

## LOW PROFICIENCY LEARNERS IN SYNCHRONOUS COMPUTER-ASSISTED AND FACE-TO-FACE INTERACTIONS

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### ABSTRACT

This experimental study offers empirical evidence of the effect of the computer-mediated environment on the linguistic output of low proficiency learners. The subjects were 32 female undergraduates with high and low proficiency in ESL. A within-subject repeated measures concurrent nested QUAN-qual (Creswell, 2003) mixed methods approach was used. Interactions between the subjects in mixed ability dyads in face-to-face (F2F) and synchronous computer-assisted (SCA) environments provide the data. The unit of analysis was negotiation of meaning (Varonis & Gass, 1985) which is the key construct that is claimed to promote second language acquisition (SLA). The evidence indicates that opportunities for SLA for low proficiency learners are enhanced with the occurrences of negotiation of meaning in both SCA and F2F environments. In particular, the SCA allowed for varied syntactic and semantic modifications which provided ample opportunities for low proficiency learners to negotiate for comprehensible input and to notice form.

**Keywords:** Computer-assisted language learning; computer-mediated communication; second language acquisition; language proficiency

### INTRODUCTION

Many studies of computer-assisted language learning (CALL) have extolled the benefits of computers (Ducate & Lomicka, 2008; Kelm, 1992; Kennedy & Levy, 2009; Kern, 1995; Kessler & Bikowski, 2010; Lee, 2004; Simpson, 2005; Tudini, 2007; Warshauer, 1997). In the technology-based language classroom, Beatty (2003) identified eight applications of CALL i.e. word processing, games, literature, corpus linguistics, computer-mediated communication (CMC), WWW resources, adapting other materials for CALL and personal digital assistants.

CMC, from the communicative language teaching perspective, fulfils the principles that benefit language learning i.e. the communication principle, the task principle and the meaningfulness principle (Richards & Rodgers, 1986). CMC also realizes Underwood's (1984) criteria for communicative CALL summarised as follows:

- acquisition rather than learning practice
- implicit grammar teaching rather than explicit
- real and meaningful communication
- no judging and evaluation of everything
- authentic and natural target language usage
- flexible

In the language learning contexts, CMC provides a means for more opportunities for communicative practice with technology. In particular, for low proficiency learners and those who are shy and reserved, the computer-mediated environment seems to provide opportunities for increased linguistic output (Beauvois, 1992; 1998; Bradley & Lomicka, 2000; Tidwell & Walther, 2006).

CMC has been defined as "communication that takes place between human beings via the instrumentality of computers" (Herring, 1996, p.1), described as "conversation in slow motion" (Beauvois, 1992, 1998) and recognized as communication with high levels of interactivity (Chun, 1994; Kern, 1995; Pellettieri, 2000; Salaberry, 2000; Smith, 2003). Hence, investigating the communication or interactions in this context is inevitable (Chapelle, 1999; Holliday, 1999; Salaberry, 2000). Additionally, a comparison between computer-mediated communication (CMC) and face-to-face (F2F) communication seems to be a critical and valuable extension of research on CMC at this juncture to evaluate the use of CMC in SLL and to provide for a more pragmatic understanding of CALL (Chapelle, 2003; Levy, 1999; Ortega, 1997). Research in second language acquisition (SLA) has been marked by the call by Chapelle (2003) for CALL researchers to channel their work

along the lines of that of Interactionist SLA researchers (Long, 1985; Pica, Holliday, Lewis, & Morgenthaler, 1989; Varonis & Gass, 1985). The work of Blake (2000), Fernandez-Garcia and Martinez-Arbelais (2002), Lee (2002), Smith (2003), Tudini (2003), and Wang (2006), amongst others, reflect this call. In other words, advances in theories of SLA should inform current language learning and teaching practices. Of particular interest in SLA is the role of interactions in promoting language development.

Much of the existing studies in CMC lack empirical evidence. Therefore, this study set out to obtain empirical evidence of the effect of the computer-mediated environment on the linguistic output of low proficiency learners and subsequently, evaluate the potential of this computer-mediated environment to support these learners for SLA development. To this end, the SLA frameworks of negotiation of meaning (Pelletieri, 2000; Pica et. al, 1989; Varonis & Gass, 1985) were employed to compare the interactions produced by the high and low proficiency learners in computer-mediated and face-to-face environments.

## THEORETICAL FRAMEWORK

### *Negotiation of meaning in F2F interactions*

Interaction promotes L2 development because there is an inherent need on the part of the interactants to understand the speech in order to participate in the on-going discourse and maintain flow (Gass & Varonis, 1984). Therefore when learners participate in interaction, this discourse flow not only provides them with the opportunity to formulate short-term hypotheses about the meaning of their interlocutor's utterances, but also with appropriate data to formulate long-term hypotheses about the structural and pragmatic rules of the language (Gass & Varonis, 1984).

Embedded with frequent occurrences within F2F interactions is the construct of negotiation of meaning or negotiation routine (NR). The Interactionist hypothesis within the instructed SLA literature identifies the NR construct to be the feature that is ideal for learners to acquire the second language (Long, 1980; 1985; Pica, 1994; Varonis & Gass, 1985 among others). During a negotiation of meaning which normally occurs due to conversational trouble (Long, 1980), it is found that there are greater modifications in the quality of the interaction. This is due to the attempts at making the utterances comprehensible to the interlocutor. This negotiation of meaning is claimed to provide more opportunities for learners to push for interactional adjustments because the turns go back and forth until the incomprehensibility of the message meaning is resolved. In this manner, negotiation of meaning supports comprehensible input and output, and aids SLA.

