Interactional Patterns in Face-to-face and Synchronous Computer-mediated Communication in Problem-based Learning Contexts

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Abstract—This study seeks to unfold interactional patterns of Thai EFL learners performing the problem-solving tasks in face-to-face (FTF) and synchronous computer-mediated (SCMC) contexts and explain to what extents that characteristics of each context contribute to learners' interaction. Problem-based learning was implemented as a scenario of the tasks due to its potentiality in bringing nature of learners' interactions out into open. The participants in this study were divided into two groups. The first group discussed the problems in the FTF context where their verbal and non-verbal languages were videotaped while the second group performed similar tasks in the SCMC context through Skype. Their conversations were automatically recorded by the program and later retrieved. The interview was conducted a week after the last discussion. The results revealed that the learners communicated through interactional patterns particular to the learning context. Furthermore, the properties of each context had influences on interactional stages, language use, and social interactions.

Index Terms—interaction, face-to-face communication, synchronous computer-mediated communication, problem-based learning

I. INTRODUCTION

Interaction has long been acknowledged as one the most influential factors contributing to language learning. Among major SLA theories such as the input hypothesis, the interaction hypothesis, the noticing hypothesis, and the output hypothesis, it is generally accepted that interaction is a key success (Chen, 2005; Figura & Jarvis, 2007; White, 2003). Earlier researchers including Long and Robinson (1998) and Swain and Lapkin (1995) also pointed out that, through interaction, students can develop their interlanguage by receiving comprehensible input, feedback, negotiation of meaning, and producing comprehensible output.

Conventionally, language instruction is conducted in a classroom where learners interact through face-to-face (FTF) communication. They directly converse with others through spoken language. Nonetheless, this practice is being altered after the emergence of synchronous computer-mediated communication (SCMC), commonly known as online chat. It allows people to communicate with others regardless of time and place with a feeling of real-time nature close to FTF communication. Regarding its qualities, SCMC, particularly text-based such as Yahoo messenger and Skype instant messenger has been widely used in daily life and language classrooms (Nik, 2010).

A growing number of studies have shown that SCMC promotes language learning in various aspects such as enhancing language skills (Warschauer & Healey, 1998), oral proficiency (Abrams, 2003), grammatical accuracy (Lee, 2008), and amounts of output and attitudes (Blake, 2000; Kern, 1995; Warschauer, 1996). Nonetheless, it is inconclusive that SCMC facilitates language learning the same way as FTF communication for it is pointed out that interaction and language use are influenced by learning contexts (Fairclough, 2003; Herring, 2001; Wetherell, Taylor, & Yates, 2001). That is to say, learners of different learning contexts tend to interact, use language, and acquire a language in a different way.

In this paper, studies on interaction from the sociocultural perspective followed by research in FTF and text-SCMC interaction are reviewed. After that, details on how the study was conducted and how the data was analyzed are reported. Also included are results, discussions, and ended with the conclusion.

II. LITERATURE REVIEW

A. Interaction in L2 Learning and Sociocultural Theory

Interaction occurs when interlocutors transmit messages through spoken and/ or written language (Nik, 2010; Ziglari, 2008). Previous studies indicated that learners can develop their interlanguage when they engage in interaction since they are exposed to scenarios where it is necessary to make input comprehensible (Gass, 1997; Long, 1996; Ziglari, 2008), practice the target language in meaningful situations where they receive feedback and language modifications (Gass, 1997; Long, 1996), notice differences between the target language and their output (Ellis, 1994; Schmidt, 2001), modify their language (Gass, 1997: Pica, 1994; Swain, 1995, Varonis & Gass, 1985), and finally produce comprehensible output (Swain, 1985). Following the sociocultural theory (SCT) of Vygotsky (1978), language learning is viewed as a process of social interaction. That is, learners were born with endowed capabilities enabling them to perform different tasks on their own and achieve a certain cognition level. However, when they encounter a task beyond their current cognition level, they get assistance from more knowledgeable learners through a dialogic process—one form of social interaction—that helps developing their knowledge until they can reach their potential to perform a task alone (Ellis, 1999; Vygotsky, 1978). The extent of their actual and potential levels of development is referred to as the zone of proximal development (ZPD). It is defined by Vygotsky (1978) as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (p. 86)." Therefore, social interaction is the key to success in language learning from the SCT perspective.

B. Interaction in Face-to-face Learning Context

In face-to-face (FTF) communication, there is a direct contact between interlocutors whereby messages are produced, received, and responded simultaneously (Abrams, 2003). It is generally recognized as verbal communication or the use of words in oral interaction to convey ideas and feeling. Moreover, it involves non-verbal communication such as facial expressions, tones, and gestures that transmits meaning of messages without using words. Those features facilitate interlocutors to interpret meaning of messages more precisely and accurately (Mehrabian, 2009).

