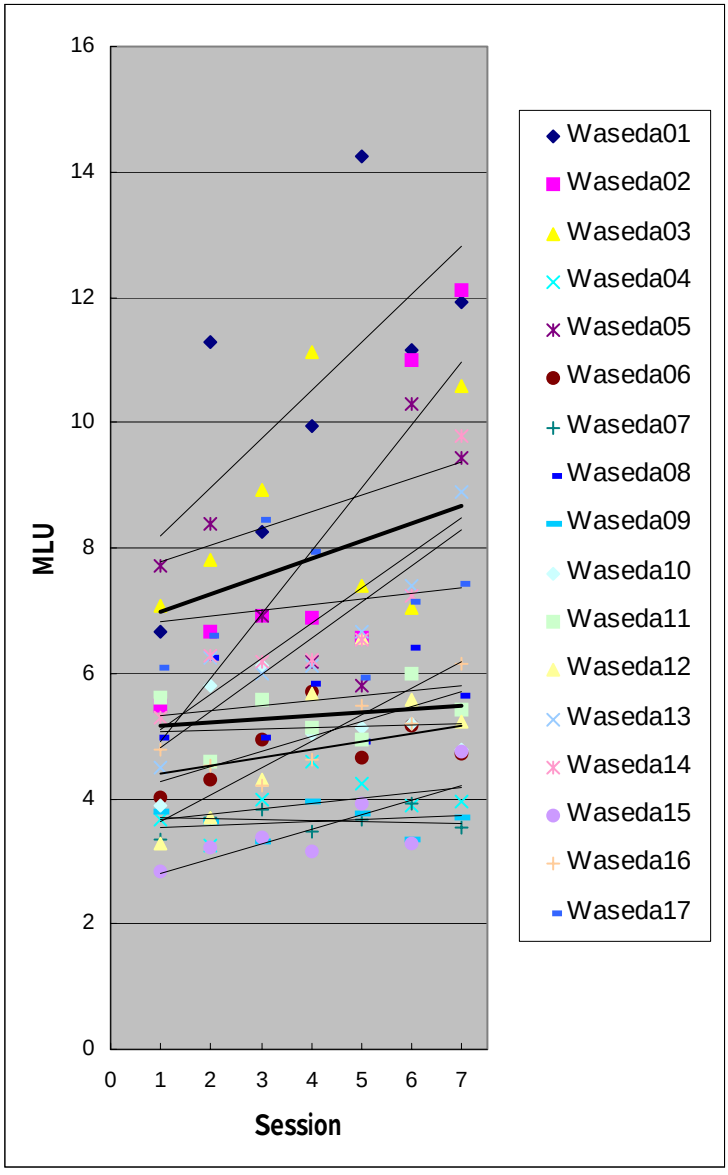

Fig. 6 MLU movement among Waseda students.

Results on Korea University students

As shown in Table 4 and Fig 7, all KU students' slopes (N=17) are positive although some R^2 are defective. We can assure that one-term CU-SeeMe sessions help to increase Korea University students' MLU by sessions.

Table 4.4 Approximated regression Lines: KU students' MLU

ID	EQUATIONS	R^2
Korea01	y=0.9325x+7.2457	0.3444
Korea02	y=0.4221x+4.8457	0.9034
Korea03	y=0.0071x+5.3486	0.0008
Korea04	y=0.8089x+3.6157	0.5868
Korea05	y=0.0286x+5.5571	0.0012
Korea06	y=0.1296x+4.2571	0.4445
Korea07	y=0.3364x+5.1671	0.5883
Korea08	y=0.235x+4.1241	0.5657
Korea09	y=0.1125x+3.9514	0.1314
Korea10	y=0.3061X+4.9771	0.7699
Korea11	y=0.525x+4.1071	0.1982
Korea12	y=0.2568x+6.4543	0.4319
Korea13	y=0.6446x+6.78	0.4487
Korea14	Y=0.4225x+4.5029	0.6652
Korea15	Y=0.325x+6.4157	0.5002
Korea16	Y=0.1593x+6.18	0.5075
Korea17	Y=0.2661x+5.5657	0.5626