Other researchers (Hegelheimer & Chappelle, 2000; Pica, 1994 among others) have corroborated Long's (1980) findings and concluded that the most useful interactions are those with occurrences of negotiation of meaning that help learners to comprehend the semantics and syntax of the input (Krashen, 1980) and the comprehensibility of their own linguistic output (Swain, 1985) as well as those that offer ample opportunities for a focus on form (Schmidt, 1990). An example of a negotiation routine follows:

NS:	Do you wanna hamburger?	[Trigger]
NNS:	Uh?	[Indicator or signal]
NS:	What do you wanna eat?	[Response]
NNS:	Oh! Yeah, hamburger	[Reaction to response]

Long, 1981, p. 269

As the above example reveals, negotiation can serve as a means of working through perceived or actual gaps in communication or comprehension of message meaning. Furthermore, more turns dedicated to the negotiation routine means that "more work [is involved] in the resolution before the routine finally pops and the conversation continues" (Varonis & Gass, 1985, p. 83) and hence, provides more opportunities for negotiation of comprehensible output and input and noticing of form.

Varonis and Gass (1985) developed a framework for analysing a non-understanding routine or negotiation of meaning wherein a negotiation routine consists minimally of a *trigger* that caused the non-understanding in the utterance, an *indicator* or signal of non-understanding, a *response* to the indicator and finally an optional *reaction to the response* (please refer to the above example). This framework is widely used to analyse instances of negotiation including studies of negotiation in the computer-mediated communication environment (Blake, 2000; Pelletieri, 2000; Smith, 2003; Toyoda & Harrison 2002); hence, by using the same model and terminology, a comparison across studies in CMC contexts can be made.

In addition, Pica et al.'s (1989), Pica's (1994) and later Pelletieri's (2000) qualitative analysis particularly of the different types of indicators and responses present in negotiation routines reveals numerous ways learners' attention is drawn to the incomprehensible portion of the utterance when there is an indication of non-understanding. The different types of indications of non-understanding (clarification requests, confirmation requests, comprehension checks) and the subsequent modifications which include lexical, structural and morphosyntactic modifications, serve to identify the ways negotiation routines maximise the conditions for comprehensible input, output and attention to form, and are therefore potentially conducive for SLA.

In a nutshell, according to SLA theory and research in the Interactionist tradition, interaction in general and negotiation of meaning in particular gives learners opportunities to comprehend message meaning, attend to and notice second language forms, produce comprehensible and modified output that compels the development of morphology and syntax, and at the same time enables them to have authentic communication (Hegelheimer & Chapelle, 2000). Whether learners capitalize on the opportunities provided by the attention on form to acquire the language especially in the long term has not been determined conclusively in the studies on negotiation thus far.

#### *Negotiation of meaning in computer-mediated communication*

In the technology-impacted pedagogical context, a fertile environment that best promotes interactions and negotiations from the Interactionist perspective in SLA is the networked task-based language teaching with CMC. CMC also enforces Swain's (1985) comprehensible output hypothesis because networked exchanges are text-based and therefore, learners must produce the structures and hence, push comprehensible output (Blake, 2000). Furthermore, the emergence of a new variety of language has resulted in a call for the development of the research field of CMC (Paramskas, 1999 cited in Harrington & Levy, 2001).

The literature on CMC reveals some early attempts at comparing CMC and F2F (Chun, 1994; Kern, 1995; Warschauer, 1996). These studies which compare computer-assisted class and teacher-fronted class discussions (Kern, 1995; Warschauer, 1996) observe increased participation and output by learners in the computer environment. However, it can be hypothesized that group size and equality of participation are "negatively related in traditional oral interactions and positively related in computer-assisted interactions" (Gallupe, Bastianutti, & Cooper, 1991 cited in Ortega, 1997, p. 86). In other words the bigger the class size, the greater the benefits of electronic over non-electronic interactions. These studies arguably are lacking in comparable conditions.

The studies on negotiation of meaning in the CMC context have used Varonis and Gass' (1985) schema in identifying and labelling the component parts of an instance of negotiation of meaning. The features of the negotiation routines investigated include the number of occurrences of negotiations across different task types including the number of turns (Blake, 2000; Iwasaki & Oliver, 2003; Pelletieri, 2000; Smith, 2003; Tudini, 2003), types of triggers (Toyoda & Harrison, 2002), feedback (Pelletieri, 2000; Tudini, 2003), self-corrections (Smith, 2003; Tudini, 2003), and an expanded model of negotiation in the CMC context (Smith, 2003). Particular to language proficiency, some studies (Beauvois, 1992, 1998; Kern, 1995) have reported increased linguistic output in the CMC context for minority, shy and reticent learners. These findings rest largely on anecdotal rather than on empirical evidence.

