Investigating L1 Arabic EFL Learners' Interactional and Attentional Processes in

Text and Voice Task-based Synchronous Computer-Mediated Communication

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Abstract

While there is a growing body of research considering second and foreign language (L2) learners' interaction and cognitive engagement in synchronous computer-mediated communication (SCMC), much of the speculation is based on the potential of text chat, with a great deal of uncertainty of how L2 learning opportunities can occur in voice chat. However, voice chat has now become more feasible for this specific purpose, due to the widespread availability of the relevant hardware. In addition, relative to text chat, voice chat has higher social presence and increased social and prosodic cues (e.g. voice tone, stress, intonation), which could promote better understanding and smoother flow of communication. There is, however, a dearth of research on its impact on language learning in comparison to the research on text chat.

In a study involving 40 (20 dyads) intermediate-level Arabic learners of English, this thesis attempts to fill this gap by investigating the impact of text chat and voice chat on negotiations and noticing during task-based interactions. The study had a one-shot, repeated-measures design. Stimulated recall interviews were carried out after the completion of the task-based interactions in the two modalities, in order to elicit data on the participants' noticing of interactional feedback. Follow up questionnaires and interviews were also administered to elicit participants' perceptions of their learning experience in the two modalities.

The findings revealed that voice chat generated more negotiation episodes and incidents of noticing of feedback than text chat. These differences were, however, not statistically significant. Conversely, text chat generated significantly more instances of self-initiated noticing (i.e. self-repairs) than voice chat. Self-repair during text chat, however, tended to focus on spelling. These quantitative findings suggested that, regardless of the SCMC modality, both contexts are equally facilitative for promoting negotiated interaction and noticing of feedback.

Moreover, qualitative analysis of the learners' responses in the debriefing interviews revealed their appreciation for both modalities, implying that both contexts could be incorporated in L2 teaching and learning. In addition, as learners reported that text chat was time-consuming and resulted in incoherent and shallow discourse, pedagogical implications stress that learners need to be prepared for this type of communication, so as to ease the level of completing tasks in text chat, increase their productions and support a more rewarding L2 chatting experience. Additionally, the stimulated recall data offered some methodological implications pertaining to the study of the cognitive process of noticing.

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Author's Declaration

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I hereby declare that this thesis is the result of my own work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

Chapter 1: Introduction

1.1 Background of the Study

Many researchers have claimed that interaction in the target language is crucial for its successful acquisition and development. Long's (1981, 1996) interaction hypothesis - now referred to as the interactionist approach to second language acquisition (SLA) or input interactionism - claims that interaction in the target language is central to language learning, since this interaction offers opportunities for *negotiation for meaning*. Negotiation for meaning is a process of modifications and restructuring used by the interlocutors when experiencing difficulties in message comprehensibility, in order to better understand one another (Pica, 1994). As part of this negotiation, learners receive interactional feedback on their language production, which may help them notice gaps in their own formulations of the target language and in the language used by their conversational partners. As a result of this, learners may modify their output in order to be understood (Mackey, 2012). The concepts of input, feedback, noticing and output are the main constructs of the interactionist approach, which all work cohesively to promote L2 learning and acquisition.

There has been a growing body of research pertaining to the use of Computer-Mediated Communication (CMC) and its effectiveness in the construction of knowledge across various fields of study, including second/foreign language (L2) learning. Over the past two decades, with the evolution and growth of Synchronous CMC (SCMC) tools, which have potentially allowed L2 learners to engage in interaction similar to those found in face-to-face (FTF) contexts, L2 researchers and educators have shown a keen interest in exploring how SCMC can be utilized for L2 learning and acquisition (Mackey, 2012). Of particular interest, the application of text-based SCMC has enjoyed growing interest among researchers, due to its inherent features, including the visual saliency of linguistic input, the permanent nature of written discourse and slower pace of interaction – all of which are argued to offer theoretical and pedagogical merits for language noticing (Blake, 2000; Kern, 1995; Pellettieri, 2000; Smith, 2004, 2005; Sauro, 2009; Warschauer, 1997).

A central issue that SLA researchers have focused on is the text-based SCMC potential to increase learners' negotiations and cognitive engagement during L2 interactions. The notion of text-based SCMC as a pedagogically sound environment for the cognitive process of noticing, has been first highlighted by Warschauer (1997), who observed that text chat enhances and accelerates learners' attention to linguistic forms more than FTF communication. Kern, Ware, and Warschauer (2004) surmise that, due to its unique affordances, text-based SCMC places less cognitive pressure on learners' working memory, thereby amplifying their attention to language forms, as well as spurring increased interaction. It is further argued that text-based SCMC provides more immediately noticeable language forms and offers learners a means to review their interaction through chat logs, without impacting the flow of their interaction, so that gaps in their interlanguage can be noted and thereby potentially leading them towards language development (Kern, 1995; Kern et al., 2004; Pellettieri, 2000; Salaberry, 2000; Smith, 2005). In addition, the slower nature of written exchanges is envisaged to allow learners an increased amount of time to review and edit their utterances, and to process the language forms available in the input (Kitade, 2000; Ortega, 1997, 2009a).

Based on the premise of the interactionist approach to SLA, a number of studies in the field of Computer-assisted Language Learning (CALL), have attempted to validate the arguments of greater potential in text-based SCMC, in comparison to oral communication, for negotiated interaction and noticing. This has been achieved by examining the learners' negotiation for meaning and incidents of noticing during synchronous written interactions, and subsequently comparing them to those that occur during FTF communication. With regards to negotiations, Kern (1995) demonstrated that text-chat generated more negotiation moves than FTF interactions, while several other empirical studies have shown the opposite result (e.g. Kaneko, 2009; Lai & Zhao, 2006; Rouhshad, Wigglesworth, & Storch, 2016; Sim, Har, & Luan, 2010; Yuksel & Inan, 2014). Mixed and inconclusive results were also found with regard to whether text-based SCMC would better promote the incidents of learners' noticing of feedback. That is, while text-based SCMC generated significantly more incidents of noticing of interactional feedback than FTF interactions (e.g. Yuksel & Inan, 2014), no differences in terms of the amount of noticing was found between the two communication modes within other studies (e.g. Gurzynski-Weiss & Baralt, 2014; Lai & Zhao, 2006).

In addition to the inconsistent empirical findings in the research of L2 interactions and noticing in SCMC, the research that has been already conducted is predominantly based on the potential of text chat (Jenks, 2014; O'Rourke & Stickler, 2017; Ziegler & Mackey, 2017), and it is also still unclear how voice chat contributes to the occurrence of negotiation and incidents of noticing during task-based interactions. Jenks (2014) outlines two main reasons that could explain why the bulk of SCMC research is based on text chat. First, text chat has 'historical precedence' over other synchronous modalities, and is arguably the most widely used online communication medium that it is often used synonymously with CMC. Second, the data that is produced in text chat requires less time and effort to obtain from researchers, as the records of written chats are stored within a software programme and/or locally on a computer file, which is ready for research use and analysis. In contrast, collecting oral data requires use and knowledge of recording software, in addition to the amount of time and effort it takes to transcribe this data into written documents, all of which are methodological challenges, and may explain why there is a dearth of research into voice chat.

While some affordances of text chat are facilitative to promote negotiated interaction and noticing (e.g. the permanency of written messages and slower pace of interaction), this environment could also posit certain challenges that may hinder the potential effects of these affordances (e.g. the disorganized turns and the cognitive burden of typing and technology). In addition to these challenges, one could argue that text chat is inherently impoverished in comparison with oral speech. Oral interactions allow for articulatory and suprasegmental features (e.g. pauses, stress and intonation), which carry a great deal of meaning (Carlson, Frazier, & Clifton, 2009), whereas written interactions contain only visual cues on the screen (Oskoz, 2009). Nevertheless, to come to a better understanding of SCMC potential for L2 learning, its written and spoken modalities should be examined in regards to how they could affect learners' engagement and cognitive processing during L2 interactions.

Therefore, this study sets out to verify the alleged arguments and the current findings for the potential of text-based SCMC, in order to enhance learners' interactional and attentional processes, and extend this line of research to the oral modality of SCMC. In essence, this study does not conduct a comparison to advocate one modality over the other,

but rather, to help understand the potential of each context in facilitating useful L2 learning opportunities. Heift and Chapelle (2012) stated,

> Although such comparisons are relevant in some contexts, research attempting to understand what, why, how, and to what end technology leads to successful learning outcomes is the challenge for most applied linguists working in this area today. (p.555)

The present study compares the oral and written modalities of SCMC in an attempt to answer which form of technology leads to increased learning opportunities. Also, seeking to answer how, and to what extent, it utilizes a mixed methods approach to investigate the ways in which each synchronous modality could affect, not only frequencies, but also features of negotiated interaction and incidents of noticing. Furthermore, this study seeks to ascertain how each context affects learners' learning experiences and facilitate their use of the available affordances.

1.2 Aims and Research Questions

Given the pervasive use of technology in L2 teaching and learning, in addition to the interest of utilizing SCMC for L2 learning purposes, it becomes relevant to explore how the oral and written synchronous modalities could contribute to L2 interaction-driven learning, both from a theoretical and pedagogical perspective. Ultimately, this study was designed to investigate how the oral and written modalities of SCMC (i.e. voice-based and text-based online chat) would facilitate L2 learners' interaction and cognitive process of noticing whilst engaged in learner-learner task-based interaction. More specifically, the main aims that guided the conception and design of the thesis were as follows:

- To determine the affordances and constraints of each modality of SCMC, so such affordances can be profitably exploited for pedagogical purposes.
- To evaluate the impact of modality (voice vs. text chat) on the occurrence and features of learners' negotiations during task-based interactions.
- To examine the impact of modality on promoting the quantity and quality of noticing during task-based interactions.

- To examine learners' perceptions of their learning experiences in the oral and written modalities of SCMC.

These aims were explored through the following research questions (RQs):

RQ1. What is the impact of modality (voice chat vs. text chat) on the frequency of negotiations in task-based interactions?

RQ2. What is the impact of modality (voice chat vs. text chat) on the characteristics of negotiations:
   a) Type of negotiation
   b) Type of interactional feedback
   c) Linguistic foci of negotiation

RQ3. What is the impact of modality (voice chat vs. text chat) on the frequency of noticing during task-based interactions:
   a) Self-repairs (i.e. self-initiated noticing)
   b) Noticing of corrective feedback

RQ4. What is the impact of modality (voice chat vs. text chat) on the quality of noticing during task-based interactions?

RQ5. What are the learners' perceptions of the strengths and limitations of voice chat and text chat?

1.3 Significance of the Study

Within the larger framework of CALL-SCMC literature, the present study is significant from a theoretical and pedagogical standpoint. Theoretically, it aims to contribute to the body of knowledge on SCMC literature in several ways. First, the experimental work presented here provides one of the first investigations into how the oral modality of SCMC contributes to the cognitive process of noticing during task-based interactions. Second, this work will generate fresh insights into the contribution of written SCMC, in comparison to oral SCMC, on L2 interaction-driven learning, examining how each modality could shape opportunities for interactional and attentional engagement, as well as determining the extent to which learners benefit from each modality affordances. Since the findings of earlier research, which empirically examined the claims that text-based SCMC is facilitative for L2 learners' noticing, are mixed and inconclusive, this research could help to verify (or refute) the

theoretical claims that advocate the increased opportunities for noticing in written rather than oral interactions. By examining negotiated interaction and internal language processing within online written interactions in a more detailed approach, and to then compare these processes to those generated in the oral online interactions, findings will help ascertain the common argument, which holds that synchronous text-based contexts are "fruitful avenues to pursue" (Pellettieri, 2000, p.83).

In terms of this study's significance to pedagogy, the empirical findings could contribute to the practical applications of SCMC in L2 teaching and learning. More specifically, they can inform L2 practitioners and learners on how spoken and written online platforms could uniquely shape L2 learning opportunities, and how each platform may facilitate or hinder SLA to a greater or lesser extent, thereby guiding their choices and decisions, and informing them of the necessary preparation for successful integration of SCMC in language learning.

Although these findings can inform any L2 learners and practitioners in general, they are of a significant relevance to EFL adult Arabic learners and their language instructors in particular. The reason for this is due to the issue of teacher-based classroom that are often found within Arab contexts, which leads to their limited support for interactive EFL learning environments (Akasha, 2013), as well as an observed lack of L2 interactional opportunities in the L1 environment outside of these learners' language classrooms (Alharbi, 2015; Alrabai, 2018). As a result, this study has focused on investigating the potential of task-based SCMC for this particular group of learners, and is the rationale behind focusing on EFL Arabic learners at the core of this research. This lack of interactional opportunities was further identified in the results of recent needs analysis of EFL high school secondary/college learners administrated in different Arabic contexts (e.g. Adnan, 2012; Al-Hamlan & Baniabdelrahman, 2015; Alqunayeer & Zamir, 2016).

1.4 Structure of the Thesis

The thesis consists of seven chapters. Following this introduction, Chapter 2 begins by outlining the theoretical framework underpinning this research, presenting the basic claims of

the interactionist approach to SLA, and expounding upon some of the issues addressed by this approach. It then proceeds to present the pedagogical framework of this research study.

Chapter 3 presents a review and critique of empirical research exploring the affordances of text and voice chat. It introduces the contexts of text- and voice-SCMC, presenting associated claims that suggest their potential usefulness for L2 learning and acquisition. The chapter then reviews, in greater detail, the relevant research that has tested these claims, with a focus on studies adopting an interactionist perspective, situating the present study within the wider context of SCMC and identifying the gaps that it aims to bridge.

Chapter 4 outlines the methodology employed for the conduct of the present study. In order to enrich the data pertaining to the learners' interactions and noticing in oral and written SCMC, a mixed methods approach was adopted; justification for this approach is provided. This chapter further presents background information about the participants, the study design, apparatus, materials, and procedures employed for data collection, as well as addressing analysis and issues related to ethical procedures. Finally, the pilot study is presented.