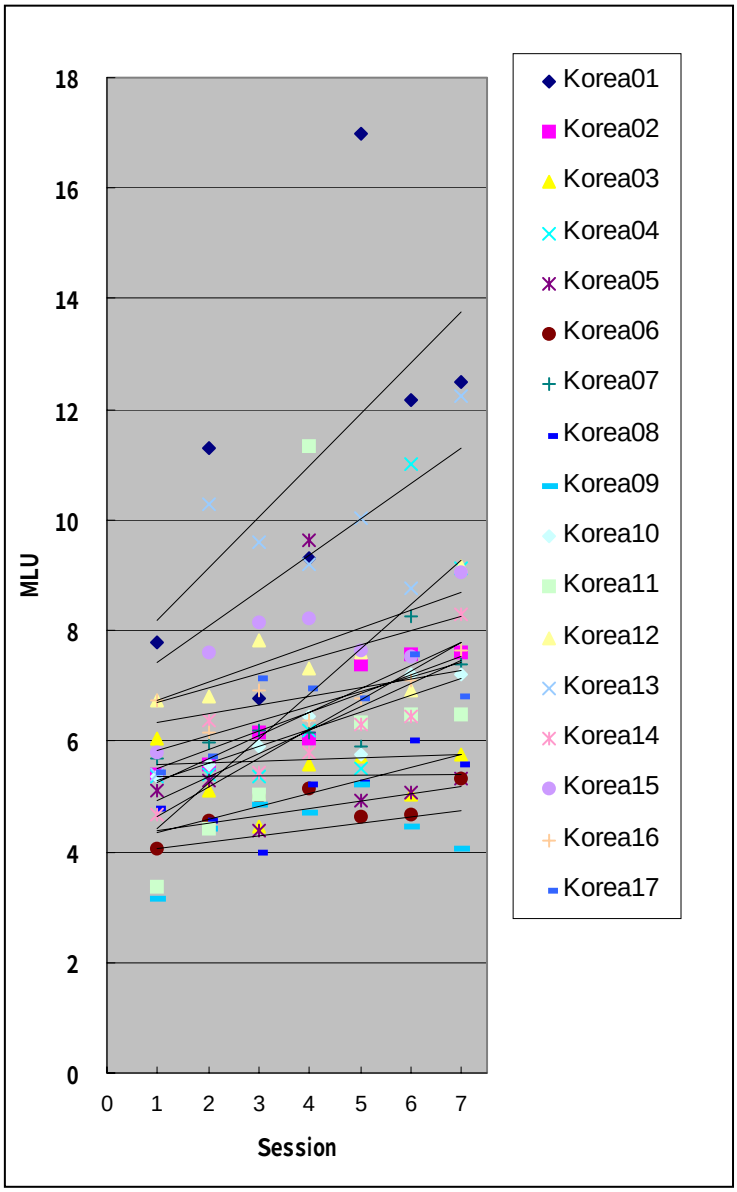

Fig. 7 MLU movement among Korea University students.

Results across two university students.

Considering there is some progress among almost all the students (33 out of 34 students), CMC effectively helps to increase grammatical development of our students, although the way MLU increases differs greatly in individuals. While some students progressed consistently, some students increase their MLU at some sessions and decreased at others. So, their progress was not linearly definable. However, judging from Table 5 and Fig 8, we can find that mean values of all the students' MLU linearly increased with high reliability because R^2 of the two approximated

regression lines for Waseda University students and Korea University students show 0.90 and 0.91, respectively.

Table 5 MLU movement of Waseda and Korea students by sessions.

	Session1	Session2	Session3	Session4	Session5	Session6	Session7
WU students' MLU **(M=5.92)**	**4.88**	**5.66**	**5.66**	**5.97**	**5.90**	**6.42**	**6.94**
KU students' MLU **(M=6.63)**	**5.35**	**6.18**	**6.06**	**7.04**	**6.99**	**7.19**	**7.62**
ALL (M=6.28)	5.12	5.92	5.86	6.50	6.45	6.81	7.28