All these studies examine features of negotiation routines in the CMC environment but do not provide a contrast with negotiation routines in the F2F environment. Thus, the findings can only describe the features of negotiations peculiar to the CMC context but cannot claim with empirical support the extent CMC advances SLA compared to the F2F environment. As such, the comparative study of negotiation of meaning between the CMC and F2F environments particularly in the context of the role of language proficiency undertaken in this study would constitute a significant and timely contribution. Three frameworks: Varonis and Gass' (1985) schema of an instance of negotiation of meaning, Pica et al.'s (1989) categories of indicators and responses and modifications from Pelletieri's (2000) in the CMC context, are combined as a modified framework to provide for quantitative and qualitative perspectives on negotiation routines in the F2F and CMC contexts.

#### *Research objectives*

This study aims to provide a data-driven, empirically-informed evaluation of the effect of the synchronous computer-assisted (SCA) environment on the linguistic output of low proficiency learners. It seeks to do this by evaluating online chat or SCA interactions through the comparison of low proficiency learners' interactions against that of high proficiency learners in two environments, namely F2F and SCA, using the key construct that is claimed to promote SLA i.e. negotiation of meaning or a negotiation routine (NR). The role played by the

mixed ability dyad formation of high and low proficiency learners on the linguistic output of low proficiency learners with a specific focus on the use of indicators and responses is the focus of investigation.

Within the larger frame of SLA and CALL, the study also aims to add to the body of knowledge on CALL and SLA's construct of negotiation of meaning in particular the extent of the role of language proficiency in interactions in the F2F and CMC environments. The empirical findings from this study will enable informed pedagogical decisions and choices pertaining particularly to low as well as high proficiency learners to be made.

## METHODOLOGY

This within-subject, repeated-measure quasi-experimental study which utilizes a concurrent nested QUAN-qual (Creswell, 2003) mixed methods approach was set up to determine the extent of the role played by language proficiency in the learners' linguistic output in the two different environments: F2F and SCA. The analytical frameworks for the routines of negotiations of meanings are derived from Varonis and Gass (1985) and Pica et al., (1989).

### *Participants*

The participants were 32 Year One undergraduates from different departments who had minimal familiarity with one another. At the time of the experiments, the majority of them were between 20 and 23 years of age. All 32 participants were females to control the gender variable.

Purposive sampling method was used to select the participants. Participants were selected based on a pre-study selection questionnaire. Proficiency in the English language was one of the criteria as the study was based on mixed dyads of high and low proficiency. In addition, computer and keyboard abilities and familiarity with MSN Messenger or Yahoo! Messenger was also a necessity. After the participants were selected, attempts at randomization were made where the participants were placed in pairs.

### *Variables*

The independent variables selected for the study were the interactions in the two different environments in which the participants had to perform four different communicative tasks. The SCA environment used either the MSN or the Yahoo! Messenger online chat software. The dependent variables selected for comparison between the SCA and F2F environments were the qualitative features of routines of negotiation of meaning i.e. the indicators and responses found within the framework of negotiation routines. The study was interested to determine if these dependent variables were affected by the language proficiency (high and low) of the participant and how low proficiency learners fared in particular.

Based on the literature reviewed which indicated that mixed-ability dyads promoted negotiations of meaning (Blake, 2000; Boulima, 1999; Pellettieri, 2000; Varonis & Gass, 1985), a low proficiency participant was paired with a high proficiency participant. To determine the proficiency level of the participants, the Malaysian University English Test (MUET) was used. All tertiary students in Malaysia are required to take the MUET. MUET uses a system of 6 bands to classify overall language proficiency based on four skills: reading, listening, writing and speaking. A student's total scores on these four skills are added together to arrive at an overall band with Band 1 being the lowest proficiency grading and Band 6 the most proficient.

For this study, it was determined that the mixed-ability dyads would be two to three bands from each other i.e. if a participant was at Band 2 she would be paired with another from Band 4 or 5. There were none with Band 1 in the population; hence, the pairs were made up of those who scored Bands 4, 5 or 6 and those who scored Bands 2 or 3. Planning time of ten minutes was given to each dyad before each experiment was run as time given for preparation would help to reduce anxiety (Fulcher, 1996).

Task variables which have been shown to have an influence on linguistic output (Robinson 2001 including task conditions, task complexity (Robinson, 2001) and task type (Pica et al., 1993) were given careful consideration. Decision-making task type was chosen for this study for various reasons. Decision-making tasks or target tasks (Nunan, 2001) have received very little attention in the task-based CMC context and, as such, they are novel and interesting. Decision-making tasks are convergent (Duff, 1986) with a two-way exchange of information but with more than one outcome (Pica et. al, 1993); therefore they have the potential to generate interactions for analysis (Long, 1980). While there is no guarantee of this because of the open-ended nature of the task objectives, as has been pointed out by Pica et al. (1989), the conversational nature of decision-making tasks do provide potentially equal opportunities for both participants to negotiate meaning toward mutual comprehension of each other's production.

To remove the potential of task complexity as a variable in order to enhance the reliability of the findings, four decision-making tasks based on topics which were neutral in nature and common to the general life experience of a university student were prepared for the study. The topics were making decisions about where to go for a holiday, where to take a pen-pal for a weekend, deciding on a stress-reducing programme for university students and on the content of a television programme for teenagers. These four topics corresponded with Tasks A, B, C and D respectively.