Given that language instruction traditionally takes place in FTF context, the main concern of earlier interaction studies is to investigate how FTF interaction contributes to language learning. The predominance tool for examining this aspect of interaction is meaning negotiation model proposed by Varonis and Gass (1985). It consists of two main parts: a trigger and a solution. The first part refers to a speaker's utterance that functions as an indication of non-understanding to a hearer. The second part consists of three elements: (a) an indicator that shows a lack of comprehension, (b) a response which acknowledges a request for additional information from the indicator, and (c) a reaction to response, an optional element, that shows understanding on the trigger and signifies the readiness to proceed the conversation. Table 1 portrays how each element functions.

TABLE 1.
MEANING NEGOTIATION MODEL OF VARONIS AND GASS (1985)

Utterance	Function
S1: And your what is you…mmm…father's job?	-
S2: My father now is retire.	Trigger
S1: Retire?	Indicator
S2: Yes.	Response
S1: Oh yeah.	Reaction to response

This model has been acknowledged for its potential and implemented as a framework in many studies to explore roles of interactions on various aspects of language learning including task types (Nakahama, Tyler, & Van Lier, 2001), students' dyads (Soler & Guzmán, 1994), and meaning negotiation in other learning context (González-Lloret, 2003; Keller-Lally, 2006; Smith, 2003). In conclusion, despite different variables taken into account, studies on interaction in FTF context yielded positive results in language learning and affirmed that interaction is the key factor constituting successful communication.

C. Interaction in Text-SCMC Learning Context

In text-SCMC, chat software and networked computers are used as a means of communication for sending and receiving text messages. Text-SCMC interlocutors, almost at the same time, receive messages, comprehend them, and produce quick responses as if they were communicating orally to keep up with the flow of the conversation (Jepson, 2005; Jurkowitz, 2008). Due to the fact that text-SCMC provide learners with exposure to meaningful interaction (Blake, 2000; Pellettieri, 2010; Razagifard & Razzaghifard, 2011; Smith, 2003), the main focus of many text-SCMC studies is parallel to that of FTF studies: examining how learners negotiate for meaning (Chu, 2004; Fernández-García & Martínez-Arbelaiz, 2002) and how language learning is facilitated in text-SCMC context (Abrams, 2003; Kung, 2004; Razagifard & Razzaghifard, 2011). Another major interest is investigating how fast the pace of text-SCMC had a consequence on language use as shown in the studies of Jarkowitz (2008), Kung (2004), Smith (2003) and Wang and Woo (2007).

With concern on the impact of changing learning contexts on learners' interaction, together with the limited studies disclosing complete interactional patterns of learners in either FTF or CMC context, this study was initiated to investigate the interactional patterns of Thai EFL learners in both FTF and text-SCMC contexts where problem-based learning was used as a scenario. The research questions are as follows:

1. What interactional patterns do Thai EFL students employ in the FTF and text-SCMC contexts?
2. How does the context of learning result in learners' interactions?

III. METHOD

A. Participants

The participants were twelve second-year English major students from the Faculty of Education at Chiang Mai Rajabhat University. They were purposively selected from the students who volunteered to participate in this study. They then were divided into two groups based on their preferences on learning context. For those interested in the text-SCMC context, they had to possess typing skill sufficient for carrying on the tasks. Each context group was sub-divided into groups of three for problem-solving discussions.

B. Procedure

Four lessons were employed. Each lesson took two weeks: three hours a week. In the first week of each lesson, the learners studied in their regular class. In the second week, the FTF participants discussed the given problems in their regular classroom by means of oral communication. During the discussions, they were videotaped for both verbal and non-verbal languages. For the text-SCMC participants, they performed the similar tasks in the computerized language laboratory through an online chat program called Skype. Their conversations were automatically saved by the program and later retrieved at the end of each chat session. A week after the last discussion, a member of each sub-group whose performance was outstanding in producing high amount of output and who played a dominant role during the discussions was selected and interviewed. The interview was conducted, audio-recorded, and transcribed by the researcher.

The tasks were developed on the problem-based learning (PBL) basis since PBL has been affirmed for its potentiality for eliciting high volume of interaction (King, Greidanus, Carbonaro, Drummond, Boechler, & Kahlke, 2010; Sanguansai, Saechan, Fongmanee, & Keawsoi, 2007). Barrows (1996) asserted that PBL students are highly motivated to interact with other students for they have to construct knowledge through inquiry process. Additionally, because PBL problems are related to their real life and have various possible solutions to be considered, students are encouraged to be more involved in PBL discussions (Shelton & Smith, 1998).