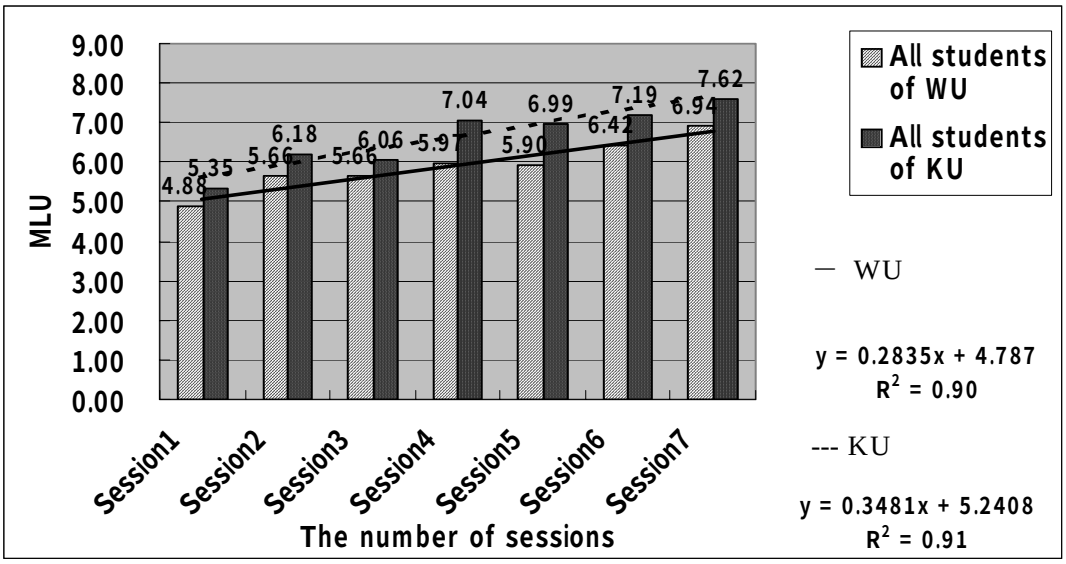

Fig.8 MLU movement of Waseda and Korea students by sessions

6. Data Analysis 2: One-way ANOVA

6.1. Method

In this section we would like to verify the increase of students' MLU by using statistical tests. First, we shall examine whether or not their MLU significantly differs in sessions by one-way ANOVA. Secondly, we will test between which sessions we can find statistical difference by the use of post- hoc test. Table 6 represents all the data of students' MLU.

Table 6 MLU of our participants (N=34)

	Session1	Session2	Session3	Session4	Session5	Session6	Session7
Waseda01	6.65	11.29	8.25	9.95	14.24	11.14	11.93
Waseda02	5.47	6.67	6.91	6.89	6.57	11	12.1
Waseda03	7.09	7.81	8.93	11.13	7.39	7.03	10.59
Waseda04	3.65	3.25	3.98	4.59	4.23	3.88	3.95

Table 6 MLU of our participants (Continued)

Waseda05	7.7	8.38	6.91	6.18	5.79	10.29	9.43
Waseda06	4.03	4.3	4.94	5.7	4.65	5.15	4.71
Waseda07	3.36	3.69	3.82	3.48	3.65	3.91	3.53
Waseda08	4.98	6.25	4.97	5.82	4.92	6.41	5.65
Waseda09	3.8	3.62	3.31	3.95	3.76	3.36	3.69
Waseda10	3.89	5.8	6.11	5.02	5.13	5.2	4.78
Waseda11	5.62	4.59	5.57	5.12	4.94	6	5.41
Waseda12	3.29	3.71	4.3	5.67	6.55	5.59	5.24
Waseda13	5.81	7.61	8.14	8.21	7.65	7.53	9.06
Waseda14	5.29	6.27	6.18	6.21	6.54	7.22	9.77
Waseda15	2.85	3.21	3.37	3.16	3.93	3.29	4.75
Waseda16	4.78	4.54	4.21	4.63	5.49	5.18	6.15
Waseda17	6.1	6.61	8.46	7.93	5.93	7.15	7.42
Korea01	7.8	11.29	6.76	9.31	17	12.16	12.51
Korea02	5.41	5.57	6.16	6.04	7.38	7.57	7.61
Korea03	6.06	5.09	4.44	5.57	5.71	5.02	5.75
Korea04	5.37	5.41	5.35	6.18	5.51	11	9.14
Korea05	5.11	5.27	4.37	9.63	4.92	5.08	5.32
Korea06	4.07	4.57	4.99	5.16	4.63	4.69	5.32
Korea07	5.7	5.96	6.2	6.15	5.92	8.26	7.4
Korea08	4.78	4.58	3.99	5.22	5.24	6.03	5.59
Korea09	3.14	4.41	4.84	4.71	5.23	4.44	4.04
Korea10	5.36	5.57	5.91	6.44	5.75	7.19	7.19
Korea11	3.38	4.43	5.03	11.33	6.32	6.47	6.49
Korea12	6.75	6.82	7.82	7.31	7.6	6.91	9.16
Korea13	5.38	10.27	9.59	9.21	10.05	8.76	12.25
Korea14	4.67	6.39	5.45	5.79	6.31	6.46	8.28
Korea15	4.48	6.25	6	6.11	6.67	7.39	8.89
Korea16	6.74	6.15	6.92	6.38	6.79	7.11	7.63
Korea17	5.43	5.74	7.12	6.97	6.77	7.57	6.81
Average	**5.12**	**5.92**	**5.86**	**6.50**	**6.45**	**6.81**	**7.28**

6.2. Results: One-way ANOVA

Table 7 shows the results of one-way ANOVA. The results indicate that there is statistical significance among learners' MLU in each session: ($F(6,231)=2.138$, $^{**}p<0.01$). Fig. 9 and Table 8 show that mean values of their MLU tend to increase. Therefore, from the results of one-way ANOVA we can assume that students who engaged in synchronous CMC were able to

make some progress in grammatical development as they experienced chatting sessions.