Chapter 5 first gives an overview of the background information on task completion in voice- and text-based SCMC, and information on standardizing scores of outcome measures, as well as statistical tests selection. The chapter then presents the quantitative and qualitative findings that emerged in accordance with each research question.

Chapter 6 provides a detailed account and interpretation of the findings of the study. The discussion is presented in accordance to the three key themes addressed in this study: (a) learners' negotiations, (b) learners' noticing and (c) learners' perceptions and experiences.

Chapter 7 recapitulates the thesis' key findings, suggests their pedagogical and methodological implications, draws attention to the research limitations, and proposes areas for future research. These are followed by concluding remarks on the contributions of the study to knowledge in the field.

Chapter 2: Theoretical and Pedagogical Perspectives

2.1 Introduction

This research study adopts the interactionist approach to SLA as a theoretical framework underpinning its goal and design. The central claim of this approach is that interaction facilitates the process of acquiring L2, as it provides learners with opportunities to receive input and feedback, which in turn may draws the learners' attention to problematic aspects of their interlanguage, and accordingly, urges them to produce modified output (Long, 1996).

This chapter provides an overview of the theoretical and pedagogical perspectives that underpin and inform this research study. First, a detailed discussion over the basic tenets of the interactionist theory to SLA is provided. Following this, a crucial analysis is made on certain reflections of Schmidt's noticing hypothesis from a theoretical and methodological perspective, tackling the role of awareness in SLA and outlining the different measures that were particularly employed by SLA researchers, to examine noticing of interactional feedback. Lastly, the chapter reflects on task-based language learning.

2.2 Interaction and SLA: Theoretical Perspectives

Researchers have affirmed that interactions amongst learners using the target language has a significant influence over language development and acquisition. Generally speaking, research examining how L2 interaction provides and maximizes learning opportunities is approached from two broad perspectives: the interactionist approach and the sociocultural approach. The interactionist approach accounts for learning through negotiation for meaning that initiates interactional modifications, which in turn stimulates learners' noticing of gaps in their interlanguage systems, and subsequently leads to language development. On the contrary, the sociocultural approach, based on the work of Vygotsky (1978), emphasizes that language learning is embedded in socially mediated interaction. While the interactionist approach emphasizes the individual cognitive endeavour for the comprehensibility during interaction with others (Long, 1996; Mackey & Philip, 1998), the sociocultural approach stresses that the locus of learning is not exclusively within the individual's mind, but rather, it

is a product of social interaction with other individuals (Lantolf & Thorne, 2006). As this research was theoretically motivated by the interactionist approach, the following section succinctly presents this approach, casting light on its central tenets.

2.2.1 Interactionist approach to SLA: Overview

The interactionist approach, which grew out of the interaction hypothesis (Long, 1981), is premised on the notion that 'conversational modifications', which take place during interaction, promote second language development. This approach is based on several hypotheses in SLA research, such as the input hypothesis (Krashen, 1982), the interaction hypothesis (Long, 1981, 1983), the output hypothesis (Swain, 1985), and the noticing hypothesis (Schmidt, 1990).

Krashen's (1982) input hypothesis proposed that comprehensible input is the main requirement for SLA. Krashen (1982) defined comprehensible input to be the language that is slightly more advanced than a learner's current level of language, which, in his terms is known as *i+1*, with *i* being the learner's current level of interlanguage and *i+1* being the level just beyond it. Later, it was apparent that relying on the construct of input to account for language learning was insufficient, causing SLA researchers to critique Krashen's hypothesis, as it failed to take into account two important aspects that are crucial to L2 learning: interaction and output.

Consequently, Long (1981) proposed his interaction hypothesis, arguing that it is only through interactions with interlocutors that input could be made comprehensible to the learners. Interaction allows learners to engage in a number of interactional modifications, which include elaborations, clarification requests, confirmation and comprehension checks – all of which contribute towards, and increase input comprehensibility. Long used the term interactional modifications to refer to what interlocutors use to avoid and repair conversational breakdowns. Other SLA researchers referred to interactional modifications as 'negotiations' (Pica, 1994; Pica, Holliday, Lewis, & Morgenthaler, 1989; Varonis & Gass, 1985).

From the research conducted by Swain (1985), the focus in SLA broadened further to include output as a necessary mechanism for L2 learning and acquisition. Swain proposed the comprehensible output hypothesis, which argues for the role of productive use of language (i.e. output) as part of the learning process. As Swain (1985) stated, "producing the target language may be the trigger that forces the learner to pay attention to the means of expression needed in order to successfully convey his or her own intended meaning" (p.249).

Swain claimed that, while attempting to produce the target language, learners may notice that they do not know how to say or write the meaning that they wish to convey with precision (or in Swain's terms, noticing a "hole"). As a result, the learners' attention may be selectively directed to relevant input. Learners may also notice a mismatch between the target input and their own interlanguage form (noticing a "gap"). In amalgamating these two components, output promotes both noticing a hole in the interlanguage system and noticing the gaps between the learners' interlanguage and target language, both of which facilitate important cognitive processes, such as selective attention and cognitive comparisons.

Furthermore, Swain (2005) proposed three functions that output may play in L2 learning: (a) the 'noticing/triggering' function, or what could be referred to as the consciousness-raising role, (b) the hypothesis-testing function, and (c) the metalinguistic function. She believed that the activity of producing the target language may push learners to reflect on their language and discover gaps in their linguistic competence (first function); thus, it allows them to try out different means of expression (second function), and also provides them with opportunities to reflect on and analyse their language production (third function).

Although Swain emphasized the need for accurate production, Long's (1981) interaction hypothesis generated a shift from accuracy-oriented activities to fluency-oriented activities, with a focus on unprompted oral L2 production. However, plentiful opportunities for exposure to language and interaction were found to result in levels of high fluency and comprehension ability, but were also the cause of inaccurate application of the language. Subsequently, in his later works, Long (1991, 1996) developed his hypothesis to account for the role of '*focus on form*', arguing that negative feedback may be necessary in the context of

meaning-oriented activities, in order to promote learners' attention to the differences between the target-like input and their erroneous output. Furthermore, it would help to confirm or disconfirm their implicit hypothesis regarding the negotiated words, structures, pronunciations, etc. Long's (1996) updated version of the interaction hypothesis reads as follows:

> It is proposed that environmental contributions to acquisition are mediated by selective attention and the learner's developing L2 processing capacity, and that these resources are brought together most usefully, although not exclusively, during *negotiation for meaning*. Negative feedback obtained during negotiation work or elsewhere may be facilitative of L2 development, at least for vocabulary, morphology and language-specific syntax, and essential for learning certain specifiable L1-L2 contrasts. (p.414)

This updated version accords a significant role to corrective feedback. Corrective feedback is a term used to describe the procedure whereby learners' errors are corrected (Lyster & Ranta, 1997). When this feedback occurs in the course of communicative interaction, it is referred to as '*interactional feedback*' (Nassaji, 2015). Accordingly, interactional feedback "refers to feedback that is generated in response to both linguistically erroneous and commutatively inappropriate utterances that learners produce during conversational interaction" (Nassaji, 2015, p. 45). As stipulated by Long's (1991) hypothesis, L2 acquisition is best promoted when learners' attention is drawn to form in the context, where they are communicating to express their meaning intentions. Following this, many SLA researchers have found that some kind of focus on form, in the context of meaning-oriented communication, can bring positive effects on the learners' L2 learning and development (e.g. Basturkmen, Loewen, & Ellis, 2002; Doughty & Varela, 1998; Foster & Ohta, 2005; Lyster, Saito, & Sato, 2013). Despite this research that suggests the positive effects of focus on form on language learning, Lyster and Ranta (1997) exercise caution when focusing on form during communicative or task-based contexts, as they state it could undermine the flow of communication. In light of this, SLA researchers have attempted to examine this issue. For example, Seedhouse (1997) investigated whether, and to what extent, an effective combined focus on form and meaning could be achieved in actual practice. He found that reactive focus on form could be provided without interfering with a focus on

meaning, and this is when the teachers draw attention to form implicitly (i.e. when they provide the correct form without any overt or explicit negative evaluation or indication that an error has been made). The negotiation for form, then, is seen as acceptable, and even desirable, in order to draw learners' attention to problems in their erroneous productions, even when a communication breakdown does not occur (Lyster & Ranta, 1997; Van den Branden, 1997). These negotiations provide opportunities to discuss language forms, to play with the language, and to draw attention to gaps in their linguistic reformulations.

In addition to the significant role of negative feedback, Long's (1991) developed version of the interaction hypothesis gave importance to the role of the learners' attention and internal processing capacities during the activity of negotiation for meaning. It posits that negotiations not only serve to make input comprehensible to L2 learners, but also draws their attention to linguistic problems in their interlanguage, and encourages them to modify their errors and produce more target-like utterances. Schmidt (1990, 1995) is one of the early researchers who was most influential in promoting the view of attention in L2 interaction, using the term 'noticing' to refer to the process of bringing some stimuli into focal attention.

Several researchers confirm that learners should notice, observe and be aware of the variances between their interlanguage and the L2 target-like forms (Ellis, 1994; Gass, 1991; Pica, 1994). Gass (1991) claims that "nothing in the target language is available for intake into a language learner's existing system unless it is consciously noticed" (p.136). Ellis (1994) also asserts that language acquisition involves several actions, such as noticing new items, and comparing and integrating between what is learned. As this study is set within a noticing framework, the construct of noticing will be further elaborated upon in Section 2.3, providing some reflections on this hypothesis from a theoretical and methodological perspective.

As can be inferred, the interactionist approach is "multi-faceted" as it draws upon a host of processes that arise within language acquisition (Bowles & Adams, 2015, p.198). The major constructs of this approach include input, interaction, corrective feedback, attention and output. When negotiating, L2 learners supply rich input, provide feedback, modify output and focus their attention on aspects of the target language, all of which can promote

incidental acquisition of L2 forms (Long, 1996). As Long (1996) explains, "*negotiation for meaning*, and especially negotiation work that triggers *interactional* adjustments by the NS or more competent interlocutor, facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways" (pp.451-452).

In this sense, this study probes into these processes while examining learners' dyadic interactions in voice- and text-based SCMC. More specifically, it attempts to uncover the potential of each synchronous context in how they provide learners with opportunities to engage in negotiations, to notice gaps in their interlanguage systems, and to be encouraged to make oneself more comprehensible and accurate in output.

2.2.2 Types of negotiations in L2 interactions

As stipulated by the interactionist approach, negotiation is a process of modifications that interlocutors use to better understand one another (Long, 1983; Pica, 1994). Two types of negotiations have been distinguished in literature: negotiation of meaning and negotiation of form, with the difference between the two types being basically functional (Ellis, Basturkmen, & Loewen, 2001; Lyster & Ranta, 1997; Nassaji, 2015; Van den Branden, 1997). Negotiation of meaning refers to exchanges where the focus is on meaning. It occurs when one of the interlocutors has not understood the message, and therefore, the role of negotiation is to clarify meaning. Example 1 provides a simple demonstration of this:

Example (1): Negotiation of meaning

> NNS: There's this thing in the wall, uhm . . . a . . .
> NS: A thing? You mean a safe?
> NNS: Yeah a safe, and the thief opens the safe.

(Van den Branden, 1997, p.596)

In this example, the native speaker (NS) fails to fully understand the non-native speaker' (NNS) initial utterance, and thus, opens the negotiation episode with a confirmation check, compelling the NNS to make input more comprehensible. This negotiation is "communicative in orientation", as its purpose is to deal with problems in message

comprehensibility, rather than linguistic inaccuracy (Ellis et al., 2001, p. 412). It should, however, be noted that meaning negotiations are not always successful, and they can continue for quite some time without reaching understanding, or can result in even bigger confusion (Van der Branden, 1997). Also, Van der Branden noted the issue that explicit signals of understanding such as "I see" or "hmm", should not be taken for granted, because interlocutors could 'feign' understanding, doing this for several reasons. For instance, it could be done to avoid looking stupid or being impolite, to save their interlocutor's face, and/or to move on with the discussion.

In the case of negotiation of form, on the other hand, the message is often clear and the feedback is used with the intention of alerting the interlocutor to his or her language problems (Ellis, et al., 2001; Van den Branden, 1997). This form of negotiation is triggered by an attention to form, and occurs as one interlocutor tries to push the other towards a more accurate and/or appropriate production. This is illustrated in Example 2.

Example (2): Negotiation of form
    P: He breaked the stick.
    T: No. Broke.

                                          (Van den Branden, 1997, p.592)

In this example, the teacher draws the participant's attention to form by correcting his previous erroneous production. The purpose here is "didactic" rather than "communicative", as it encourages precision and accuracy and not merely comprehensibility (Ellis et al., 2001, p. 412).

This present study considers both types of negotiations, aiming to determine the impact of synchronous modality (i.e. voice vs. text chat) on their occurrences in online task-based interactions. To assess and analyze negotiation episodes, they will be identified following Varonis and Gass' (1985) model of non-understanding in FTF interaction. This model is further outlined and illustrated in the following section.

2.2.3 Models of negotiations

Various proposals have been developed over the years to assess episodes of negotiations. Perhaps the most influential of these has been the model proposed by Varonis and Gass (1985). This model proposes four functional primes and two different parts: a trigger (T) and a resolution, which consists of the other three primes: an indicator (I), a response (R), and a reaction to the response (RR) (see Figure 2.1).
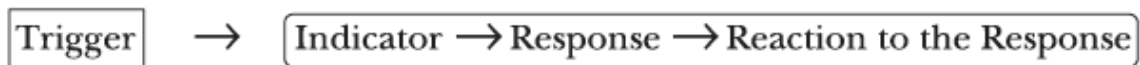
Figure 2.1. Varonis and Gass' (1985, p.74) model of negotiation episode

According to this model, a negotiation of meaning commences when there is an ambiguous, incomprehensible utterance (Trigger, <T>). Triggers may or may not be related to linguistic errors, and consequently they trigger a feedback move. In other words, an indicator <I> is provided in response to the trigger, either indicating a problem in communication, or in drawing the speakers' attention to a problematic part in their previous utterances. An indicator leads to a response <R> from the first speaker, and finally, a reaction to the response <RR> might follow the repair to indicate understanding, and mark the end of the negotiation episode. An example of this model from the current study is provided in Example 3.