Tasks A and B were adapted from Condon and Cěch (1996); these two tasks required participants to plan an itinerary for a weekend, one for a getaway anywhere in the world and the other for a friend to visit southern Louisiana. For this study, a local destination was used. Tasks C and D were modified from two oral test situations used in the MUET of December 2000. The modifications were necessary because the original tasks were meant for a discussion for four participants. All four prepared tasks were pre-tested with two ESL lecturers to rectify any fundamental problems with the tasks or the instructions.

Table 1: Task variables that were controlled

Variable	How the variable was controlled
Format	Mixed-ability dyad (high and low proficiency learners)
Planning time	Ten minutes of planning time before each task.
Task type	Four decision-making tasks
Sequence of tasks	Alternate between task and environment for each experiment.

The dyads had to perform two tasks in the CMC environment and another two in the F2F environment. To reduce the potential variable of task sequence from the study and increase the reliability of the findings (Pica et. al, 1993) The sequence of tasks (Pica et. al, 1989) given to the dyads was controlled i.e. each dyad began with a different task in a different environment. For example, the first dyad began with Task A in the SCA and Task B in the F2F environment while the second dyad performed the reverse: Task B in the SCA environment and Task A in the F2F and so on. In other words, the dependant variables in this study (quantitative and qualitative measures of routines of negotiation) were measured 16 times i.e. with 16 pairs of participants in four different tasks, two in the CMC environment and another two in the F2F environment. Table 1 presents the task variables that were controlled and the means by which they were controlled.

#### *Data analysis procedure*

Using the schema developed by Varonis and Gass (1985, see 2.1 above), negotiation routines in the data were first identified. Next, six different types of indicators adapted from Pica (1989; 1994) and Pelletieri (2000) were applied to the data. These indicators are:

1. Explicit statement or request for clarification
2. Request for confirmation through repetition
3. Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation)
4. Request for confirmation through completion or elaboration of trigger or the previous utterance (another indicator or response when it is an extended negotiation)
5. Inappropriate response (Note: In Pelletieri's and my data, an inappropriate response also serves to indicate lack of understanding)
6. Request for confirmation through comprehension check e.g. Do you understand?

The next stage of data analysis involved Pica et al.'s (1989) study which presented findings from F2F interactions and reported that the type of responses is influenced considerably by the type of indicators used. Pica et al. had established that the indicator type 'explicit statement or request for clarification' would be most beneficial for SLA because it elicited responses with syntactic modification through embedding and elaboration in clause(s). These features in the data for this study were then extracted for further analysis and comparison. The percentage and means of the categories of indicators by the high proficiency learners were calculated first; then the same was applied to low proficiency learners.

Statistical testing procedures were conducted on the numbers for comparison and contrast in the two different environments. Similarities and differences were identified. This procedure was repeated for the response categories by the high and low proficiency learners in the two different environments.

A sample of 25 percent data was coded by an independent rater. Second coder inter-rater reliability was between 89 percent and 97 percent on the following points: identifying the different moves of the NRs, categorising the types of indicators and responses.

## RESULTS AND DISCUSSION

The data and discussion for indicators will be presented first followed by that for responses. Within each section, the data for high proficiency learners (HPL) will first be discussed and then compared with the data for low proficiency learners (LPL).

### *Indicators*

The distribution of indicators by the HPLs in the two environments is presented in Table 2. In the F2F environment, the HPLs indicate problems with comprehensibility of message most commonly with type 2 indicators i.e. request for confirmation with repetition, with 68 occurrences (37%). Following closely behind is type 3 (request for confirmation through modification of the trigger) with 58 occurrences (32%). The third most common is type 1 which is explicit statement or request for clarification. All three types of indicators have the potential to provide optimum conditions for SLA opportunities.

In the SCA environment, the most common type of indicator utilised by HPLs is type 3 i.e. almost half of the total number of indicators (31 occurrences or 47%); while the second most common indicator is type 1 i.e. 24 number of occurrences or 36 percent. Type 3 indicators by HPLs with requests for confirmation through modifications of the trigger would provide modified models of LPLs' problematic triggers, thus providing more opportunity for comprehensibility of input, output and notice of form. In other words, whenever there was an indicator of non-understanding in the SCA environment, more than 80 percent of the time, the indicator type would be a type 3 or type 1; both provided conditions that maximised the potential for SLA. Surprisingly, type 2 occurred minimally in the SCA environment while in the F2F it was the second most common type of indicator tabulated. Type 2 indicator is a request for confirmation through repetition; so it does seem that type 2 is quite irrelevant in the SCA environment compared to the F2F environment.