IV. DATA ANALYSIS

To analyze the data, the coding process of Strauss and Corbin (1990) was employed. It consisted of four stages: (a) transcribing verbatim where the recordings of FTF discussions and the interviews were converted to text without correction on language mistakes; (b) open coding in which all data—transcripts of the FTF discussions and interviews, and chat logs—were examined for concepts and evidences related to learners' interactions and then labeled; (c) axial coding by which the labeled concepts with sharing characteristics were grouped together as a category and given a concept name; and (d) making conclusion where each category was observed for details as well as interconnections among categories. Subsequently, conceptual patterns of FTF and text-SCMC interactions were derived.

V. RESULTS AND DISCUSSION

It was found that learners' interactions were distinct in each learning context as shown in Fig. 1.

A. FTF Interactions

The analysis of the transcripts indicated that there were six steps involved in the FTF problem-solving discussions.
Step 1: Task exploration
This step consisted of three sub-stage: (a) introducing a task overview which was initiated by a leader uttering the marker "We will + task overview" so as to start the discussion, (b) discussing task details such as conditional circumstances, causes, and effects of the problems, and (c) setting a goal where the learners suggested ways to solve the problem. Excerpt 1 demonstrates learners' interactions in this step.
Excerpt 1
Poto: Ok, Hern, today *we'll* we talk about um...the problem um (Task overview) that Thomas has to travel in Chiang Mai.
Hern: Oh, I see.
Poto: So? How how how how should we… How do we::
How can we do:
Hern: But but we have to think first. He he has er: he has er: (Task detail)
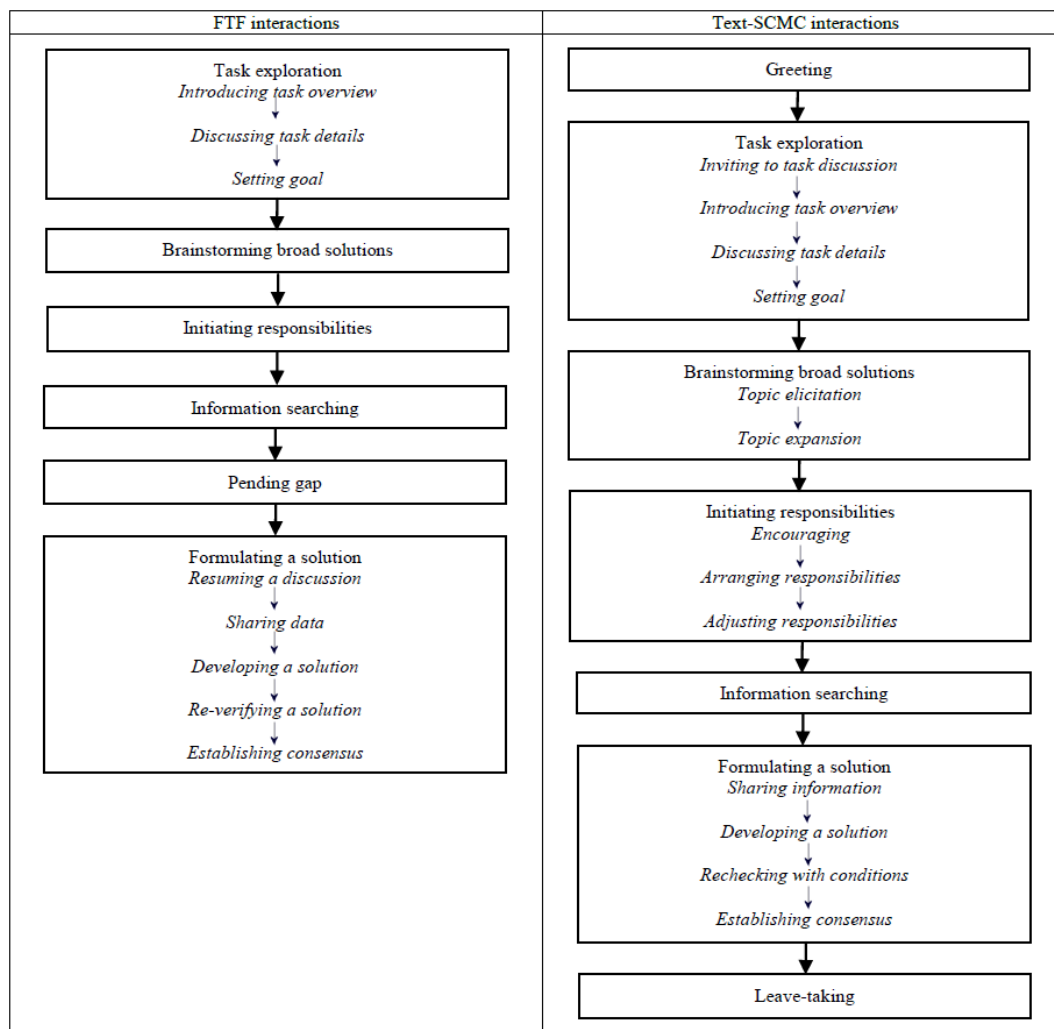
Figure 1. Learners' interactions in problem-solving discussion

he has three thousand baht for: three days.
Tai: Yes and and and and she ha- she ha- er er he has three day (Task detail)   for this trip.
        …
Hern: Make a plan for for for: travel in Chiang mai. (Goal)
Poto: Yes:, we make: make a travel plan for him.