Example (3): Varonis and Gass'(1985) model with data from study under discussion

```
50 <T> P37: i have a cot
51         for baby
52 <I> P38: what
53 <R> P37: bed for babies
54 <RR>P38: aha
55     P37: do you have
56     P38: no i haven't
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(Voice chat 19, P37 & P38)

Here, the example shows the unfamiliar word 'cot' serves as the trigger for negotiation. Upon encountering a difficulty in understanding, P38 uses a clarification request to motivate his partner to provide more information. In response, P37 offers an explanation on the trigger in an attempt to solve the non-understanding. With the P38's utterance of 'aha', the negotiation episode comes to an end and the interaction proceeds.

It should be noted that the model proposed by Varonis and Gass (1985) restricts negotiated interaction to instances that are triggered by communication breakdowns, due to linguistic or non-linguistic reasons, so the negotiation is used to better understand one another. However, as pointed by Foster and Ohta (2005), the concept of negotiation in SLA research seems to have shifted from communication breakdowns to situations, where indicators are provided to inform of linguistic inaccuracies. Consequently, this model has been widely utilized in most of the interaction studies to assess occasions of meaning negotiation and form negotiation, whether it be traditional FTF studies (e.g. Long, 1996; Mackey, Gass, & McDonough, 2000), or SCMC studies (e.g. Blake, 2000; Bower & Kawagushi, 2011; Lee, 2008; O'Rourke, 2005; Smith, 2003; Toyoda & Harrison, 2002; Tudini, 2003; Yanguas, 2010).

However, in a study into the patterns of written online interactions, Smith (2003) proposed to expand the Varonis and Gass' (1985) model to adequately accommodate a number of features that are unique to text chat discourse (see Figure 2.2). To illustrate, Smith (2003) found that, occasionally, there was a delay between the trigger and indicator moves in written negotiations, thus resulting in "split negotiation routines" (p.48). In addition, Smith found that the reaction to response move was "more dynamic" in written exchanges than had been reported in FTF interactions (p.49), and learners were likely to carry on negotiation episodes after the reaction to response move. Consequently, Smith added additional moves to his proposed model: (a) a testing deduction move (i.e. <TD>) and/or a task appropriate response <TAR>, which interlocutors employ to show degrees of understating, (b) a confirmation move <C>, where the respondent either confirms or disconfirms understanding, and (c) an optional reconfirmation move <RC> by the initiator, usually consisting of a single word, such as "ok" or "good", and serving as a definitive signal that understanding is attained. Overall, Smith's proposed changes apply to the response and the reaction to

response moves in Varonis and Gass' (1985) original model, leaving the trigger and indicator moves unchanged. The coding of negotiation in the present study will benefit significantly from Smith's (2003) model when charting negotiation episodes in text-SCMC interactions, allowing for a delay between the trigger and indicator move, and when considering any relevant exchanges after the reaction to response move.
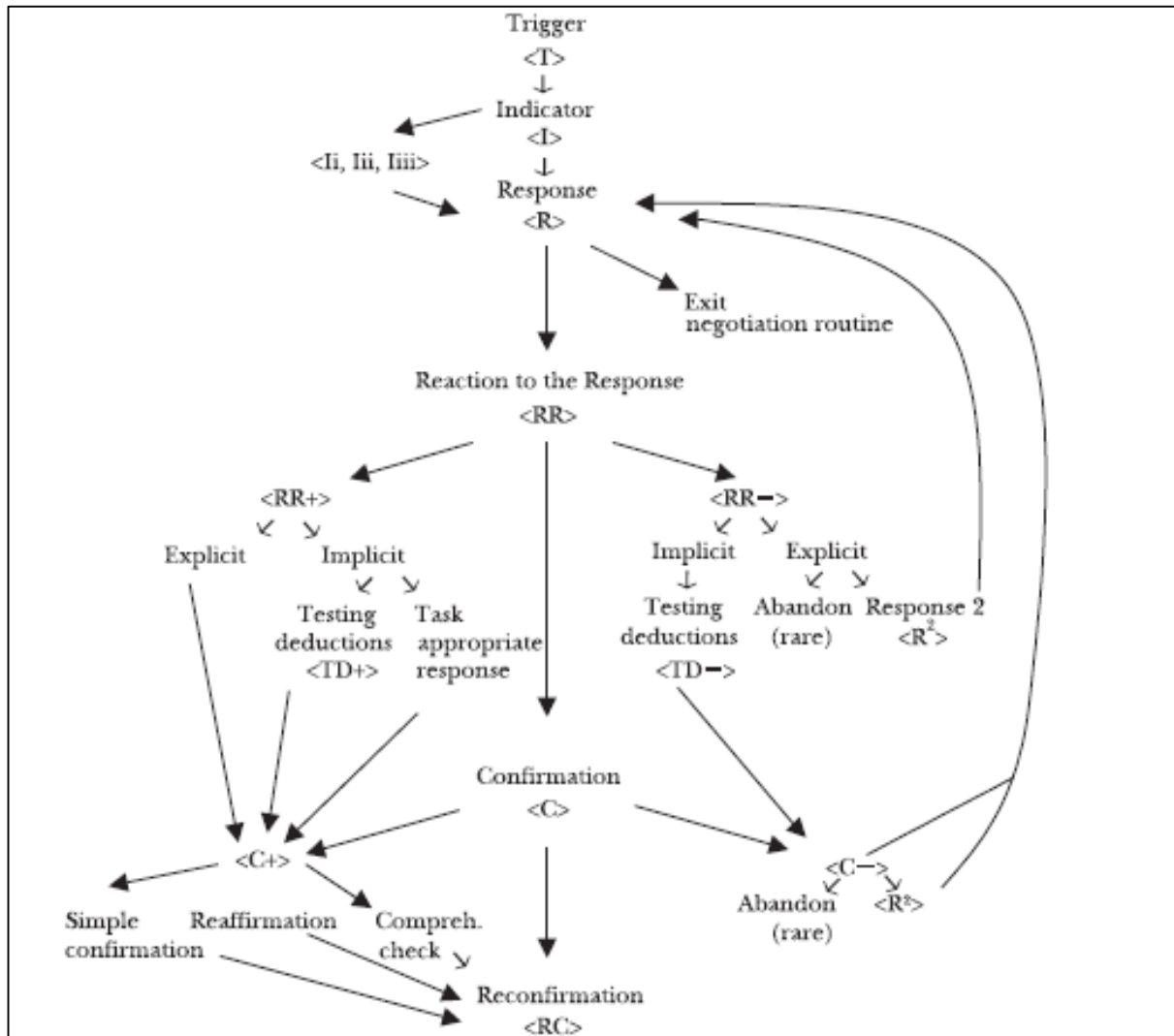
Figure 2.2. Smith's (2003, p.50) model of computer-mediated negotiated interaction

2.3 Noticing Hypothesis

The role of noticing in SLA is widely viewed as crucial to the L2 learning process. Noticing is broadly conceptualized as "the process of bringing some stimulus into focal attention, that is, registering its simple occurrence, whether voluntarily or involuntarily" (Mitchell, Myles, & Marsden, 2013, p.146). As proposed within Schmidt's (1990, 1993) noticing hypothesis, noticing is the necessary and sufficient condition for input to become intake, thereby making it available for further processing in working memory. In accordance with this, Ellis (1994) defines intake to be the "portion of the input that learners notice and therefore take into temporary memory" (p.708). Schmidt (1990, 1993) argued that subliminal language learning is impossible, proposing that before a new language can serve as intake and incorporated into a learner's interlanguage system, the learners must consciously notice the mismatch between features of their interlanguage and target language forms. Drawing upon his own experience when learning Portuguese, Schmidt declared that cognitive processes, such as noticing and attention, were crucial to his L2 learning. After months of taking classes, living in Brazil, and keeping a diary, he began to realize that during this entire time, certain features of language that had been present in the environment began to enter his own second language system only when he had noticed them, either because they were brought to his attention in class or because some other experience made them salient. Upon this, Schmidt postulated that, in some way, L2 learners must be overtly cognitively aware of discrepancies between their interlanguage and the target language forms in order to learn from them, even though they may lack understanding of the underlying rule for these particular linguistic forms. Following this line of reasoning, noticing may be regarded as a mechanism that is mediated between input and learning.

After a decade of research, Schmidt (2001) slightly modified his claim to a weaker version, where more noticing facilitates more learning, implying that learning without noticing is possible, but that noticing is beneficial and would considerably enhance the L2 learning process. As he claims, "attended learning is far superior" (Schmidt, 2001, p.3).

Although commonly held to be necessary for SLA, noticing has been the focus of much debate in this field of study. Two theoretical positions have been posited in response to Schmidt's (2001) noticing hypothesis. First, in line with Schmidt, is Robinson (2001), who

argues that only input that is attended to whilst learning, and encoded in working memory, can be subsequently transformed into intake. Thus, from this perspective, attention and learning cannot be dissociated; lack of awareness precludes learning. However, contrary to this, is the alternative position proposed by Tomlin and Villa (1994). Whilst they agreed with Schmidt's (2001) noticing hypothesis on the importance of attention to the L2 learning, they contradicted his ideas concerning the role of awareness at the input-to-intake stage. To illustrate, a more fine-grained analysis for attention was proposed.

In the model by Tomlin and Villa (1994), attention was given three components: (a) alertness (i.e. readiness to deal with incoming stimuli), (b) orientation (i.e. direction of attentional resources to stimuli), and (c) detection (i.e. selective cognitive registration of stimuli). In accordance to this model, detection alone is the key attentional point that allows learning to take place. Despite these different views for the levels of awareness that are deemed necessary for SLA, suggestions that awareness may be facilitative for L2 learning and acquisition have been influential and are supported by several empirical studies (Yoshioka, Frota, & Bergsleithner, 2013). More importantly, noticing plays a significant role in SLA, and could be argued as a prerequisite for the facilitative role of negotiated interaction in L2 learning. This role can be drawn upon from different classroom studies, which suggest that teaching approaches that promote awareness lead to greater gains, as opposed to approaches that do not (Mitchell et al., 2013).

2.3.1 Types of noticing

Schmidt's (1990, 1993, 2001) idea of noticing has been interpreted in several ways, and subsequently given rise to discussion of different types of noticing in SLA research. First, there is the noticing of instances of L2 forms in the input. Learners interlanguage develops when they notice how a particular form is used in the input they receive, realizing the form in relation to the meaning it conveys and the context in which it is used (Schmidt, 2001). Second, there is noticing the gap. This sense of noticing may be considered as a more advanced process than simple noticing of language forms, as learners in this case conduct cognitive comparisons between their own output and that of a native or more proficient speaker and identify differences (Izumi, 2013). Third, there is noticing the hole. This type of

noticing was first discussed by Swain's (1985) argument of the output hypothesis, claiming that when learners produce output, they may notice that they do not have the means to express it. This type of noticing is different from the preceding types, as learners in this case notice the absence of a form in their interlanguage, not the presence of it in the target-like input (Izumi, 2013). As Swain (1998) argues, noticing a hole may be a prerequisite to noticing a form. Such noticing may not promote language acquisition on its own, but it is expected to promote noticing the form.

In addition to the aforementioned types of noticing, which are initiated in response to external input/feedback, Swain's (1995) proposal of the output hypothesis further suggested another type of noticing. This type is internally-driven and occurs through the learner's own reflections and monitoring of their productions (i.e. self-correction). Self-correction is defined by Foster and Ohta (2005) as "self-initiated, self-repair, [which] occurs when a learner corrects his or her own utterance without being prompted to do so by another person" (p.420). From an SLA perspective, self-repairs are regarded as important because they provide evidence of noticing and are used to infer that a learner has engaged in some monitoring strategy or has noticed an error in his/her production (Kormos, 1999; Swain & Lapkin, 1995).

2.3.2 Level of awareness

Awareness, in general, is described as a particular state of mind in which an individual has undergone a specific subjective experience (Schmidt, 1990, 1995). In his updated version, Schmidt (2001) distinguishes between two different levels of awareness: awareness at the level of noticing and awareness at the level of understanding. According to Schmidt, noticing involves registration or detection of a form, accompanied by some conscious processing of this form in short-term memory, whereas understanding involves a higher level of awareness than noticing because it involves more complex processing in long-term memory, and is related to system learning. Thus, noticing refers to the conscious registration in the occurrence of some event, whilst understanding is associated with learners' ability to analyse, compare and test hypotheses pertaining to the linguistic input.

The level of awareness has recently been related to other concepts, such as depth of processing (Calderon, 2013). Several researchers have assigned a crucial role to depth of processing, suggesting that it has a facilitative effect on L2 learning and retention (Craik, 2002; Gass, 1988). Craik and Lockhart (1972) were the first to mention the 'levels of processing' construct in the field of cognitive psychology, suggesting that remembered information depends, not only on attending to it in the input and rehearsing it afterwards, but also on how deeply it is processed. They distinguished between conceptual or semantic processing (i.e. deep processing) and perceptual processing (i.e. shallow processing).

The construct of awareness has been notably established in the field of SLA research (Leow, 1997; Rosa & Leow, 2004; Rosa & O'Neill, 1999; Sachs & Suh, 2007). These studies have revealed that noticing of L2 forms facilitates SLA, and that higher levels of awareness are more strongly related to L2 gains and development. For example, Leow (1997) examined the relationship between the quality of noticing, and subsequent L2 learning, on learners completing a crossword puzzle in a Spanish language class for beginners. He explored noticing through the means of think-aloud protocols, while ascertaining L2 learning through two immediate post-tests: a recognition test and a fill-in-the-blank production text. Leow (1997) operationalized noticing as some form of subjective awareness, manifesting itself in a verbal or written correction of the target form. He distinguished between simple noticing (i.e. where learners simply reported or repeated the noticed linguistic form) and elaborate noticing (i.e. noticing accompanied by meta awareness). Findings demonstrated that elaborate noticing resulted in a significant increase in the learners' ability to recognize items, particularly on the recognition test and, to a lesser extent, on the production test.

Another noteworthy study is Qi and Lapkin (2001). They analyzed the think-aloud protocols of two adult ESL learners, as they compared their composition with a NS reformulated version. They distinguished between two levels of noticing: perfunctory and substantive noticing. Perfunctory noticing referred to cases where learners simply noted the difference between their version and that of a NS's, whereas substantive noticing referred to situations where the learners noticed the difference and verbalized reasons for accepting the reformulated items. A noteworthy finding in their study was that items that received substantive noticing were more likely to be used when learners subsequently rewrote their

compositions. Accordingly, the researchers suggested that the quality of noticing may have had an impact on L2 learning; that is, noticing without showing awareness of the nature of the gap in the L2 may not lead to language development.

Furthermore, Storch (2008) examined the metatalk of pairs working on a text reconstruction task, to ascertain the learners' level of engagement with linguistic choices, and whether the level of engagement affected their language development. Transcripts of the pairs' metatalk were analysed for the level of noticing, where a distinction was made between limited and elaborate noticing. Elaborate engagement was operationalized as instances where the learners discussed and deliberated on the language items, while limited engagement was operationalized as instances where one learner made a suggestion and the other accepted or did not respond. Findings showed that pairs attended to a range of lexical to grammatical items; however, items that elicited elaborate engagement led to more instances of learning/consolidation for both learners in the pair than limited engagement.

All of the aforementioned studies demonstrate that attention comprising of a very low level of awareness appears to contribute to subsequent learning of L2 forms, but the higher levels of awareness lead to more learning. Upon these findings, Calderon (2013) posits that, while promoting noticing is important, improving the quality of noticing may be even more important. This study, therefore, makes an effort to shed light on how oral and written modalities of SCMC could contribute to enhancing the quality of learners' noticing during task-based interactions.

2.3.3 Factors affecting noticing

SLA literature has suggested a number of factors that are at work in generating learners' noticing. These factors can be roughly divided into either learner factors or input features (Park, 2011), or in Schmidt's (2001) terms, learner-internal factors and learner-external factors. Examples of the former include learners' developmental readiness (Mackey, 2012), working memory capacity (Mackey & Philp, 1998) and language learning aptitude (Sheen, 2007), whilst examples of the latter include the salience and the communicative value of the form (Gass, 2011), the educational context (Bitchener, 2017) and task conditions (Robinson,

1995).

Learner-internal factors are, in fact, dynamic and ready to change as the learners' knowledge or experience of the L2 changes (Sharwood Smith, 1991). For example, what appears to be non-salient to the learner at one point would later become salient because of changes in their L2 knowledge or proficiency levels. Despite this, the external salience of the input has been argued to be one of the important factors that could modulate L2 noticing (Gass, 1997; Han, 2004). As proposed by Gass (1997, p.19), "salience can be said to help ensure that particular forms are noticed by the learner and hence lead to rule strengthening".