Table 2: Distribution of indicators (%) among the high proficiency learners (HPLs) in the F2F and SCA environments

Type of indicators	No. of occurrences in the F2F environment (%)	No. of occurrences in the SCA environment (%)	Combined total no. of occurrences (%)
1. Explicit statement or request for clarification	32 (18)	24 (36)	56 (22)
2. Request for confirmation through repetition	68 (37)	4 (6)	72 (29)
3. Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation)	58 (32)	31 (47)	89 (36)
4. Request for confirmation through completion or elaboration of trigger or the previous utterance (another indicator or response when it is an extended negotiation)	19 (10)	1 (2)	20 (8)
5. Inappropriate response	2 (1)	6 (9)	8 (3)
6. Request for confirmation through comprehension check e.g. Do you understand?	4 (2)	0 (0)	4 (2)
TOTAL	183 (100)	66 (100)	249 (100)

In addition, Pica et al. (1989) found that type 1 indicator correlates significantly with syntactic modifications as the type of response regardless of task type. This study thus far had tested and advanced the correlation of type 1 indicator with syntactic modifications as responses and found a significant correlation regardless of environment. In other words, the higher occurrence of explicit statement or request for clarification by HPLs in either

environment would provide opportunity to promote SLA through syntactic modifications from the LPLs. Therefore, in this study, the higher occurrences of indicator types 3 (47%) and 1 (36%) by the HPLs by percentage in the SCA compared to the F2F environments (type 3, 32% and type 1, 18%) seemed to assist LPLs more in the SCA environment by providing them with the models of their problematic triggers and by prompting responses with syntactic modifications. The distribution of indicators by the low proficiency learners (LPLs) is examined next and the results are presented in Table 3.

Table 3: Distribution of indicators (%) among the low proficiency learners in the F2F and SCA environments

Type of indicators	No. of occurrences in the F2F (%)		No. of occurrences in the SCA (%)		Combined total no. of occurrences (%)
1. Explicit statement or request for clarification	28	(16)	16	(32)	44 (19)
2. Request for confirmation through repetition	93	(52)	5	(10)	98 (42)
3. Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation)	39	(22)	20	(40)	59 (25)
4. Request for confirmation through completion or elaboration of trigger or the previous utterance (another indicator or response when it is an extended negotiation)	12	(6)	1	(2)	13 (6)
5. Inappropriate response	7	(3)	8	(16)	15 (7)
6. Request for confirmation through comprehension check e.g. Do you understand?	1	(1)	0	(0)	1 (1)
<b>TOTAL</b>	<b>180</b>	<b>(100)</b>	<b>50</b>	<b>(100)</b>	<b>230 (100)</b>

In the F2F environment among the LPLs and similar to the HPLs, the most common way to indicate a problem of non-understanding is by requesting for confirmation through repetition i.e. type 2 (52%). This tallied with the results in Pica's (1994) study. The second most common way is through requesting for confirmation through modifications of the trigger (type 3, 22%). The third most common way is type 1 i.e. explicit statement of request or clarification request with 16 percent (28 occurrences) of the total number of occurrences of indicators among the LPLs in the F2F environment.

Interestingly, in the SCA environment among the LPLs, the highest occurrence of indicator type is type 3 (request for confirmation through modifications of HPLs' trigger); this is followed by type 1 with 16 occurrences (32%) and then type 5 (16% or 8 occurrences) with inappropriate response as an indicator of non-understanding. Type 5 seemed to be quite typical of the SCA environment because of the delay in transmission causing an inappropriate response. Type 2 which was very common in the F2F environment with 52 percent, only garnered 10 percent (or 5 occurrences) in the SCA.

In terms of indicators tabulated in the LPLs' repertoire, the SCA environment seemed to provide opportunity for comprehensible output from the LPLs and comprehensible input from the HPLs more than the F2F environment. This is through the preference for type 3 (request for confirmation through modifications) and type 1 (clarification request which would elicit a syntactic response from the HPLs). This seemed to indicate that the computer environment was more conducive as a provider of conditions for SLA.

Paired *t*-test was conducted in light of the normal distribution of the data on the number of occurrences of indicator types 1 and 3 for the HPLs and LPLs in the F2F and SCA environments to determine the significant differences and the results are presented in the Table 4. The results show that among the high proficiency learners, there are no significant differences in the occurrences of indicator type 1 and type 3 between F2F and SCA environments. Similarly, among low proficiency learners, there are no significant differences in the occurrences of indicator type 1 and type 3 between F2F and SCA environments.

Table 4: Paired *t*-test comparisons of the number of occurrences of Types 1 and 3 indicators in the F2F and SCA environments

Indicators	Environment						<i>t</i> *	<i>p</i> < .008
	F2F			SCA				
	n	M	SD	n	M	SD		
High Proficiency Learners								
Type 1	15	.93	1.10	15	1.07	1.28	.34	NS
Type 3	16	2.44	3.71	16	1.25	1.60	1.25	NS
Low Proficiency Learners								
Type 1	15	1.87	1.81	15	1.00	1.13	1.94	NS
Type 3	16	3.63	2.96	16	1.94	2.44	1.94	NS

\*With Bonferroni adjustments for multiple comparisons,  $p < .05 = .008$   
 Type 1 - explicit statement or request for clarification  
 Type 3 - request for confirmation through modification of trigger

In other words, on the role of language proficiency, although there were percentage differences in the two environments, there were no significant differences between types 1 and 3 in the F2F and SCA environments and between the HPLs and LPLs. To determine if there was a pattern in the preference of indicators by the HPLs and LPLs in the two environments, the three most common indicators among the HPLs and LPLs in the two environments were extracted and examined further in the following tables: Table 5 for F2F environment and Table 6 for SCA environment.

It is interesting to note that in both the environments, the 3 most common types of indicators preferred were the same for both the HPLs and LPLs although in terms of the number of occurrences and percentage of occurrences, there were relative differences. Both types of proficiency levels (HPLs and LPLs) preferred to indicate problems with comprehensibility of message most commonly with type 2 followed by type 3 and then type 1 in the F2F environment while in the SCA environment it was type 3 most preferred followed by type 1 and then type 5.