Step 2: Brainstorming broad solutions
The learners brainstormed relevant information necessary for constructing solutions. To propose their ideas, the marker "I think" was used. Excerpt 2 is an example of this point.

Excerpt 2
Cake: First, I think the place to stay. If you, if we plan the place to stay it, we control activity.
Nan: ((nod)) I think it's:: the:: the Impress hotel.
Cake: ((inhale)) Very expensive.
Nan: I see, I see. Er, and, and you? ((turn to P)) What do you think?
Pim: Ummmm… I: think… I think er should him to er:: the Imperial.
It should be noted that the FTF learners brainstormed a single topic at a time. After general ideas of a certain topic were attained, they moved on to discuss the next topic.

Step 3: Initiating responsibilities
The learners volunteered to find information on topics mentioned in stage 2. Their choices were expressed through the marker "I will find/ search + topic" followed by expansion on details, examples, and reasons for choosing that topic as shown in Excerpt 3.

Excerpt 3
Hern: There are many there are many natural places in Chiang Mai. But the first thing *I wis I will find information about them.*

Step 4: Information searching

To commence data searching, the learners used "Let's search/ find" as a marker to encourage all members to explore Information. Excerpt 4 demonstrates this point.

Excerpt 4

Tai: *Let's search.* Find information?
Poto: *Search.* Yeah, yeah, yeah. You do, you do.

Step 5: Pending gap

Then, a member who finished the first would ask a question using either "Finish?" or "Done?" as a marker to continue the discussion and find out about other learners' readiness. It should be noted that, the discussion did not proceed immediately after a question was asked. It was held until all of the learners showed signs of their readiness.

Step 6: Formulating a solution

This step included five smaller stages: (a) resuming a discussion in which after all learners had showed signs of their readiness, one student would ask a question to invite other students to share information, (b) sharing data where the learners took turns giving information. Each learner's turn was mainly introduced through the marker "I find + information" and handed over to the next learner in a form of questioning, (c) developing a solution in which the learners proposed possible solutions through the markers "should," " can," and "suggest." Only necessary information was selected for constructing a solution, (d) re-verifying a solution which included making a conclusion and condition-rechecking. This stage aimed to ascertain that the solution was congruent with the given situation, and (e) establishing consensus whereby the learners ended the discussion by making compliments on the finalized solution through the marker "It's a great/ good+ N" followed by showing agreement to it though the marker "Ok." An example of this step is shown in Excerpt 5 below.

Excerpt 5

Hern: What about infor- information that… that you you find? (Resuming the discussion)
Tai: *I I find* erm.. the interesting places in Chiang Mai. (Sharing data)
        I think is Mae Wang district.
…
Poto: So Hern, what about you?
…
Hern: How how we make how we make a plan for   for for=   (Developing a solution)
Tai: Three day.
Hern: =three day? For travelling, for his travelling. About the
        frist day,
Tai: I I think the first day we will em:::
Hern: We should we should we should him to to travel around
        Chiang Mai, around Chiang Mai? Visit visit temples.
…
Poto: … if we will:: your bring him to travel: in Chiang Mai (Re-verifying a solution)
        first day? to to visit at Wat Phrathat Doi Suthep or?
        vis- er Wiang Gum Gam museum? all the first day and
        the second then second day we will ((hand to Tai))
…
Hern: Er: about: about money. It's enough or not enough? (Re-verifying a solution)
…
Hern: Ok. It's a great plan:: (Establishing consensus)
Poto: Yes:: Ok?
Hern: Ok. (Establishing consensus)

To sum up, each step in the FTF interactional patterns contains its particular markers and functions demonstrating how meaning was constructed in problem-solving discussion.

B. Text-SCMC Interactions

During the problem-solving discussions, the text-SCMC learners were engaged in seven steps as follows:

Step 1: Greeting

The text-SCMC learners started a conversation using a variety of language in greeting whereby all learners were involved as shown in Excerpt 6.