In addition, Gilabert, Manchón, and Vasylets (2016) suggest that modality is an issue that warrants some research attention, arguing that different modalities (oral vs. written) may modulate the noticing of L2 input/feedback. Due to the idiosyncrasies of speech and writing, oral and written contexts are argued to represent rather distinct language learning opportunities in terms of SLA processes (Gilabert et al., 2016). This suggestion is partially supported by García Mayo and Azkarai's (2016) research on the effect of task modality (oral vs. writing) on the amount of noticing, operationalized as language-related episodes (LREs). The researchers found that the writing tasks (i.e. a dictogloss and a text editing task) initiated significantly more LREs than the oral tasks (i.e. a picture placement and a picture differences task), thus indicating the potential of modality as a variable that facilitates learners' attention to L2 forms. However, García Mayo and Azkarai (2016) found no major effect for the modality of task on learners' level of engagement, both enhancing elaborate level of engagement.

With the growing research of SCMC, researchers have comparatively examined noticing in written SCMC contexts with that of oral FTF contexts. However, empirical evidence so far appears inconclusive, with some studies suggesting increased opportunities for noticing in written SCMC (e.g. Yuksel & Inan, 2014), while others have found the opposite (e.g. Loewen & Wolff, 2016; Rouhshad & Storch, 2016)[1] or no difference (e.g. Gurzynski-Weiss & Baralt, 2014; Lai & Zhao, 2006). In consideration of these mixed findings and of current theoretical arguments on the potential relationship between learning

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[1] These studies are grounded in the sociocultural paradigms.

contexts and noticing, it is worthwhile to investigate whether the oral and written synchronous online interactions are likely to raise the salience of interactional feedback and help draw learners' attention to them during L2 interactions.

2.3.4 Measures of noticing

Several measures have been used to examine noticing of interactional feedback in SLA research, including: (a) learners' uptake (i.e. immediate modification of their output in response to feedback), (b) language-related episodes (LREs), (c) the classical pretest-experimental exposure/treatment – posttest design, (d) self-reports, such as think-alouds (Sachs & Suh, 2007), stimulated recalls (Mackey et al., 2000) or immediate recalls (e.g. Philp, 2003), and lastly, (e) eye-tracking technology (e.g. Smith, 2010, 2012). The presentation of these different measures follows.

2.3.4.1 Uptake (i.e. modified output)

In most of the descriptive research, learners' noticing of interactional feedback has been measured only through uptake, operationalized as the learner's immediate modifications of their output in response to their interlocutor's feedback (e.g. FTF studies: Oliver, 1995 and text-based SCMC studies: Iwasaki & Oliver, 2003; Tudini, 2007).

Several definitions of the term 'uptake' are suggested in SLA literature. As described by Nassaji (2015), this term was initially used in classroom research to describe the relationship between classroom interaction and opportunities for learning. In interaction research, however, the term has been used with a different meaning, and specifically refers to the immediate learner's response after receiving interactional feedback. Repair, in particular, is used to describe learners' successful uptake. The term is originally derived from the field of discourse and conversation analysis, where repair is used to identify how troubled areas are managed in the course of interaction. In interaction research, repair has been used to describe the learners' successful modifications of their erroneous output in response to feedback during the course of interaction (Nassaji, 2015). It is argued that, on the whole, noticing is more likely to have occurred when there is uptake with repair than when the

uptake does not repair the error (Ellis, 2013).

Descriptive research that has examined noticing in text-based SCMC contexts, utilizing 'uptake' as their unit of analysis, have yielded mixed findings. For example, Pellettieri (2000) and Tudini (2007) reported a high rate of uptake during synchronous written interactions. That is, 75% of the corrective feedback led to uptake in Pellettieri's study and 59% of feedback moves were followed by uptake in Tudini's study. In contrast, a number of other researchers found a relatively low rate of uptake during such interactions, ranging from 7% to 23% only (e.g. Kim, 2014b; Iwaskai & Oliver, 2003; Loewen & Erlam, 2006; Smith, 2005). These mixed findings of uptake rate, however, may result from differences in task and dyad type. For instance, in Pellettieri's (2000) study, learners completed jigsaw tasks, after which they were asked to compose a short piece of discourse; hence, this could have resulted in learners' increased attention and incorporation of target forms during their subsequent turns. Conversely, Tudini's (2007) study included NS-NNS dyads in comparison to NNS-NNS dyads in the other studies, and thus, learners could have trusted and benefitted more from feedback provided by the native interlocutors.

Although immediate uptake and repair could be taken as a sign of learners' noticing of feedback, this measurement is not without its drawbacks. Many researchers have questioned the reliability of immediate uptake as a measure of noticing or as an evidence of learning, citing a number of reasons to support their case. First, it is quite possible that learners' immediate use of feedback is nothing more than parroting the feedback (Gass, 2003), without being consciously aware that it was corrective, as discovered by some researchers (e.g. Egi, 2010; Révész, Sachs, & Mackey, 2011). In addition, the lack of immediate uptake cannot be taken as evidence that the learner has not noticed the feedback or has not learned from it. In support of this, Mackey and Philp (1998) demonstrated that, although learners did not repair their utterances when receiving recasts, they could still benefit from recasts, as shown by their increased production of developmentally more advanced structures. Nassaji (2015) further explains that interactional feedback may not only result in observable uptake in the form of 'overt' responses to feedback, but can also result in 'covert' uptake or what is referred to as "private speech" (p.102). Another problematic issue is that noticing does not necessarily lead to uptake, as the provision of uptake depends on conversational contexts

(Oliver & Mackey, 2003). This is particularly relevant, given the unique features of text-based SCMC, as some researchers observed that this communication medium may not provide the best interactional environment to encourage learner uptake (e.g. Baralt, 2010; Smith, 2010). Retyping the correct utterance may therefore feel "unnatural and redundant" in written SCMC in comparison to situations with oral feedback (Kim, 2014b, p.65).

Considering these aforementioned issues, one may argue that learner uptake cannot provide the whole picture concerning learners' cognitive engagement with feedback. In turn, Swain (1998) encourages researchers to explore "what learners actually do, not what the researcher assumes instructions and task demands will lead learner to focus on" (p.80). Furthermore, Gass and Mackey (2007) urge researchers in this vein, not to rely solely on the transcript of interaction, but also to investigate noticing by other available means. Therefore, evidence of noticing has been collected in other various ways. For example, some researchers have utilized pretest-posttest (and delayed posttests as well) designs in their examinations of the construct of noticing, whereas others have considered alternative instruments that are available, which could tap directly into what learners attend to whilst engaging in L2 interaction. Among these are the concurrent and off-line verbal reports and eye-tracking. These different measures of noticing are further expounded upon in the following sections.

2.3.4.2 LREs and pretest-posttest designs

Swain (2000) suggests that learners' noticing can be observed through LREs. LREs are collaborative mini-dialogues, in which learners explicitly or implicitly turn their attention to formal aspects of language by questioning and talking about the accuracy of their own language or that of others (Swain & Lapkin, 2001). A specific language item is always at the core of LREs, and they provide a complete record of the language item initiation, noticing, discussion and resolving. It should be noted that other studies have referred to this activity of talking about language using different terminology, such as hypothesis testing episodes (Shehadeh, 2003), form-focused episodes (Loewen & Reissner, 2009) or awareness episodes (Armengol & Cots, 2009).

In most of the studies that document the occurrence of learners' attention to form when

using LREs as their unit of analysis, they further examine its subsequent effect on L2 learning, if any, through individual tailor-made tests based on the LREs. In other words, LREs serve as a type of pretest that identifies learners' lack of knowledge or their problematic use of specific linguistic forms, whereby tailor-made posttests can be later constructed to measure any effectiveness of learners' noticing. That said, it should be noted that the operationalization of the construct of noticing as LREs, and the employment of the pretest-posttest design, are mainly followed by studies that adhere to the sociocultural tradition.

Among the studies in FTF meaning-oriented classrooms are those by Ellis et al. (2001), Loewen (2005) and Williams (1999, 2001). While LREs were primarily teacher-driven, as shown in Loewen's study, Ellis et al.'s and Williams' studies showed that they can be learner-initiated. Furthermore, LREs were also documented in SCMC contexts (e.g. Chen & Eslami, 2013; Eslami & Kung, 2016; Shekary & Tahririan, 2006; Ware & O'Dowed, 2008). Overall, these studies suggested the significance of text chat in creating an environment conductive for noticing, which was also associated with subsequent L2 learning. For example, Shekary and Tahririan's (2006) examination of written online dyadic task-based interactions of 16 EFL Persian learners, showed that learners did focus on form, and that the ratio of LREs far exceeded those in previous FTF settings. In addition, the results from the posttest showed that learners were able to correctly recall 70% of the targeted forms in an immediate posttest (1 to 5 days after the treatment) and 56.7% in a delayed posttest (3 weeks after the treatment). Eslami and Kung (2016) took this enquiry further, by examining the occurrence of LREs and its subsequent effect on L2 learning in different dyads (i.e. NS-NNS vs. NNS-NNS dyads). The results revealed no significant difference between the two dyadic types in relation to the amount of LREs produced and the learning outcomes.

While the aforementioned studies predominantly examined LREs in text-based SCMC, Sotillo's (2009, 2010) studies examined their occurrences in text compared to voice chat. Sotillo (2009) first examined exchanges of four NS-NNS dyads, consisting of tutors and ESL learners, in voice and text chat, to ascertain their potential for learners' noticing, operationalized as LREs. The results of this small-scale exploratory study suggested that both modalities of SCMC were facilitative for learners' noticing. Learners were able to self-

correct, request feedback from their tutors, acknowledge the feedback provided, and consequently, modify their output. In her following study, Sotillo (2010) reanalyzed 89% of the chat logs and transcribed voice chats of the previous investigation. This qualitative endeavour aimed to examine the frequency and characteristics of LREs (i.e. the type and quality of corrective feedback and the type of learner uptake). The results revealed that LREs were found more frequent in text-based chats than in voice chats (61 vs. 37 instances, respectively). However, it should be noted that one of the four dyads did not tape their voice exchanges, and also, that Sotillo did not use any tailor-made tests that are predominately used to measure the effectiveness of LREs.

While studies employing pretest-posttest design, and utilizing LREs as their unit of analysis to study noticing, have been informative with regard to the potential of certain L2 contexts for facilitating learners' noticing and L2 learning, questions remain as whether learners would verbalize their language problems and engage in meta-talk (Williams, 2001). In addition, Leow and Bowles (2005) describe the traditional pre/posttests design to constitute L2 noticing as methodologically "thorny" (p.183). That is, rather than ascertaining the online processes of learners' interactions, these studies are dominantly outcome-oriented, focusing on examining immediate and/or delayed posttest to infer about learners' noticing, and to then hypothesize the potential of the given treatment or context to an increased attention of L2 forms. With specific regard to online interactions, Chapelle (2001) suggested that it is valuable to reconcile the traditional summative approach - a paradigm inherited from education - with one that is more process-oriented to gain evidence of CALL learning outcomes. The following sections present the measures of verbal reports and eye-tracking technology, which focus on documenting the online process, rather than the product of learners' noticing.

2.3.4.3 Verbal reports

Schmidt (1990, p.132) proposes that noticing can be operationally defined as "availability for verbal report". Verbal reports, also called verbal protocols, have become one of the standard measures in SLA research that investigates attention and awareness, including both on-line/concurrent (e.g. think-alouds) and off-line/retrospective (e.g. stimulated recall) reporting

(Leow, Johnson & Zárate-Sández, 2011). In concurrent reports, learners are instructed to say out loud whatever comes to their mind concerning what they are attending to while reading a text or engaging in a task that uses the L2. Conversely, in retrospective reports, learners are asked to verbalize their thoughts after the completion of a given task. In both cases, researchers are provided with information as to the cognitive processes and learning strategies employed by L2 learners when engaged in L2 tasks or activities (Lesser, 2014).

2.3.4.3.1 Think-alouds

Think-alouds, also known as on-line tasks, is a method that has been extensively utilized to produce concurrent verbalizations of learners' thoughts whilst reading a text or performing a task (Yoshida, 2008). They have been utilized in the last few decades of SLA research, as a means of observing the cognitive processes involved in the use and acquisition of L2. The major SLA areas that they have been employed in are reading, writing and testing, while in more recent times, other SLA areas have benefited from this methodology, including language acquisition, discourse research and research on attention and awareness (Yoshida, 2008).

Sachs and Suh (2007) and Gurzynski-Weiss, Al Khalil, Baralt, and Leow (2015) are the most relevant studies that have employed think-aloud protocols to examine noticing in text-SCMC contexts, particularly to answer the question of whether the technique of textual enhancement would affect learners' attention and awareness of recasts provided by a NS during text chatting. Utilizing think-aloud protocols and post-tests, Sachs and Suh (2007) investigated the effects of textually enhanced recasts, compared to unenhanced recasts, on Korean EFL learners' subsequent accuracy of the target grammatical structure (i.e. the backshifting of verbs from the past to the past perfect in contexts of indirect reported speech). They also probed into the relationship between reported levels of awareness and the subsequent learning of the target form. When considering the potential of textual enhancement to L2 learning, no effect was found, as participants in both enhanced and unenhanced groups showed significant gains from pretest to posttests. This finding suggests that, even if they are not textually enhanced, recasts provided in text-based SCMC do benefit L2 learning. Sachs and Suh also found that higher levels of awareness led to better L2 development.