Table 5: The three most common indicator types among the LPLs and HPLs in the F2F environment

Most common indicator types by HPLs		Most common indicator types by LPLs	
2.	Request for confirmation through repetition (37%)	2.	Request for confirmation through repetition (52%)
3.	Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation) (32%)	3.	Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation) (22%)
1.	Explicit statement or request for clarification (18%)	1.	Explicit statement or request for clarification (16%)

Table 6: The three most common indicator types among the LPLs and HPLs in the SCA environment

Most common indicator types by HPLs		Most common indicator types by LPLs	
3.	Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation) (47%)	3.	Request for confirmation through modification of trigger or the previous utterance (another indicator or response when it is an extended negotiation) (40%)
1.	Explicit statement or request for clarification (36%)	1.	Explicit statement or request for clarification (32%)
5.	Inappropriate response (9%)	5.	Inappropriate response (16%)

The similarity in trend points to the fact that the behaviours in indicating problems seemed to be similar despite the difference in the language proficiency in the two environments. In addition, based on the types of indicators preferred, the two most preferred indicator types (i.e. types 3 and 1) in the SCA environment seemed more conducive for providing opportunities for SLA compared to the two most preferred indicator types in the F2F environment (i.e. types 2 and 3). This similarity in patterns also seemed to indicate that the environment and language proficiency had no role in the types of indicators 1 and 3 and this was tested further.

A correlation analysis was conducted to investigate the relationship between language proficiency and indicator types 1 and 3. It was found that there were no significant correlations between language proficiency and type 1 ( $r = -.30, p > .05$ ), language proficiency and type 3 ( $r = -.29, p > .05$ ) in the F2F environment. Similarly in the SCA environment there were no significant correlations between language proficiency and type 1 ( $r = -.02, p > .05$ ), language proficiency and type 3 ( $r = -.13, p > .05$ ). These results show that the indicator types 1 and 3 were not significantly correlated with language proficiency or the environment. In other words, the choice of indicator type 1 or 3 was not determined by language proficiency or by the environment.

Overall on the role of language proficiency on indicators, the above findings seemed to indicate that the indicator types 3 and 1 which would provide more opportunities for enhancement of SLA seemed to have high occurrences by the HPLs and LPLs in the SCA and the F2F environments. These trends augur well for SLA in both the environments. In other words, the requests for confirmation with modifications by the HPLs and the explicit statements or requests for clarifications by the HPLs would provide linguistic models of the LPLs problematic triggers and induce modified responses from LPLs through syntactic modifications and vice versa regardless of the environment. The findings for the role of language proficiency in the qualitative feature of responses of the negotiation routines are presented next.

#### Responses

Certain types of responses have been put forth to be more conducive for linguistic development (Pica et al., 1989). This study examined the role of proficiency in this qualitative feature found in the negotiation routines.

The results for the HPLs are presented first followed by those for the LPLs. Distribution of types of responses by the HPLs in the two environments is presented in Table 7.

Among the HPLs, in the F2F environment, the most common type of response is type 4 (46%) with sub-category 4D (34%). In the SCA environment, the highest occurrence of response type is also type 4 (65%) with sub-category 4D (48%) occurring with a higher percentage than in the F2F environment. The second highest is type 4B with 17 percent of occurrences. Since types 4D and 4B are claimed to be the response types that provide the most opportunity as linguistic models for LPLs' problematic triggers, therefore, the SCA environment seemed to be more conducive to provide for opportunities for SLA. The fewer occurrences of negotiation routines in the SCA environment were taken into consideration when making this claim.

Table 7: Distribution of types of responses (%) among the high proficiency learners in the F2F and SCA environments

Type of responses	No. of occurrences in F2F (%)		No. of occurrences in SCA (%)		Combined total no. of occurrences (%)
1. Switch to a new topic	2	(1)	0	(0)	2 (1)
2. Suppliance of information relevant to topic, but not directly responsive to indicator (previous utterance)	9	(5)	5	(11)	14 (6)
3. Repetition of indicator	9	(5)	2	(4)	11 (5)
4. Self modification of trigger (Production of modified i.e. comprehensible output)					
A. Phonological modification	2	(1)	0	(0)	30 (65)
B. Semantic modification, through synonym, paraphrase, or example	20	(11)	8	(17)	
C. Morphological modification through addition, substitution, or deletion of inflectional morpheme (s) and / or functor (s)	0	(0)	0	(0)	
D. Syntactic modification through embedding and elaboration in clause (s)	59	(34)	22	(48)	
	81 (46)		30 (65)		111 (50)

5. Repetition of trigger	18	(10)	4	(9)	22	(10)
6. Confirmation or acknowledgment of indicator only	56	(32)	5	(11)	61	(27)
7. Indication of difficulty or inability to respond	2	(1)	0	(0)	2	(1)
<b>TOTAL</b>	<b>177</b>	<b>(100)</b>	<b>46</b>	<b>(100)</b>	<b>223</b>	<b>(100)</b>

The results for the types of responses by the low proficiency learners (LPLs) are examined next. Table 8 shows that among the LPLs, in the F2F environment, the highest response type is type 6 (71 occurrences or 40%) which was expected given their limited linguistic ability. The second highest is type 4 response (32% or 56 occurrences) with sub-category 4D (26 occurrences or 15%) and 4B (25 occurrences or 14%).