Excerpt 6

[9:44:01] Chak: hello
[9:46:03] Su: hello
[9:46:23] Chak: how are you?
[9:46:37] Ploy: fine
[9:46:57] Chak: 😌
[9:47:44] Su: 🤗

Step 2: Task exploration

Then, the text-SCMC learners explored the tasks in a manner close to those of FTF learners. It started from discussing task overview and task details to setting goal respectively. The only difference was at the beginning of this step where a question was addressed. It functioned not only as a transition between the first and the second steps but also as a topic initiation. An example is in Excerpt 7.

Excerpt 7
[17:13:11] Tin: How about the topic that we got (Inviting to task discussion)
[17:14:07] Wee: I think thomas to visit in chiang mai (Task overview)
[17:14:31] Pit: but he have only 3000 bath (Task detail)
[17:14:38] Tin: Oops!!!
[17:15:09] Tin: How many days?
[17:15:26] Pit: I think just 3 days(Task detail)
[17:16:17] Tin:How can we oganize to him 3000 for 3 days right?
[17:20:00]Pit: He have just only 3000 bath but he would like (Task detail) to visit several spots
[17:20:08] Wee: We will give him the best memorie in 3 days   (Task detail)
[17:21:03] Tin: first we have to think about travel plan (Goal)

Step 3: Brainstorming broad solutions

This step involved two sub-stages: topic elicitation and topic expansion. In the first sub-stage, topics necessary for developing a solution were initiated regardless details as shown in Excerpt 8. In the second sub-stage, concepts, details, and examples were elicited one topic after the others. These are shown in Excerpt 9.

Excerpt 8
[9:53:42] Ploy: what to eat? (Topic1)
[9:54:01] Ploy: transportation?? (Topic2)
[9:54:10] Su: Go to temple
[9:54:22] Su: Zoo
[9:54:42] Chak: a place to stay for 3 night (Topic3)
(4 lines)
[9:56:30] Chak: where are to visit?, too (Topic4)

Excerpt 9
[9:57:42] Su: About many temple in CM. (Topic4)
[9:57:46] Chak: wat pra singha. (Topic4 example)
[9:57:55] Su: Yes
[9:58:10] Cha: Wat loy kroh (Topic 4 example)

Step 4: Initiating responsibilities

Each learner volunteered to gather information on certain topics. This step consisted of three sub-stages: (a) encouraging whereby one learner suggested other learners start searching further information through the marker "I/ We (should) find information," (b) arranging responsibilities in which each learner volunteered for a certain topic by using a marker " I + find/ search/ choose + topic" to propose their preference on certain topics, and (c) adjusting responsibilities in which the learners investigated and adjusted their responsibilities so as to make the plan successful. This point is illustrated in Excerpt 10.

Excerpt 10
[17:43:41] Tin:let we find more information first (Encouraging)
[17:43:41] Pit: ok good
[17:43:41] Pit: but wich topic I can help
[17:44:46] Wee: I will find about travel place (Arranging responsibilities)
[17:44:50] Tin: I am going to find more about the activities (Arranging responsibilities)
[17:45:05] Pit: ok
[17:45:11] Pit: I will find about (Arranging responsibilities)
[17:45:15] Pit: eating
[17:46:13] Tin: How about hotel and transportation (Adjusting responsibilities)
[17:46:35] Wee: I will find hotel (Adjusting responsibilities)
[17:48:38] Pit: I will find about transport and food (Adjusting responsibilities)

Step 5: Information searching

In step 5, each learner searched information on a topic for which he or she was responsible. The transitional phrase "Let's + V.1 " was used as a marker to initiate this step as shown in Excerpt 11.

Excerpt 11
[18:09:18] Tin: Let's goooooooooooo
[18:09:25] Wee: ^_____^
[18:09:30]Tin:: 😄

Step 6: Formulating a solution

This step consisted of four sub-stages: (a) sharing information—any learners shared their information to their groups simultaneously regardless turn-allocation, (b) developing a solution—the learners evaluated all information by discarding irrelevant information and developed possible solutions based on information being shared, (c) rechecking with conditions by referring back to the given conditions and/ or making a conclusion, and (d) establishing consensus through making compliments and/ or showing direct agreement with the solution. An example is in Excerpt 12.

Excerpt 12
[18:03:37] Wee: I got information about travel place such as (Sharing information)
[18:03:45] Tin: I found that the activities (Sharing information)
…
[18:05:35] Pit: about the food I found buffet brownie (Sharing information)
…
[18:15:38] Tin: next we have to design all for each day (Developing a solution)
…
[18:48:03] Tin: 3000 will be enough (Rechecking with conditions)
[18:48:10] Pit: I think so
[18:49:15] Tin: It's a deal (Establishing consensus)

Step 7: Leave-taking

After formulating a solution, the text-SCMC learners ended the discussion through leave-taking exchanges in which all learners were involved as shown in Excerpt 13.