Gurzynski-Weiss et al. (2015) further examined the effectiveness of two variables on the attentional processing of recasts from learners of Spanish. The variables they examined were: (a) the type of recast (enhanced vs. unenhanced) and (b) the type of linguistic target of recasts. Findings revealed that, while the learners' reported level of awareness was not moderated by the type of recast, it was significantly related to different types of linguistic targets. That is, learners reported more awareness of recasts targeting lexis in comparison to morphology and syntax.

Through think-alouds protocols, these two studies have contributed valuable information to learners' attentional processing of recasts during text-based SCMC. The findings did not support the value of input enhancement technique, showing that there is no significant difference in the amount of noticing between the enhanced and unenhanced groups. In relation to this, questions have been raised about artificially induced noticing, debating whether it may result in the target forms being incorporated into L2 learners' developing interlanguage system. In other words, forms may be noticed perceptually, but not linguistically; although, as Sharwood Smith (1991) affirms, "learners may notice the signals, the input may nevertheless be non-salient to their learning mechanisms" (p.121).

2.3.4.3.2 Stimulated recalls

Stimulated recall (SR) is a technique used to collect learners' introspection about their thoughts during the time of an interaction, whilst watching or listening to stimuli (Gass & Mackey, 2000, 2017). The purpose of using the stimuli is to orient the learners to the previous task and gain information about their thought processes and attentional foci specifically at the time of the task. An example of this would be where the researcher plays back a videotape of the learner during a task, and pauses it at critical points to elicit a verbalization of the learner's thought processes, by asking them what they were thinking at that particular time. The learners could also ask to pause the tape at any point if they wish to add additional comments. In doing so, this method allows the researcher to gain a deeper insight into the qualitative aspects of learners' noticing (Mackey & Gass, 2015).

A number of studies have employed the methodological approach of SR in their

examination of noticing of interactional feedback from different perspectives, including FTF classroom interactions (e.g. Bao, Egi, & Han, 2011; Mackey, 2006b), classroom dyadic interactions (e.g. Adams, 2003), laboratory dyadic interactions (e.g. Egi, 2007b; Mackey et al., 2000) and text-based SCMC (e.g. Kim, 2014b). Amongst these, is a seminal study by Mackey et al. (2000), who investigated how language learners, ten of whom were ESL learners, and seven who were Italian as a foreign language learners, perceived interactional feedback provided to them by a NS interlocutor during task-based interaction. During the interaction, learners received feedback that targeted a range of morphosyntactic, lexical and phonological issues; all the interactions were videotaped. Thus, during the SR sessions, students were able to watch the video clips of their interactions, and were then asked about their thoughts during the time of the interaction. The findings revealed that the learners were generally accurate in regards to their perceptions of lexical and phonological feedback, but they were less accurate of morphosyntactic feedback.

Gurzynski-Weiss and Baralt (2014) conducted a similar study, which examined and compared learners' of Spanish perceptions of feedback provided by a NS in FTF and text-based SCMC contexts. The results revealed no difference in their feedback perception according to mode, but differences were found with regard to the type of linguistic foci addressed. Corroborating the findings of Mackey et al. (2000), the researchers also found that learners were more accurate in their perceptions of lexical, semantic and phonological feedback than morphosyntactic feedback.

A significant point raised from these two studies is that learners were less aware of feedback containing L2 morphosyntactic information, and tended to interpret feedback of this type as relating to content rather than linguistic form. In Mackey et al. (2000), 13% of ESL learners were able to recognize morphosyntactic errors and 24% in the case of learners of Italian, while in Gurzunski-Wiess and Baralt (2014), learners' noticing of morphosyntactic feedback resulted in 41.5% in FTF mode and 48.4% in CMC. Researchers in the both studies conducted a post hoc analysis to examine what kind of feedback was used to address different error types, and, overwhelmingly, recasts were the most common type of feedback used to address morphosyntactic errors. In fact, morphosyntactic forms have been argued by many researchers to be the most difficult for L2 learners because of their low salience

(Goldschneider & DeKeyser, 2001) and lack of communicative value (Han, 2004).

A number of other studies have also utilized SR to study learners' noticing of interactional feedback during written SCMC (e.g. Kim, 2014b; Lai & Zhao, 2006; Yuksel & Inan, 2014). Thorough description of these studies and their findings will be presented in Section 3.5 of the next chapter.

2.3.4.3.3 Immediate recalls

Immediate recall is another technique used to elicit data directly after the completion of an event that is to be recalled (Mackey & Gass, 2015). It can be distinguished from think-alouds, in that it does not occur simultaneously with the event, and it can be distinguished from SR, in that it takes place immediately after the event and it does not require the need for a stimulus. For example, in an experiment involving oral interaction, immediate recall can take place after one conversational turn during the interaction, while the SR would take place after the completion of the entire interaction session, and incorporate the use of a video or audio recording of the interaction as stimulus. Thus, unlike SR, immediate recalls has fewer problems that can be associated to memory decay; however, they are argued to be "a more artificial task", and that they could interfere with task performance (Makey & Gass, 2015, p.94).

Within research literature, immediate recalls have been significantly utilized by Philp (2003) to explore learners' noticing of interactional feedback. In Philp's (2003) study, adult ESL learners were engaged in NS-NNS dyadic task-based interactions to examine their noticing of the NS interlocutor's recasts targeting their non-target-like question forms. Following the recasts, the learners' response was interrupted by a recall prompt, which consisted of two knocking sounds. This was a cue to the learners to repeat the previous turn (i.e. the recast). Results showed that learners noticed over 60-70% of recasts, but their noticing of feedback was modulated by the length and number of changes in the recast.

2.3.4.3.4 Commentary on verbal reports

Despite their popularity and usefulness in gaining valuable insights into learners' cognitive processes that are unavailable through other means (Gass & Mackey, 2017), the use of verbal

reports is not without its controversy. They have been frequently questioned due to concerns over their veridicality and reactivity (Egi, Rebecca, & Ana-María, 2013; Yoshida, 2008). Veridicality refers to the extent by which the information in the verbal report could accurately represent the cognitive processing (Yoshida, 2008). More specifically, learners may provide erroneous information on what they actually became aware of during a task (Leow & Bowles, 2005), or they may not fully report their thoughts during such verbal reports. This type of "under-reporting problem" constitutes a major limitation (Egi, 2007b, p.267). Schmidt (1990) also identifies this limitation, notifying that failure to report something that has been noticed does not necessarily mean that the aspect was not consciously attended to at the time of the task. Similarly, Mitchell et al. (2013, p.149) have criticized self-report procedures because they may have certain 'circularity'; that is, they document what learners are capable of articulating, rather than those critical moments where initial awareness to new language features is registered. Language features may be so fleeting that it is forgotten, or it may be that the participant does not want to report it or cannot do so due to a lack of meta-language.

As for reactivity, this refers to the possibility that the act of reporting may influence the participants' cognitive processes and their performance during a task (as is the case of concurrent think-alouds), or in their post-task behaviours (in the case of the introspective SR). It is possible that SR could represent an additional learning opportunity, and thus, may negatively affect the results of studies that are particularly interested in examining gains in the L2. For instance, in Admas' (2003) study, learners were engaged in SR interviews between the pretest and posttest, and she suggested that the posttest scores were affected by participation in these interviews during the study.

2.3.4.4 Eye-tracking Technology

With specific reference to text-based SCMC, Smith and Gorsuch (2004) argue that integrating new forms of technology would significantly bring to light the nuances of interaction in SCMC, as well as uncover noticing instances experienced by learners. Other researchers (e.g. Mackey, 2006a; Smith, 2010) support this argument and propose that borrowing and extending techniques used in other disciplines, could potentially contribute to our understanding of noticing opportunities in text-based SCMC L2 interaction. Recently,

there has been a surge of interest in adopting eye-tracking technology to explore the cognitive construct of noticing within text-based SCMC.

Eye tracking refers to "the recording of a subject's point of gaze during visual tasks" (O'Rourke, 2012, p.305). Eye tracking technology has been employed as a tool in psychological reading research for over 100 years (Smith, 2012). However, recently, it has been utilized to examine L2 noticing in text-based SCMC (e.g. O'Rourke, 2008; Smith, 2010, 2012; Smith & Renaud, 2013). In light of this, the theoretical value of employing this type of technology in exploring learners' attention is that, as Smith (2012) states, "it adds a new and powerful methodological dimension in exploring constructs associated with attention and noticing and their respective roles in SLA" (p.71). It is not only useful in informing researchers what learners notice within the written input, but that it also provides valuable information that can be used to make inferences about their cognitive processing, (e.g. fixations, saccades length and occurrence of regressions) (Roberts & Siyannova-Chanturia, 2013; Smith, 2012). Fixations are regarded as moments when the eyes are relatively stable, reflecting on the information that is being encoded (Roberts & Siyannova-Chanturia, 2013). Eye gaze while fixating is assumed to provide an indication of processing time applied to the item being fixated upon in relation to other relevant input. Conversely, saccades are referred to as fast movements of the eyes between fixations; however, no encoding takes place during saccades (Roberts & Siyannova-Chanturia, 2013). As such, eye-tracking provides documentation of where a learner is focusing attention, the duration of this attention, and the sequence in which his/her eyes are shifting from one location to the other. Eye-tracking technology could also offer screen captured video recordings and time-stamped event data (i.e. key-presses and mouse-clicks) (O'Rourke, 2012), thereby allowing access to a learner's private actions, as well as offering greater insights into their attention to language forms whilst engaged in synchronous written interactions.

Among the relevant studies pertaining to this topic in literature, O'Rourke (2008) conducted an eye-tracking study to explore written computer-mediated conversation. The gaze and keystroke data of a student revealed her attention to the information in the recasts and her later incorporation of the information in subsequent output. In another eye-tracking study, Smith (2010) examined the duration of eye fixations on NS's recasts that were

provided during task-based SCMC. The findings revealed that students noticed 60% of the recasts they received. Smith also found that the lexical recasts were more effective than the grammatical recasts in generating learners' attention to them, resulting in L2 gains as evidenced in the subsequent written posttests. Smith and Renaud (2013) also explored the relationship between recasts, noticing and learning during text-based SCMC. For their study, intermediate learners of Spanish and German were engaged in a chat conference with their instructor and after one week, they took posttests. The findings revealed that there was a relationship between noticing of lexical and grammatical forms and posttests success.

2.3.4.5 Measures of noticing of feedback in the present study

After presenting the different measures that are commonly used to examine learners' noticing of interactional feedback in SLA research, it is worth elaborating on the measures employed in the present study, explaining and justifying their use.

In this particular study, learners' noticing of interactional feedback provided during oral and written synchronous online interactions were assessed through performance (i.e. uptake) and introspective (i.e. SR reports) measures. In the former, noticing was operationalized as the learners' immediate modification of their output in response to interactional feedback, while in the latter, noticing was operationalized as situations where learners indicated that, (a) they were aware of the fact that they received a target-like model of the linguistic form, and/or whether their production of the form was problematic (Lai & Zhao, 2006; Smith, 2009), (b) the form was new to them (Mackey, 2006b), and (c) the feedback led to revisions of their hypotheses about the target form (Izumi, 2003).

Among the available measures, SR lends itself best at tapping learners' attentional processes during online task-based interactions. Thus, the aim of utilizing SR was twofold: (a) as it is a retrospective method, it is unlikely to interfere with the learners' cognitive processing when performing the tasks, and (b) the triangulation of the learners' interactional data (i.e. provision of uptake/ modified output), with accounts of their performance, could help to better understand their online processing while completing task-based activities in online settings. SR would therefore help in exploring the learning mechanisms and mental

processes involved in recognizing and interpreting interactional feedback, as well as allowing qualitative insights into learners' noticing.

Given the theoretical claims of Schmidt's noticing hypothesis (2001), which posits different levels of awareness, and the several accounts of attention in SLA research (e.g. Tomlin & Villa, 1994), the current study aimed to ascertain the effects of synchronous modality on the quality of learners' noticing. Methodologically, concurrent data (i.e. think-alouds) is crucial in examining and understanding the levels of awareness in L2 processing (Leow, 2012). The previous studies have depended upon this measure in their examination of learners' awareness and in the quality of their engagement with L2 input. However, most of these studies are in the written mode. As a result, given the comparative nature of this study between oral and written contexts, in addition to learners' one-to-one synchronous interactions, this method is impractical. This means the best alternative to collect verbal reports appears to be through off-line stimulated recalls.

This study made an attempt at understanding the level of learners' engagement with L2 input/feedback during online dyadic task-based interactions, differentiating between two levels of noticing: (a) simple noticing, operationalized as incidents of noticing where learners simply reported or referred to the target-like linguistic form in the feedback or the problematic form in his/her utterance without further deliberation, and (b) elaborate noticing, operationalized as incidents where learners deliberated over the language forms and provided explanations of the differences, as well as reasons for accepting the corrected forms or discussion of alternative forms.