Table 7 Analysis-of-variance table

Variable factor	Sum of deviation square	DF	Mean Square	F value	P value	F(0.99)
Total Variation	1156.6	237				
Variation In sessions	102.3793	6	17.06322	3.74	**0.001434**	2.138
Variation of error of difference	1054.179	231	4.563547			

Table 8 Mean Value and SD

	Mean Value	SD
Session1	5.12	1.30
Session2	5.92	2.04
Session3	5.86	1.64
Session4	6.50	2.03
Session5	6.45	2.69
Session6	6.81	2.28
Session7	7.28	2.62

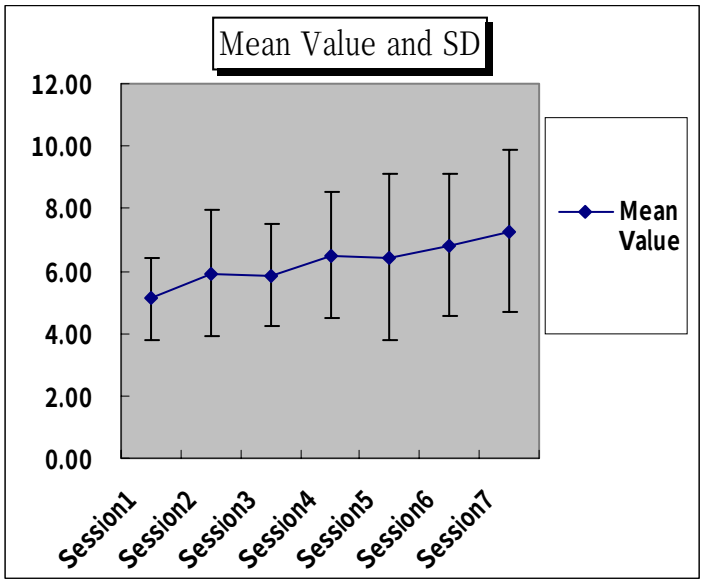

Fig. 9 Mean Value and SD

6.3. Results of Post-hoc test; Fisher's PLSD

A post-hoc test is used so as to see whether or not there is a statistically significant difference between sessions. The significance is indicated by "S" in the table 9.

Table 9 Results of Post-hoc test: Fisher's PLSD (at the probability level of 0.05)

	Difference of means	Value of rejection	P value	Significance
Session1,Session2	-0.81	1.02	0.12	
Session1,Session3	-0.74	1.02	0.15	
Session1,Session4	-1.39	1.02	0.01	S
Session1,Session5	-1.33	1.02	0.01	S
Session1,Session6	-1.69	1.02	0.00	S
Session1,Session7	-2.16	1.02	0.00	S

Table 9 Results of Post-hoc test: Fisher's PLSD (Continued)

Session2,Session3	0.06	1.02	0.91	
Session2,Session4	-0.58	1.02	0.26	
Session2,Session5	-0.52	1.02	0.31	
Session2,Session6	-0.88	1.02	0.09	
Session2,Session7	-1.36	1.02	0.01	S
Session3,Session4	-0.64	1.02	0.22	
Session3,Session5	-0.58	1.02	0.26	
Session3,Session6	-0.95	1.02	0.07	
Session3,Session7	-1.42	1.02	0.01	S
Session4,Session5	0.06	1.02	0.91	
Session4,Session6	-0.30	1.02	0.56	
Session4,Session7	-0.78	1.02	0.14	
Session5,Session6	-0.36	1.02	0.49	
Session5,Session7	-0.83	1.02	0.11	
Session6,Session7	-0.47	1.02	0.36	

From the results, there is a significance between session1 and session 4; 1 and 5; 1 and 6; 1and 7; 2 and 7; and session 3 and 7.

6.4. Conclusion

We can probably conclude that our students increased their MLU from session to session. And from the results of the post-hoc test, synchronous CMC may contribute, to some extent, to students' progress in grammatical development in a short time. That is because when they have the 4th chatting session, namely just in one month, they must have made some progress.

However, not only synchronous CMC, they probably learn English outside the chatting room, for example CCDL participants are assigned to exchange e-mails frequently and write a summary of each chatting exchange on CCDL homepage after the session. Therefore, it is reasonable that various factors including synchronous CMC may contribute to their progress. However, we need to emphasize that synchronous CMC can be a booster for students to be determined to learn English actively.

7. Discussion about MLU

Although our students made progress in MLU, we still have some concerns about the results. First, our students tend to be inexperienced for this kind of communication; therefore, they might just get used to synchronous CMC and include more words at one time. For example, it is dubious that mode advanced students increase their MLU unlimitedly as they keep on communicating. Secondly, since this is based on interaction, psychological factors may affect the results. For example, some students are unwilling to make their partner wait and be irritated.

Before completing sentences, they frequently send sentence fragments such as, “Yes” “I like it” “very much” in different utterances. As one of the characteristics of our daily conversation, short responses are in need for interactive communication, as discussed in the sixth chapter. This means that the length of utterance cannot always correspond with the level of their progress in their proficiency. Therefore, we need more research to investigate other factors to increase students’ MLU.

References

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