Excerpt 13
[11:54:42] Su: See you tomorrow.
[11:54:44] Ploy: See ya next week.
[11:55:02] Chak: see you!!
[11:55:05] Su: good bye
[11:55:19] Chak: ☀
[11:55:20] Ploy: byeeee
[11:55:26] Su: 😄

It can be said that, the text-SCMC learners experienced seven major interactional steps with functions and markers particular to the context during the problem-solving discussions.

C. Interrelationship of Interactions and Learning Context

In addition to findings on interactional patterns presented above, this study provides further analysis of interactions in three aspects: overall structure, language use, and social interaction, as well as explanation of how they were influenced by the learning context.

1. Overall interactional patterns

The analysis of the transcripts and the chat logs indicated that the FTF discussions were shorter in length and took less time than the text-SCMC discussions. In terms of interactional steps, those in the FTF context were geared towards problem-solving activity whereas the text-SCMC interactions contained greeting and leave-taking stages embedded to problem-solving activity. This concurs with the studies of Chang (2007) and Negretti (1999) suggesting that text-SCMC learners showed awareness on typical conversational sequence consisting of greeting, activity, and leave-taking. To explain, the availability of audio-visual cues allowed the FTF students to observe one another. Therefore, it was likely that they started a discussion as soon as all of the learners were present and ended it when all of them agreed on the solution without greeting and leave-taking. On the contrary, the absence of audio-visual cues of the text-SCMC resulted in the learners concocting other compensatory communication strategies. In this case, they used greeting to monitor if all of the learners were ready for the discussion, and leave-taking to indicate the end of a discussion.

Moreover, it is shown that the FTF interactions did not contain as many turns as the text-SCMC interactions and were orderly managed following initial-response structure. On the other hand, the text-SCMC interactions were conveyed through a large number of messages with disrupted turns and overlaps in meaning. This phenomenon could be discussed on a basis of how messages were transmitted. According to Cherny (1999, as cited in Herring, 2001), messages are two-way transmitted in FTF context—produced by an addresser and received by an audience at the same time. Through this property, FTF learners gained simultaneous feedback and signals of turn-allocation from their interactional partners, and consequently produced responses adjacent to the initiated turns. Thus, FTF interactions are coherent and precise in meaning transmission. In contrast, text-SCMC is one-way transmission—an audience cannot witness that a massage being produced until he or she receives it. Because the text-SCMC learners were absent from immediate feedback, they posted messages with less constraint on turn adjacency as Tin stated that, "the absence of my interactional partners caused non-immediate responses…If I want to express my ideas, I will do it first. Then, I will come back to read my friends' ideas..." Another possible explanation is the limited space for text characters in each message; a very long message had to be divided into several short messages (Herring, 2001).

One interesting finding was the text-SCMC learners were likely to re-organize their previous actions as shown in the brainstorming stage and the initiating responsibilities stage (see Fig. 1). One possible explanation for this is the availability of written conversation on the screen which encouraged the text-SCMC learners to revisit their interactions

and adjust them as Tin reflected during the interview that, " It (the written conversation) helps me and my friends realize if my ideas and their ideas are agreeable and which points should be reexamined." In addition, the transmission of messages was taken into account for explaining this result.

2. Language use

The analysis of the transcripts indicated that the FTF interactions relied on spoken language where verbal language was used as a main tool together with some features of non-verbal language to convey meaning to others. Those features included, for instance, prosodic features such as stress and intonation; paralinguistic features which covered body language, gestures and facial expressions; and backchannelling such as 'uh-huh' and 'I see.' This is illustrated in Excerpt 14.

Excerpt 14
Hern: (How about?) Er: about: about money. It's enough or not enough?
Poto: Oh.
Tai: I think: it's::… enough.
Hern: Enough.
Poto: ENOUGH? ((frown))
Tai: Enough?
Hern: I not sure. ((laugh))

Excerpt 14 reveals a number of spoken discourse features: (a) a filler "Er," (b) a contraction "It's," (c) pause in speech "…," (d) back-channeling "Oh," (e) facial expressions inlcuding frowning and laughing, and (f) raising intonation and loudness of speech as in "ENOUGH?"

For the text-SCMC language, although it is written-based, it showed characteristics of both written language such as the use of punctuation, long sentences with subordinate clauses, and complex syntax; and spoken language such as the use of incomplete sentences and informal language. It also involved replication of spoken discourse features such as a string of words, as shown in Excerpt 11, that emphasized a certain word and capitalization such as "NO" which indicated loudness. These hybrid characteristics might stem from the simultaneity of text-SCMC. It made the learners felt as if they were communicating in the FTF context and, therefore, adapted some spoken language features in their conversations. Furthermore, emoticons—a device in text-SCMC combined of punctuation marks and other characters that display facial expressions—were used to express feelings and emotions as an alternative for of non-verbal language (Jibril & Abdullah, 2013; Sauro, 2011). The learners also used them as a substitution for referential meaning. Excerpt 15 below is an example. The sentence "I don't agree" was replaced with the emoticon 😕.