While SR provides insights into the occurrence and the qualitative aspects of noticing, it is not without its drawbacks. First, there is the danger of memory deterioration. Gass and Mackey (2017) urge researchers to collect data as soon as possible after the event because retrieval from long-term memory may result in recall interferences. This means, if the event becomes distance in memory, there is a greater tendency for learners to verbalize what they are thinking about at the time of the recall, rather than what they were actually thinking during the activity, because the event is not sharply focused in their memory. Second, it is possible that learners may provide erroneous information on what they actually became

aware of during the interaction. Egi (2010) pointed out that, as recall prompts are typically general (i.e. '*what were you thinking then?*'), they might elicit reports that represent learners' summative comments in regards to a conversational interaction presented in the stimulus, rather than their thoughts about a particular turn in the interaction (i.e. the interactional feedback).

To alleviate these potential limitations associated with the use of SR and to obtain more accurate data, Gass and Mackey (2000, 2017) suggest a variety of strategies. These strategies were subsequently adhered to in this present study, which shall be elaborated in greater detail in Chapter 4, Section 4.7.5.

2.4 Task-based Language Learning: Pedagogical Perspective

The concept of 'task' has become central to both L2 pedagogy and research, helping to bridge the gap between these two areas (Gass & Mackey, 2007). Most of the interaction-based research, both in classroom and laboratory settings, generally involves collecting data from learners in a task-based setting, which helps to create conditions for L2 use, and later determines any learning opportunities that have resulted from the treatment (Foster & Ohta, 2005; Gass & Mackey, 2007).

The theoretical rationale for using a communication task is that language is best learned and taught through interaction (Pica, Kanagy, & Falodun, 1993). Task-based language learning is based on the premise that language learning can take place through holistic language use activities, which should reflect the things learners need to be able to do beyond their L2 classroom setting (Samuda & Bygate, 2008). Unlike language exercises, which focus primarily on linguistic accuracy for its own sake, communication tasks require learners to use language appropriately to address needs similar to those they encounter outside their language classroom. They are structured in a way that learners will talk, not for the sake of the language as an end of itself, but as a means of sharing ideas, expressing opinions, and working towards convergent or divergent goals (Pica et al., 1993). Along the lines of relevant research, the present study utilizes task-based activities to trigger learners' interactions in the oral and written modalities of SCMC. Therefore, this section presents the relevance of task-

based learning to the interactionist approach, and then proceeds to define a task and discuss the characteristics of communicative tasks.

2.4.1 Task-based learning and the interactionist approach

Research in the field of SLA has revealed the benefits of using pedagogic tasks for L2 interaction-driven language learning (Ellis, 2003). Task-based learning has its foundations in use-oriented theories of SLA, namely, the interactionist, the sociocultural, and the ecological approaches (Ortega, 2009b).

The interactionist approach serves as "a theoretical foothold" for task-based language teaching (TBLT) (Lai & Li, 2011, p.500), in which it posits that TBLT offers ideal linguistic environments and conditions for negotiated interaction that is potentially useful for language learning. The sociocultural approach, in contrast, supports the value of task-based learning for its potential to provide opportunities for collaborative interaction and scaffolding, both of which are at the crux of language learning. As for the ecological approach to language learning, this too supports the value of task-based learning. According to this approach, language learning occurs within "the context of the learners' activities, where learners utilize language as well as other tools and the given conditions of the classroom to achieve particular goals that are driven by their motivations and intentions" (Jeon-Ellis, Debski, & Wigglesworth, 2005, p.124).

Tasks interaction provides authentic contexts where learners use the language and achieve goals. They are generators of input and output, and are useful for potentially generating the internal processes necessary for SLA (Ellis, 2003). In tasks, "input often takes the shape of positive evidence of the target language or is presented as corrective feedback, and it is typically part of a dynamic, goal-oriented, input-output-feedback cycle" (Gilabert et al., 2016, p.122).

2.4.2 What is a task?

Many definitions of a 'task' have been proposed within the literature of TBLT. For this study, the definition proposed by Ellis (2003) has been adopted, as it involves the criterial features of a 'task'.

> A task is a workplan that requires learners to process language pragmatically in order to achieve an outcome that can be evaluated in terms of whether the correct or appropriate propositional content has been conveyed. To this end, it requires them to give primary attention to meaning and to make use of their own linguistic resources, although the design of the task may predispose them to choose particular forms. A task is intended to result in language use that bears a resemblance, direct or indirect, to the way language is used in the real world. Like other language activities, a task can engage productive or receptive, and oral or written skills, and also various cognitive processes. (p.16)

Ellis' definition offers a general outline and features of a task, identifying a task as a pedagogical work plan with a primary focus on meaning, which involves real-world processes of language use that engage cognitive processes to reach the clearly defined communicative outcome.

2.4.3 Which type of tasks?

Many researchers have attempted to identify tasks and task conditions that are likely to enhance learners' interactions. Many researchers have implied that a task may make a key difference; that is, the nature of the task at hand may promote or preclude the occurrence of the different interactional moves (i.e. negotiation for meaning and receiving and incorporating feedback) (Pica et al., 1993).

Furthermore, several task features were argued to promote interaction and language learning more effectively. Some of the widely researched task characteristics include information exchange (required versus optional), information-gap (one-way versus two-way) and outcome (convergent versus divergent) (Ellis, 2003). A number of studies have also

investigated these different characteristics and, overall, it was found that task characteristics that required a two-way information exchange and a convergent outcome elicit more negotiation for meaning than one-way, optional information exchanges, particularly during task-based learner-learner interactions (e.g. Gass, Mackey, & Ross-Feldman, 2005; Pica et al., 1993). Pica et al. (1993) found that jigsaw tasks met these criteria, where learners have different portions of information, and must subsequently request and exchange this information in order to complete the task. As a result, they are most likely to yield more opportunities for learner's negotiations towards comprehension, feedback on production and interlanguage modifications, particularly in comparison to other task types, such as opinion-exchange and decision-making tasks.

In terms of task type within text-based SCMC, few studies have sought to address the issue; however, these initiative attempts have produced mixed findings. For example, Blake (2000) compared learners' performance in a jigsaw task, an information-gap task and a decision-making task, and his findings suggested that the jigsaw task promoted the most incidents of negotiation for meaning. Conversely, Smith (2003) provides counter-evidence supporting decision-making tasks. While comparing jigsaw and decision-making tasks, Smith (2003) found that learners negotiated a significantly higher percentage of turns when they were engaged in the decision-making tasks than when they worked on the jigsaw tasks ($M=$ 44%; $M=$ 23%, respectively[2]). Given these mixed findings, the extent to which a given task can be influential in online synchronous interactions is still uncertain.

The type of task that was utilized in this present study is a spot-the-difference task. The same task type was used in the two treatment conditions, thereby eliminating the potential effect of task type as a variable, which has been shown to affect task performance (Ellis, 2003). It is a communicative task in which each of the dyadic interlocutors has a slightly different version of the same picture, and thus, learners need to interact with each other to find out the differences between the two pictures. This type of two-way task was particularly chosen as it exhibits the two features argued to be effective in fostering negotiated interaction (Gass, Mackey & Feldman, 2005; Pica et al., 1993). The first feature is that the task is oriented towards a specific goal and a clearly defined outcome (i.e. finding a specific number of

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[2] These refer to the mean percentages of turns negotiated during each task.

differences). The second feature is activity, which suggests that the participants take an active role whilst performing the task. This is evident for this task, as each participant in the dyad holds different portion of the information and is required to request and supply this information to the other participant to achieve the task outcome. In other words, this type of tasks involves plenty of information exchanges, as participants are required to interact with each other while completing the task.

2.5 Summary

This chapter has reviewed the theoretical and pedagogical perspectives underpinning this research study. To summarise, the interactionist approach to SLA argues that interactions in general, and negotiations in particular, give rise to opportunities for L2 learners to comprehend message meaning, receive interactional feedback, notice language forms, produce comprehensible and modified output - all of which lead to success in L2 learning and development. Noticing is at the heart of this approach and, according to the Schmidt's (1990, 1995) views, this is a crucial mechanism in the internalization of L2 input into learners' interlanguage systems.

Since noticing is claimed to play an important role in the L2 knowledge reconstruction process and in the transition of input into intake, SLA researchers feel compelled to empirically examine supportive conditions, under which opportunities for this cognitive process are accelerated. Optimally, text-based SCMC is argued for its increased cognitive advantages for L2 learners, in comparison to spoken interactions, due to a number of affordances it exhibits (O'Rourke, 2005; Sauro, 2009; Smith, Alvarez-Torres, & Zhao, 2003).

The next chapter introduces the context of SCMC, outlining its written and oral modalities. It then reviews literature that was oriented by the interactionist approach to examine the potential of SCMC in spurring negotiated interaction and facilitating the cognitive process of noticing.

Chapter 3: Synchronous Computer-Mediated Communication

3.1 Introduction

This chapter aims to situate the present study into the broader literature of SCMC. It begins by providing an introduction of CMC into the actual field of CALL, which is then followed by introducing the written and oral modalities of SCMC, drawing upon associated claims that suggest their potential usefulness for L2 learning and acquisition. Reflecting on the scope of this study, the chapter then continues to present a comprehensive review of research on negotiated interaction and noticing in SCMC environments, demonstrating its status quo and also identifying the gaps that the present study attempts to bridge. This in turn, shall further demonstrate how this area of research could be extended and expanded upon.

3.2 CALL History: Introduction of CMC

In parallel with the evolution of SLA theories, CALL has undergone three critical stages of development, upon which the computer has played a number of different roles (Kern & Warschauer, 2000). In the 1970s and early 1980s, early CALL applications reflected behaviorist perspectives, whereby learners interacted with the computer to complete repetitive drill exercises that focused on form, which were specifically designed to increase language accuracy. A more cognitive constructivist view of learning was seen in later CALL applications that involved learners in communicative exercise, which engaged them in higher-order problem-solving interactions, such as games and simulations. The last stage of the evolution, known as network-based CALL, took place with the rapid advancement of the Internet and through the expansion of communication tools that occurred at the turn of the 19th century; this offered new possibilities for learners to work in networked classrooms and engage in online interactions. This stage reflects a sociocultural interactionist shift, where learners interacted with each other or with native speakers through CMC.

CMC is generally defined as, "communication that takes place between human beings via the instrumentality of computers" (Herring, 1996, p.1). In the specific context of L2 learning, CMC permits language learners to communicate with other learners or speakers of

the target language (Kern & Warschauer, 2000). Conventionally, two main modes of CMC can be found: synchronous and asynchronous CMC. Synchronous CMC (SCMC) (chat-based) refers to communication that is performed in real time, whereby interlocutors simultaneously communicate with one another while being online. Conversely, Asynchronous CMC (ACMC) (forum-based) refers to communication where interlocutors are not required to be simultaneously online and may have a time lag (O'Rourke & Stickler, 2017; Warschauer, 1996).

CMC started to become important for language learning in the mid-1990s, when L2 learning and teaching institutions started offering asynchronous text-based networking opportunities to their learners (Lamy & Hampel, 2007). Due to a greater access to the Internet and computers in recent years, the use of CMC has increasingly expanded, both inside and outside the language classroom.

3.3 Synchronous Computer-Mediated Communication (SCMC)

SCMC, which is the primary focus of this study, is defined as, "learner-learner or learner-teacher simultaneous conversational exchanges that take place in virtual contexts, such as chatrooms" (Sagarra, 2007, p. 230). In addition, SCMC has been more commonly referred to in studies of CALL as 'text-based' or 'written' interaction between learners within a networked setting (Levy & Stockwell, 2006; Smith, 2005). However, given that current computers are equipped with audio and video communication software, which are widely used for synchronous chat and have superseded traditional chatting practices, this common reference is no longer applicable during such times or in respect to this research; rather, SCMC can be used to refer to any kind of interaction, whether it be verbal, written or a combination of the two. It should also be noted that computer technology does not exclusively refer to the use of computer devices, as this term is currently broadly defined and includes desktops, laptops, hand held devices, smartphones, and tablets, among other technologies (Smith, 2017).

Due to its capacity for instant communication and in its ability to encourage collaborative interaction, SCMC has caught the interest of many SLA researchers and has

subsequently gained popularity as a pedagogical tool. Much of this interest, however, has been devoted to the written modality of SCMC and prompted by the unique features available in this medium of interaction.

3.3.1 Text-based SCMC

Text-based SCMC (text chat or text-SCMC, henceforth) is argued by many researchers to provide a particularly useful vehicle for L2 learning and acquisition. Although it is written, its synchronicity makes it similar to language that is found in spoken conversation, and it is this similarity that prompts Pellettieri (2000) to assume its benefits for the L2 learning process:

> Because synchronous [CMC] chatting bears a striking resemblance to oral interaction, it seems logical to assume that language practice through [CMC] will reap some of the same benefits for second language development as practice through oral interaction. (p.59)

The indication here is that synchronous text chatting is hypothesized to be as effective as oral FTF interaction for the development of L2. This is not only for its similarity to FTF oral contexts, but rather, text-SCMC has also attracted the interest of SLA researchers for the numerous linguistic, cognitive, and even affective advantages it has been shown to offer. Before presenting these advantages, however, it is worth attempting to situate text-SCMC on the speech/writing continuum.

Generally speaking, text-SCMC has been labeled as a hybrid mode of communication because it exhibits features of both written and spoken language (Smith, 2005; Yanguas, 2010). It exhibits some of the features that are fundamental to oral interactions, such as interactivity, rapidity and pressure to respond to an interlocutor's turn in a timely fashion (Lee, 2009). In contrast, it does differ from spoken interactions in a number of ways. First, it has a textual representation, which depends on writing and reading, and therefore, it may require extra time for individuals to process the input and plan their output (Abrams, 2003). Second, it lacks the provision of simultaneous feedback, so the participant has no clear indication to know how successful their message was, and whether it has been understood or if it needs repairs (Crystal, 2006). Third, because of the time it takes to type messages and the

lack of immediate feedback, it is possible that messages within this medium do not adhere to turn adjacency conventions, since participants could send their messages simultaneously, which would subsequently result in "split negotiation routines" (Smith, 2003, p.48). Finally, it lacks the social aspects that are present in FTF interactions, such as prosodic and paralinguistic cues (e.g. intonation and gestures). This has led to different practices, such as the use of pause fillers in writing (e.g. "hmmm"), special acronyms or 'onomatopoeia' (e.g. BTW for "by the way"), emoticons and expressive punctuations (e.g. smiley faces ☺) or the use of capital letters to denote shouting or the person yelling (Crystal, 2006).

Table 3.1 presents some of the purported advantages of text chat, with examples of the supporting studies. For this study purpose, the claims that text-based SCMC promotes opportunities for negotiated interaction and noticing will be thoroughly discussed in Sections 3.4 and 3.5.

Table3.1

Claims of text-based SCMC

Claims	Supporting Studies
Enhanced amount of output and interaction	Beauvois, 1992, 1997; Kern, 1995; Kitade, 2000; Warschauer, 1996
Enhanced quality of output	Kern, 1995; Payne & Whitney, 2002; Salaberry, 2000; Warschauer, 1996
Enhanced equal opportunities for participation	Beauvois, 1992; Kern, 1995; Sauro, 2009; Warschauer, 1996
Enhanced opportunities for negotiations	Blake, 2000; Kitade, 2000; Lee, 2008; O' Rourke, 2005; Pellettieri, 2000; Sauro, 2009; Sotillo, 2000; Warschauer, 1997; Warschauer & Kern, 2000; Ware & O' Dowd, 2008
Enhanced opportunities for oral skills development	Abrams, 2003; Beauvois, 1998; Kern, 1995; Payne & Whitney, 2002; Satar & Özdener, 2008
Enhanced reduction of foreign language anxiety	Beauvois, 1998; Kern, 1995; Satar & Özdener, 2008; Warschauer, 1996
Enhanced noticing and metalinguistic knowledge	Blake, 2000; Kern, 1995; Kitade, 2000; Pellettieri, 2000; Salaberry, 2000; Shekary & Tahririan, 2006; Smith, 2003, 2004; Toyoda & Harrison, 2002; Warschauer, 1997

As highlighted, a number of early research studies examining the context of text-SCMC does suggest it can offer significant advantages that are believed to be beneficial for the process and development of the L2. Among its several benefits is the potential to prompt the quantity and quality of learners' output, and language production. For example, Kern (1995) compared the quantity and characteristics of discourse produced by French students during a text chat session with that of FTF classroom discussion. The findings revealed that text-SCMC offered more frequent opportunities for language production than the oral interactions; students produced two to four times more sentences and had over twice as many turns in the text chat session than in the classroom discussion. Furthermore, Kern's findings

not only showed that text-SCMC encouraged more quantity of output, but also led to a heightened quality of output, particularly in terms of the range of morphosyntactic features, and in the variety of discourse functions. Likewise, Warschauer (1996) reported that students used more formal and complex language in this medium of interaction than in FTF interaction.

Furthermore, researchers have also argued that another potential benefit of text-SCMC is that it offers an increased opportunity for equal participation from all learners when engaging in discussion. For instance, Beauvois (1992) found that nobody dominated a discussion during this mode of interaction and everyone, even the teacher, had equal control over the discussion. Similarly, Warschauer (1996) reported that ESL students, who barely participated in FTF discussions, became active contributors in the text-SCMC setting. In addition, researchers have reported that interactions in text-SCMC can lead to increased L2 oral proficiency. For example, Payne and Whitney (2002) found a significant difference between the experimental and control groups' oral proficiency development, with the experimental group demonstrating greater gains than the control group, who did not have any online chat time (the experimental group spent two out of the four hours of classroom time per week in a chat room).

In addition, text-SCMC is lauded to create opportunities for meaning-oriented and form-focused negotiations. Several SLA researchers have suggested the usefulness of negotiated interaction in this context, since this written modality could enhance the availability and salience of interactional feedback, and consequently provide learners with extra opportunities to reflect on both the form and meaning of their communication (Warschauer, 1997; Warschauer & Kern, 2000). Closely related to these benefits, text-SCMC is argued to reduce learners' anxiety, fear, and lack of confidence, thereby increasing their involvement and participation during interactions. Beauvois (1998) and Warschauer (1996) reported that text-SCMC sessions allowed learners to communicate in a non-stressful environment, and Satar and Özdener's (2008) study similarly highlighted the ways in which text-SCMC can be utilized as a useful tool in boosting L2 learners' confidence and diminishing levels of their foreign language anxiety.

Aside from these linguistic and affective advantages that text-SCMC has been claimed to offer, researchers have also argued for its cognitive advantages. Several researchers indicate that the text-SCMC medium can afford greater opportunities for planning, monitoring and reflection, which consequently, encourages a greater degree of noticing than in oral interactions (Chapelle, 2001; Kern & Warschauer, 2000; Smith, 2004).

Arguably, three major characteristics of text-SCMC have motivated SLA researchers to claim its usefulness to reduce the cognitive demands imposed on learners' attentional resources. These characteristics subsequently enhance the learners' noticing and are as follows: (a) the enhanced perceptual salience, (b) the permanent nature of written discourse, and (c) the slow pace of a text-based interaction, which allows increased processing and planning time. First, the perceptual salience of input within written exchanges is argued to increase learners' opportunities to notice new target language forms, as well as aiding in the noticing of gaps between their interlanguage and the target language (Kern et al., 2004; Sauro, 2009). According to Gass (1997), increased salience of language forms can help ensure that particular forms are noticed and processed by language learners. Second, contrary to the ephemeral nature of spoken conversation, the permanent nature of written exchanges in a chat window is assumed to provide greater opportunities for making comparisons between corrected forms and non-target-like productions (Kern, 1995; Payne & Whitney, 2002; Pellettieri, 2000; Salaberry, 2000; Smith, 2005; Toyoda & Harrison, 2002). Unlike the rapid fade of oral interactions, the enduring visual record of text chat offers a means for learners to review, compare and reuse language forms available in the input, whilst not impacting the flow of interaction. This subsequently has the potential to further improve language development. Finally, other researchers have attributed the enhanced noticing opportunities in text chat to the slow turn-taking of written interactions, which allows interlocutors increased amounts of processing and planning time (Kitade, 2000; Ortega, 1997, 2009a; Payne & Whitney, 2002; Sauro, 2009; Williams, 2005). Moreover, conversations tend to flow at a slower pace during text chat because interlocutors are not able to type as quickly as they speak, and this slower pace of interaction may allow learners to have longer processing time of incoming messages and also longer planning time of outgoing messages. In other words, the reduced time pressure afforded by text chat may be beneficial for facilitating not only

attention to language input and feedback, but also attention and monitoring of one's own L2 output.

3.3.2 Voice-based SCMC

With the evolution of technological tools, SCMC formats have begun to include spoken communications within online environments (Shih, 2014). Voice–based SCMC (voice chat or voice-SCMC, henceforth) has been available since the mid 1990s, offering L2 learners the opportunity to communicate orally and synchronously with remote native speakers or other L2 learners (Rosell-Aguilar, 2005; Levy & Stockwell, 2006). Naturally, voice chat resembles FTF interactions in several aspects, depending on the activity of speaking and listening, such as sequential adjacent discourse patterns (Herring, 1999), rapidity and evanescence of output (Gilabert et al., 2016) and availability of prosodic features of communication. However, it has been argued that this mode is less rich than interactions in FTF, as it lacks the paralinguistic and non-verbal features.

Much of the research into voice-based SCMC has been in the area of distant language education (e.g. Hampel & Hauck, 2004, 2006; Heins, Duensing, Stickler, & Batstone 2007), with very few studies tackling the potential application of voice chat for L2 learning development. As for the studies that were found, a number of them show elements of relevancy and potential in applying voice-SCMC for L2 learning. They have demonstrated how learners are willing to participate in interactions using this medium (e.g. Bueno-Alastuey, 2011), how it generates repair moves (e.g. Jepson, 2005) and self-repairs (e.g.Yamada, 2009), as well as how it potentially supports the development of oral proficiency (e.g. Satar & Özdener, 2008). Thus, the general finding from this research is that voice chat offers opportunities for authentic communication in the target language and in the development of speaking skills. These studies serve as a foundation on which to build our knowledge of how voice-SCMC could promote L2 learners' negotiated interactions and noticing.

3.4 Negotiated Interaction in SCMC

Since the late 1990's, there has been a growing body of research that has examined interactions within the context of SCMC, exploring its potential to offer the same interactional moves found in FTF interaction for the facilitation of L2 learning development. These include negotiation for meaning, corrective feedback, attention to language forms and modified output. This research has adopted different goals and designs, and could be generally grouped into two categories: one-modality research and comparative research. While the former has particularly focused on examining overall patterns of negotiated interaction in one type of synchronous communication, the latter has examined the occurrences and patterns of negotiations in synchronous written discourse, in comparison to those generated either by FTF contexts or other synchronous modalities (i.e. audio, video, or multimodality).

3.4.1 Studies examining one modality

3.4.1.1 Text-SCMC

Encouraged by the development of computer networks and their capability for interactive communication, Chun (1994) examined the discourse produced by first-year German students during their computer-assisted class discussion. The purpose of this study was to ascertain whether online written communication generates and initiates the types of discourse that are facilitative for L2 learning. The findings revealed that the students were more actively involved in the management of their online discussions than what was typically found in normal classroom discussions, wherein they would ask questions of their fellow students and teacher, give feedback to others and request clarifications if there was a lack of comprehension.

Building upon Chun's early work, Kitade (2000) conducted a qualitative examination of written SCMC in light of SLA theories. In his analysis, he found that there were instances of collaborative learning among learners of Japanese during their dyadic interactions with each other and with native speakers, revealing that text chatting encouraged negotiation for meaning and promoted learners' modifications of their linguistic errors after receiving interactional feedback. Pellettieri's (2000) study also suggested that text-based online chat

was advantageous, where she investigated intermediate-level Spanish learners in their negotiations for meaning and form while they were performing five dyadic communicative tasks in text-SCMC, ranging in type from focused open discussion to closed jigsaw tasks. Upon completion, the participants were also asked to jointly compose a short piece of discourse based on the information they had shared during each task. The results revealed that negotiation for meaning and form occurred across all the five sessions, and the moves of negotiations looked much like those found in FTF communication. More specifically, four components of the negotiation moves were analysed: (a) the percentage of three specific types of triggers of negotiated interaction (i.e. lexical, morphosyntactic, and content), (b) frequencies of negotiated modifications, (c) corrective feedback, and (d) the incorporation of feedback. This analysis showed that the majority of the triggers for negotiated interaction were lexical, and with regard to corrective feedback, 31 instances were identified (18 explicit and 13 implicit feedback moves). It also showed that learners did attend to form in their output, and subsequently produced lexical, syntactic and semantic modified output in response to corrective feedback. Lastly, the incorporation rates were high, resulting in 68% for explicit feedback and 75% for implicit feedback.

These findings suggest that text-based online chat fosters negotiated interaction and promotes incidents of noticing and modified output that could foster L2 development. In addition, Blake (2000) investigated negotiations in written computer-mediated tasks amongst intermediate-level Spanish learners. The findings showed that negotiations were present in text chat, prompting learners to modify output and incorporate lexical items in their L2 knowledge. Similar to Pellettieri's (2000) findings, Blake (2000) found that negotiations were mostly triggered by lexical confusions, which echoed findings that were also found in FTF interaction research (e.g. Mackey et al., 2000).

In addition to the aforementioned studies, Lee's (2001) exploration of online written interactions from intermediate-level learners of Spanish demonstrated that the learners used a variety of negotiation strategies during their group discussions (3 to 4 learners per group), such as clarification requests and comprehension and confirmation checks. Lee also reported that one of the advantages of text-SCMC was that it encouraged learners to pay attention to the accuracy of their own output, thus producing self-corrections. However, this study also