Table 8: Distribution of types of responses (%) among the low proficiency learners in the F2F and SCA environments

Type of indicator	No. of occurrences in F2F (%)		No. of occurrences in SCA (%)		Combined total no. of occurrences (%)
1. Switch to a new topic	1	(1)	2	(3)	3 (1)
2. Suppliance of information relevant to topic, but not directly responsive to indicator (previous utterance)	15	(8)	12	(20)	27 (11)
3. Repetition of indicator	22	(12)	3	(5)	25 (11)
4. Self modification of trigger (Production of modified i.e. comprehensible output)					
A. Phonological modification	5	(3)	1	(2)	56 (32) } 15 (25) } 71 (30)
B. Semantic modification, through synonym, paraphrase, or example	25	(14)	3	(5)	
C. Morphological modification through addition, substitution, or deletion of inflectional morpheme (s) and / or functor (s)	0	(0)	2	(3)	
D. Syntactic modification through embedding and elaboration in clause (s)	26	(15)	9	(15)	
5. Repetition of trigger	9	(5)	3	(5)	12 (5)
6. Confirmation or acknowledgment of indicator only	71	(40)	25	(42)	96 (40)
7. Indication of difficulty or inability to respond	4	(2)	0	(0)	4 (2)
<b>TOTAL</b>	<b>178</b>	<b>(100)</b>	<b>60</b>	<b>(100)</b>	<b>238 (100)</b>

In the SCA environment, again because of the limited linguistic ability of the LPLs, the highest response type is also type 6 (42%); the second highest is type 4 (25%) with 4D (15%) followed by type 2 with 12 occurrences (or 20%). 4B only garnered 3 occurrences (or 5%); this meant that there were limited semantic modifications. In other words, response type 6 was very common among the LPLs in both the environments probably due to the limited repertoire of the LPLs. Self modifications of trigger i.e. type 4 was collectively high in both the environments while type 2 was unusually high in the SCA environment among the LPLs; the latter is probably due to the delayed transmission problem in the computer environment.

Compared to the F2F environment, the LPLs seemed more often to supply information which was not directly responsive to the signal of the interactional problem in the SCA environment; this reveals their linguistic inability to follow the interaction and to provide more appropriate responses directly relevant to the utterance before that. This is in contrast with the F2F environment. As for the lower occurrences of type 4B in the SCA environment compared to the F2F environment, semantic modification is limited probably because of the LPLs' limited linguistic repertoire.

Worth mentioning was the response type 4C in the SCA environment which garnered 2 occurrences by an LPL. This type of modification was not tabulated in the HPL or in the LPL data in the F2F environment. In this SCA environment among the LPLs however, both cases belong to an LPL because of the need to self-correct or modify her utterance at the morphological level as the example below shows:

- L: **what i mean....**  
 H: i think we should make it compulsory but let the student decide on which sports they want to enter  
 L: **what i meant** is they can enter any sports or act they like

For a comparison with HPLs' preference of response type, the three most common response types among the HPLs and LPLs in the F2F and SCA environments were extracted and are presented in Table 9 for the F2F and Table 10 for the SCA environment.

Table 9: The three most common response types among the LPLs and HPLs in the F2F environment

Most common response types by HPLs		Most common response types by LPLs	
4D	Syntactic modification through embedding and elaboration in clause (s)	6	Confirmation or acknowledgment of indicator only
6	Confirmation or acknowledgment of indicator only	4D	Syntactic modification through embedding and elaboration in clause (s)
4B	Semantic modification, through synonym, paraphrase, or example	4B	Semantic modification, through synonym, paraphrase, or example

Table 10: The three most common response types among the LPLs and HPLs in the SCA environment

Most common response types by HPLs		Most common response types by LPLs	
4D	Syntactic modification through embedding and elaboration in clause (s)	6	Confirmation or acknowledgment of indicator only
4B	Semantic modification, through synonym, paraphrase, or example	2	Suppliance of information relevant to topic, but not directly responsive to indicator (previous utterance)
2	Suppliance of information relevant to topic, but not directly responsive to indicator (previous utterance)	4D	Syntactic modification through embedding and elaboration in clause (s)
6	Confirmation or acknowledgment of indicator only		

In contrast to the similar trend observed in the types of indicators tabulated for both the HPLs and LPLs in both the F2F and SCA environments, the response types saw differences more so in the SCA than in the F2F environments. In the F2F environment, the three most common response types are similar but the ranking of frequency of occurrences is slightly different with HPLs having 4D (syntactic modification through embedding and elaboration in clause) as the highest response type followed by type 6 (confirmation or acknowledgment) while LPLs have response type 6 followed by type 4D. 4B (semantic modification, through synonym, paraphrase, or example) is relatively common for both HPLs and LPLs in the F2F environment. The linguistically more capable HPLs were able to generate responses of type 4D which has the greatest potential for SLA because of its syntactic modifications. These varied responses would provide a model and give opportunities to the LPLs to notice form and negotiate comprehensible output. Type 6 occurred most commonly in the LPL's data pointing to their limited linguistic repertoire which limited their ability to modify their utterances. Type 6 responses were also preferred among the HPLs in the F2F environment probably because the simple confirmation or acknowledgment was the easiest form of response and in the F2F environment was appropriate.