Excerpt 15
[18:37:04] Pit: what do you think?
[18:37:18] Tin: 😕

This result supports previous study of Fussell (2002, as cited in Derks, Bos, & Grumbkow, 2007). He proposed that the functions of emoticons involved not only displaying emotions and non-verbal language in the computer-mediated context but also literal or referential meaning in respect to that conversational context. Another characteristic of text-SCMC language that should not be overlooked is ignoring syntactic rules such as the use of lower case; and subject pronouns, determiners, and auxiliary verbs omission. Herring (2001) explained that these syntactic errors did not imply that the learners lack some kind of knowledge. Instead, it was because they tried to ease their typing and show their creativity in language use. Keep in mind that the FTF learners likewise produced a number of language errors. However, errors in FTF communication were mostly produced unconsciously regarding the simultaneity of direct communication. Therefore, the explanation of text-SCMC above was not applicable to that in the FTF context. Accordingly, it is shown that the learners of both contexts showed little concern over the correct use of language. The interview data uncovered this point. Tai, an FTF student, said, "when we talked about the same topic, overlooking some language errors and continuing the conversation would be more beneficial for the discussions because it aided the communication—making it more understandable and direct to the point…it made the conversation progress." The same is also true for the text-SCMC learners. Tin reflected during the interview that, "In the online chat, it is unnecessary to use perfect grammar. We can use spoken language in the online chat so as to make it easy for others to understand our messages." This shows that the learners of both contexts were more aware of exchanging ideas and the goal of the task than accurate language use which was consistent with previous studies of Gass (1997) and Lee (2002).

3. Social interaction

It was found that this aspect of social interactions contributed to the interaction of language learning. The learners in both contexts made an attempt to communicate in social interaction. Furthermore, they basically negotiated for meaning in the same way and in similar nature to Varonis and Gass' meaning negotiation model. This finding confirms earlier studies of Gonzádez-Lloret (2003), Keller-Lally (2006), and Smith (2003). In addition to this, two interesting points on interactions have emerged. The first point is in agreement with Warschauer's (1996) findings showing that FTF interactions contribute more to language learning than text-SCMC interactions. There are several possible explanations for this result. First, the FTF learners tended to negotiate for meaning more frequent than the text-SCMC learners since they were likely to produce more language errors regarding the speed of FTF communication. Moreover, the FTF learners could benefit from the sharing physical space and availability of audio-visual for they could immediately

indicate their non-understanding during the discussions. Third, because the text-SCMC learners had more time to refine their language before posting their messages, their language errors were accordingly lower (Kelm, 1992; Warschauer, 1996; Smith 2003). The interview data reflected this point. Ploy stated that "I spent few minutes thinking about vocabulary and grammar before typing messages." Another interviewee, Tin, also proposed ideas supporting this point:

I have to think what I am going to type and whether my messages signal meaning conforming to my ideas…On the basis that online users cannot see their interactional partners, they will be aware of their conversation coherence. The online users, therefore, try to find the best way to transmit meaning to raise mutual understanding.

Another possible explanation led to the advantage of written conversation. Ploy explained that, in some cases, meaning negotiation was unnecessary because written conversation facilitated her with context clues.

I would rather ignore asking about incorrect word use because I could guess the meaning of that word without asking for explanation of every incorrectness. I could guess…replace that wrong word with words that are likely to be correct. As a result, I can understand the meaning of that wrong word by myself.

This explained why the FTF learners were more involved in meaning negotiation than the text-SCMC learners. Another finding that has not been explained in earlier studies was the role of non-verbal language in meaning negotiation. Even though it is commonly known that meaning is mainly developed through dialogical process or verbal communication, based on sociocultural theory, this study revealed that non-verbal language played a significant role. Oftentimes, the FTF learners signaled their non-understanding by uttering exclamation such as "Huh?" and "Ha," raising eyebrows, frowning; clarified meaning with the aid of non-verbal language; and used back-channel features such as nodding and interjection as in "Uh-huh" to show their understanding towards modified language. Mehrabian (2009) explained that non-verbal language is the largest part in FTF communication and it conveys meaning much better than the words being spoken. In addition, one of the interviewees, Cake, offered an interesting idea on this point. She stated that, in the situation she had to clarify meaning, gestures were preferable to verbal language for "gestures are comparable to universal language that creates mutual understanding among interlocutors." Surprisingly, non-verbal language played role in not only the FTF context but also in the text-SCMC context, in the written form. An example is shown in Excerpt 16.