In the SCA environment on the other hand, the LPLs' linguistically limited repertoire is evident with the preference for simple acknowledgment in the form of type 6 responses. Furthermore, type 2 responses in the SCA environment were not surprising given the fact that the delay in transmission sometimes caused the suppliance of information relevant to the topic but not directly responding to the indicator. The 4D responses which would be the type of response with the most potential for SLA because of the syntactic modifications does not seem to be given the opportunity to occur as often in the SCA environment for the LPLs compared to the F2F environment. The HPLs' responses on the other hand, having more variety and modifications (type 4D and 4B), were similar to Pica's (1994) findings in the F2F data. These response types would provide evidence of

linguistic adjustments by interactants in negotiating meaning towards comprehensible input and output and in this case, in the SCA environment, provided a more varied linguistic model to LPLs' indication of non-understanding and thus provided more opportunities for notice of form.

In addition, response type 4D which was particularly favoured for the modifications of comprehensible output was tested for correlation with language proficiency. The results show that there is a significant correlation between language proficiency and 4D responses in the F2F environment ( $r = .41, p < .05$ ) but not the SCA environment ( $r = .30, p > .05$ ). This meant that the 4D responses generated by HPLs were not bound by the environment; HPLs produced 4D responses more in the F2F than in the SCA environment. For the LPLs, the 4D responses were found to be lower in the F2F but not in the SCA environment. The LPLs were given the opportunity to produce type 4D linguistically more varied responses to HPLs' indicators of non-understanding. This significant correlation provides evidence to support SCA as an environment for SLA through responses with syntactic modifications made by low proficiency learners.

### SUMMARY AND CONCLUSIONS

On the whole, the role of language proficiency in relation to the occurrences of indicators seemed to show that the greater tendency to indicate problems with type 3 (requests for confirmation through modifications of the trigger) and type 1 indicators (explicit statement or requests for clarification) by both HPLs and LPLs would provide more opportunities for LPL enhancement of SLA in the computer and the F2F environments. The response types produced in the two environments seemed to indicate that LPLs benefitted from the ample opportunity to negotiate for comprehensible input and to notice form due to the HPL's varied syntactic and semantic modifications (types 4D and 4B). The LPLs' response type to produce semantic responses i.e. their comprehensible output, however, seemed to be hindered in the SCA environment but this was not the case for the syntactic modifications which was correlated with LPLs in the SCA environment.

It can be concluded that learners' communicative language ability can be promoted with technology, in this case through the SCA environment. This experimental study utilising the SLA feature of negotiation of meaning or negotiation routines (NRs) provides empirical evidence that this environment offers an additional context for communicative language practice particularly for low proficiency learners.

### IMPLICATIONS FOR PEDAGOGY AND RESEARCH

With the empirical findings from this study, language teachers can promote the use of technology (CMC) in language teaching with the awareness that opportunities for SLA are enhanced with the occurrences of negotiation of meaning. The SCA mode of communication cannot replace F2F interactions but it can be an additional environment to provide opportunities for language practice with a view to developing communicative language ability with technology. Specifically, online chats could be an option for communication among learners and between learners and teacher.

In addition, anecdotal studies (Beauvois, 1992; 1998; Kern, 1995) and perception studies (Lee, 2004) on CALL which have promoted the CMC environment for low proficiency or minority or shy learners have gained corroboration from the empirical findings of this study. The SCA environment can support SLA as an additional context for those with low language proficiency to interact with others in the class. For low proficiency learners, it would be particularly beneficial to incorporate lessons using online chats as a bridge for F2F interaction.

Furthermore, the choice of discussion or decision-making tasks in this study generally provided the impetus for interactions and negotiation to occur (Long, 1980). The conversational nature of discussion/decision-making tasks provided potentially equal opportunities for both participants to negotiate meaning toward mutual comprehension of each other's linguistic production. However, unlike jigsaw tasks, there is no guarantee for negotiation to occur because of the open-ended nature of the task objective leading to more authentic production. Thus, goal-oriented tasks of the decision-making type should be deployed for the CMC environment for L2 learning and acquisition.

This study provided evidence that the frameworks employing the SLA negotiation of meaning at the macro (Varonis & Gass, 1985) and micro (Pica et al., 1989) levels were applicable for the further development of research and theory in CALL. The additional analytical framework by Pica et al. (1989) enabled an investigation of the qualitative measures of the routines of negotiation at a micro level. This framework could be employed in similar studies to enable comparisons to be made.

Future comparative research in this area may have as a feature the gender variable. The relatively small number of participants in Pica's et al.'s (1989) F2F study observed some interesting differences in the NRs between the

male and female participants. This merits further investigation. Furthermore, Smith's (2003) expansion model of negotiation in a CMC environment is a relatively new development. His rather detailed model of negotiation of meaning which applies to the CMC context only extends the basic negotiation routines of four stages proposed by Varonis and Gass (1985). Future researchers interested in extending the knowledge on the nature of negotiation of meaning in a CMC context will find Smith's model worth examining.

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