Excerpt 16
[13:56:50] Ploy: She shouldn't drinks pop and caffeine. She should drinks water and hot tea or chamomile hot tea instead coffee. They are reducing stress and feeling calmer.
[13:57:11] Chak: do you know what kind of vitamins??
[13:57:40] Su: ????

From this example, a question mark posted by Su functioned as rising intonation to indicate her non-understanding about previous messages. This strategy could result from the real-time nature of text-SCMC, as previously explained, that the learners replicate spoken discourse features in written form to maintain the pace of conversation. Despite this, it should be noted that these devices were inferior to non-verbal language of FTF context (Wang & Woo, 2007) as Ploy puts it:

Although I like to use question marks and emoji—a kind of cartoon characters—to indicate my non-understanding, I think it is not as effective as communicating in the FTF context for, in the text-SCMC context, I cannot see my interactional partners' gestures and facial expressions. That makes the transmission of meaning more difficult than the FTF communication.

From the results presented, it can be said that learners' interactions are echoes of each learning context nature where they are exposed to.

The contributions of the findings are discussed in two panes. The first pane pertains to SLA theories. In relation to the input hypothesis (Krashen, 1982) and the interactional hypothesis (Long, 1985), the learners of both learning contexts were exposed to input that could be made comprehensible through meaning negotiation. In respect to the output hypothesis (Swain, 1985), both learning contexts provided learners with opportunities to produce output in which they could test their hypothesis about the target language, notice gaps between the target language and their language output, get feedback from their interactional partners, and modify their output. Furthermore, interactions among the learners in both contexts confirmed the role of interaction from Vygotsky's (1978) sociocultural theory in that learning is a social process. During the problem-solving discussions, they got assistance from other learners through social interactions to overcome communication problems. This gave rise to cognition and interlanguage development to the point that learners could accomplish tasks by themselves. Therefore, both learning contexts were acquisition-rich for language learning. The second pane throws lights on classroom implications. In future planning, teachers are encouraged to be aware of timeframe. Studying in the text-SCMC context may not be suitable for classes with limited time because learners need extra time to read messages, comprehend them, type responses, and monitor their language before sending a message. Moreover, teachers should be more considerate on how to implement tasks, facilitate learners, evaluate learners' knowledge and performance of different contexts. In respect to language errors abandonment, it is necessary that teachers raise learners' awareness on correct language use to prevent future language misuse and fossilization. Over and above, keep in mind that each learning context holds its unique characteristics and strengths. Therefore, implementing it to lessons with its own right could draw out its highest capacity and yield the most benefits to learners. In relation to problem-based learning, problems are meaningful to learners with various possible solutions,

together with learning as an inquiry process, were proved to be efficient in promoting dynamic interaction among the learners. This seems to validate the view that PBL promotes co-construction of meaning through social interactions consistent with the studies of Hmelo-Silver (2004) and King et al. (2010). Therefore, it is recommended that language teachers implement PBL in language classrooms so as to promote learners' interactions and language development.

This study has limitations needed to be noted. While one criticism of this method might be that the CMC tasks were unnatural given that most CMC interactions occur asynchronously such as facebook and discussion boards, the scope of this study does not intend to draw conclusion about the narrower patterns of the computer-mediated language among various tasks and groups. In other words, this study is not interested at this stage about synchronous versus asynchronous computer-mediated language differences. Instead, the focus of this study is the broader interactional patterns that students engaged in during the FTF and SCMC conversation. While it is certain that extending the method at a later time will yield interesting data, it is not felt that the method here, using SCMC, has shown the results in terms of the parameters and research questions for this particular study. Another limitation is the small number of the participants. Consequently, the results may not be generalized to other contexts. The third limitation concerns with the participants' language proficiency. Regarding the requirements that the participants gained scores at least 50 percent based on their English proficiency test score of Chiang Mai Rajabhat University, all of them had close language proficiency level. Therefore, the results did not yield a variety of communication strategies during the discussion. The last limitation is the gender issue: each group consisted of different number in male and female. It is unclear that there is an impact of the difference in gender dyad on the results of this study.

Future studies are needed to look at wider range of data including the number of participants and PBL lessons to investigate a confirmation or disconfirmation to findings in this study. Other issues such as gender and cultural context should also be investigated for further explanation on learners' interaction. There is a need to examine if learners can transfer their knowledge, skills and strategies form one context to another context and whether all of which are altered by learning context.

VI. CONCLUSION

This study aims to unfold how learners in the FTF and text-SCMC contexts interacted during the PBL discussions; and to explain how characteristics of each learning context give impacts on their interactions. The findings of this study extend knowledge of the nature of interactions in both learning contexts and yield benefits for language teaching, and thus the following conclusion can be drawn: interactions were shaped by context; and as long as that learning context provides learners with opportunities of social interaction, language learning is facilitated.

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