found that text-SCMC impeded learners from engaging in rich, correct and coherent discourse, as their written discourse was shown to be brief, short and abundant with incorrect forms.

Developing this line of research further, Smith (2003) conducted a study to examine the amount and type of negotiations that occurred when intermediate-level learners of English encountered new lexical items during a jigsaw and decision-making task within a text-SCMC environment. In addition, Smith aimed to examine how the patterns of negotiation in text chat compared to Varonis and Gass' (1985) widely used model of negotiated interaction in FTF contexts. The findings showed that learners were engaged in negotiated interaction for approximately one-third of the time. The task type was found to have a significant influence on the extent to which learners engaged in negotiations, with the decision-making tasks generating higher percentage of negotiated interaction than the jigsaw tasks. In addition, Smith found that Varonis and Gass' (1985) model was largely applicable to text-SCMC, but it required further developments in order to adequately account for the observed features of negotiation episodes in text-SCMC. Smith's (2003) seminal study, therefore, proposed his expanded model of negotiations, which allows for a delay between the trigger and signal moves and for the occurrence of split negotiation turns (see Section 2.2.2).

3.4.1.2 Voice-SCMC

Unlike text-SCMC, there is a dearth of literature that informs the potential effects of voice-based chat on L2 interactions. Motivated by this lack of research, Bueno-Alastuey's (2013) study attempted to address this gap and provide an account for the availability of interactional feedback in voice-based SCMC. More specifically, this study focused on examining whether different dyad composition (14 NNS-NNS sharing the same L1, 14 NNS-NNS with different L1, and 14 NNS-NS) affected the number and type of LREs, the type of feedback and the amount of modified output. Overall, the study findings showed the existence of high incidents of LREs, focusing both on meaning and on form, which subsequently led Bueno-Alastuey (2013) to conclude that voice chat SCMC is "a fertile ground for negotiated interaction and for making learners use their linguistic resources, so that they could modify their production and advance in their L2 learning process" (p.551).

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With regards to the effect of dyad type on the occurrence and features of LREs, Bueno-Alastuey (2013) found that *NNS-NNS different L1 dyads* experienced the most meaning, phonetic and form-focused LREs, and significantly more lexical and morphosyntactic LREs than the *NNS-NS dyads* and *NNS-NNS same L1 dyads*. In fact, *NNS-NNS same L1 dyads* appeared to be the least beneficial, as they showed the least meaning, phonetic and form-focused LREs, as well as the least amount of modified output. In her conclusion, however, Bueno-Alastuey explained that the differences between the two kinds of NNS-NNS dyads may have been attributed to the differences between the learners that were found in these groups. That is, the dyads of NNSs same L1 were Spanish-Spanish, while the dyads of NNSs different L1 were Spanish-Turkish. Moreover, all the Spanish learners were L2 learners of English, with mixed proficiency levels ranging from low-intermediate to advanced, while the Turkish NNSs were pre-service teachers of English at an advanced proficiency level. Therefore, knowledge of the interlocutors' L1 and being a future teacher of L2 could have possibly influenced the differences between the dyads significantly.

Other studies into negotiated interaction in voice-SCMC have included comparisons between voice chat and other modalities of SCMC, either written (e.g. Jepson, 2005) or video-based (e.g. Yanguas, 2010). These studies are reviewed in Section 3.4.2.2.

3.4.2 Comparative research

3.4.2.1 Text-SCMC vs. FTF

Following the earlier exploratory research examining text-SCMC, a number of researchers have carried out their examination of the nature of L2 interactions in this context, in comparison to those that occur in FTF communication and other modalities of SCMC. These comparative studies were of two groups. The first group, in fact, did not include comparable FTF participants, but they did, nevertheless, make claims advocating or discouraging the usefulness of text-SCMC to L2 learning by comparing their findings to those reported in earlier FTF research. For example, Iwasaki and Oliver (2003) explored NS-NNS interactions in text-SCMC, and compared their findings, specifically in terms of the percentages of non-target-like utterances that initiated negative feedback, with those in Oliver's (1995) study of

NS-NNS interactions in FTF context. Twelve gender-matched NS-NNS dyads had free online conversation in three separate data collection sessions. The results showed that the proportion of NS' negative feedback to the number of NNS' non-target-like productions was lower in comparison to those reported in FTF oral interactions (25%, in comparison to 61% of the turns collectively, respectively). Similar comparisons have been made by a number of researchers who approached learners' interaction from a sociocultural perspective and used LREs as their unit of analysis (e.g. Shekary & Tahririan, 2006; Zeng & Takatsuka, 2009). These researchers compared the distributions of LREs in their examination of text-SCMC with those reported by Williams (1999) in the FTF mode, and, overall, their findings indicated the higher opportunities for LREs in text-SCMC than in FTF interactions.

As the first group did not compare the same participants working in the two comparative modes of interaction, the second group of studies addressed this gap by using within-participants designs to compare interactions across FTF and text-SCMC contexts (e.g. Fernández-García & Arbelaiz, 2003; Kern, 1995; Kaneko, 2009; Lai & Zhao, 2006; Loewen & Reissner, 2009; Rouhshad et al., 2016; Sim et al., 2010; Yuksel & Inan, 2014). As previously demonstrated, Kern (1995) compared the discourse produced by French students during an oral class discussion with that of discourse produced in a text-SCMC session. The findings of this comparison showed that text-SCMC was found to offer more frequent opportunities for students' engagement and language production. However, Kern outlined a number of methodological limitations that could challenge his findings. First, the duration of the sessions within each mode was not identical, with the duration of text-SCMC being longer than that of FTF discussions. Second, the same open-ended discussion task was used in both modes, with the text-SCMC session preceding the oral discussion. Therefore, it might be the case that students felt 'talked out' by the time they discussed the same topic in the oral mode. These limitations, in fact, could have influenced the quantity of language production in the two modes of interaction.

The other studies were more tightly controlled, incorporating a counterbalanced design. Fernández-García and Arbelaiz (2003) examined the effects of mode (i.e. oral FTF in comparison to text-SCMC) and group (i.e. NNS-NNS, NS-NNS, NS-NS) on the frequency of negotiations, and found that the *NS-NNS* group was the only one that had negotiated

significantly more in the oral FTF than in written SCMC, but the other two groups produced comparable amounts of negotiations across both modes. However, a closer look at the NS-NNS negotiations revealed that lack of NNS' familiarity with NS's pronunciation seemed to have caused most of the breakdowns in their interactions during oral communication.

While Fernández-García and Arbelaiz's (2003) study did not reveal any differential effect on the mode of interaction for the number of negotiations generated by the *NNS-NNS* group, the findings from the rest of the other studies favoured the FTF mode, contradicting Kern's findings. Lai and Zhao (2006) revealed that, when learners performed spot-the-difference tasks, the mixed-proficiency NNS-NNS dyads produced significantly more negotiations for meaning in FTF than in SCMC. Consistent with this, Kaneko (2009) found that same-proficiency NNS-NNS dyads produced twice as many negotiations for meaning in FTF than in text-SCMC when performing three communicative tasks (i.e. spot-the-difference, role play and constructing sentence tasks). Sim et al. (2010) also revealed that FTF generated more negotiations for meaning than text-SCMC while mixed-proficiency NNS-NNS dyads were completing decision-making tasks. Their findings demonstrated that text-SCMC allowed for syntactic and semantic modifications by high proficiency learners, which in turn (as the researchers assumed), provided opportunities for low proficiency learners to negotiate for comprehensible input and to notice forms. Yuksel and Inan (2014) further found that FTF generated significantly more negotiations for meaning than text-SCMC while intermediate-level dyads were completing the jigsaw tasks.

More recently, Rouhshad et al. (2016) extended this line of research by comparing the nature of negotiations (meaning vs. form) in same-proficiency intermediate dyads' interactions across FTF and text-SCMC. Their findings again revealed significantly more negotiations for meaning in FTF than in text-SCMC mode; however, instances of negotiation for form fell short of significance across the modes. In addition, the findings showed that the text-SCMC led to fewer instances of successful uptake than FTF conversations.

Taking all of the aforementioned findings into consideration could arguably challenge earlier claims for the potential of text-SCMC in creating greater opportunities for negotiations and attention to language forms (e.g. Blake, 2000; Warschauer, 1997). A number of

researchers have attributed the fewer occurrences of negotiation in text-SCMC to the greater processing time available to learners in this context, which could allow them to read and re-read messages in cases of non-understanding; this shall subsequently eliminate the need to negotiate (e.g. Fernández-García & Arbelaiz, 2003; Rouhshad et al., 2016). In fact, Smith's (2009) findings could lend support to this suggestion. In his examination of the relationship between scrolling and negotiation among dyads in their online interactions, he found that when the amount of scrolling increases, the occurrence of negotiation for meaning decreases.

Aside from these comparative studies on dyadic interaction in text-SCMC with FTF interactions, Loewen and Reissner (2009) examined the occurrence of focus on form episodes in virtual (i.e. text-SCMC) and traditional (i.e. FTF) classroom interactions. The overall average number of focus on form episodes per minute was 0.73 in the FTF context, whereas in the text-SCMC, the overall average was 0.12. Though the researchers did not conduct any inferential statistics, the difference appears substantial, indicating the increased benefits of focusing on form in oral FTF than in written online interactions. One point worth mentioning here, however, is that the interactions within the FTF context were teacher-monitored, but in the text-SCMC, half of them were teacher-monitored while the other half were not. As teachers where involved in all the FTF discussion, their presence may have resulted in increased focus on language forms.

While the above-discussed studies only made comparisons between the interactive moves in text-SCMC with those available in FTF settings, other empirical research has attempted to further ascertain how L2 learning is achieved as a result of engaging in negotiated interaction in the two interactional contexts (e.g. Baralt, 2008; De la Fuente, 2003; Salaberry, 2000). While Salaberry (2000) descriptively examined the differential effects in modes of communication on L2 morphosyntactic development, De la Funeto (2003) and Baralt (2008) empirically examined their effects on L2 vocabulary acquisition via a pretest-posttest-delayed posttest design.

Salaberry (2000) made a comparison between the languages of four English-speaking learners of Spanish in an offline (FTF) versus online (text-SCMC) setting. His analysis revealed that the process of scaffolding, power relationships and morphosyntactic changes of

past tense verbal endings were more evident in the online setting than during FTF interaction. Despite the small-scale and exploratory nature of this study, which limited the conclusiveness of the findings, Salaberry suggested that the inherent characteristics of text-SCMC may increase the salience of morphosyncatic markers and also promote noticing the gap between one's interlanguage and the target language.

In contrary to Salaberry's findings, De la Fuente (2003) found that both FTF and SCMC appeared equally effective in promoting receptive and productive acquisition of target lexical items by learners of Spanish, which was achieved through the negotiation for meaning. However, she also found that oral FTF appeared to be more effective in promoting oral acquisition of L2 words, particularly the productive end of acquisition. Based on these findings, De la Fuente concluded that the mode of interaction does not affect learning of L2 words, although the FTF setting may be more facilitative than text-SCMC in promoting short and long-term oral productive acquisition. Baralt (2008) conducted a similar study to examine the differential effects of FTF and text-SCMC modes on the acquisition of lexical items from learners of Spanish. However, contrary to De la Fuente's (2003) findings, Baralt's (2008) study revealed that, for oral and written production tests, learners did significantly better in the text-SCMC mode than in the FTF mode, but not on receptive written production tests. Therefore, Baralt challenged De la Fuente's (2003) findings and suggested that text-SCMC "may pose more benefits than interaction in the FTF mode for developing production skills" (p.182). It should be noted, however, that the time allowed to complete the tasks in the two studies was different. In De la Fuente's study, participants were given a strict controlled time limit to complete the negotiation of lexical words: one minute per each lexical item in the FTF group and two minutes per item in the text-SCMC group, while in Baralt's study, the time was not controlled to allow participants achieving a mutual comprehension of the lexical items. Baralt (2008) argued that learners in De la Fuente's study did not have enough time to negotiate words in text-SCMC to result in vocabulary acquisition.

Despite the different findings that have been found with regard to L2 learning in the two conversational modes (FTF vs. text-SCMC), Ziegler's (2013) meta-analysis, based on journal articles and dissertations published between 1990 and 2013, has helped to reveal a clearer picture concerning the efficacy of interaction in the different modes, revealing, "no

significant differences were found between the two modes on the development of learners' oral and written skills or their productive and receptive skills" (p.155).

This finding is important for SCMC research, as it suggests that learners can reap the same L2 developmental benefits in text-SCMC that they are likely to experience in FTF contexts. It could, however, raise concerns with regard to the argument that written interactions, relative to spoken conversations, lead to greater opportunities for negotiations, noticing, and consequently, L2 gains (e.g. Blake, 2000; Salaberry, 2000; Warschauer, 1997). Nevertheless, it should be noted that this line of comparative research has been questioned because it assumes that CALL conditions are to be matched against traditional FTF learning conditions, when in fact they could represent a new kind of learning experience, offering affordances that need to be evaluated differently (Cerezo, 2015).

3.4.2.2 Modalities of SCMC

A handful of other comparative studies have scrutinized the occurrence and features of negotiated interaction across the different modalities of SCMC. The majority of these studies have compared text chat to oral voice-based or video-based SCMC, while only few have compared voice to video-based SCMC.

One of the first L2 interaction investigations of text chat in comparison to voice chat was conducted by Jepson (2005). Jepson explored the patterns of repair moves, operationalized as negotiation of meaning and corrective feedback, in ten 5-minute online conversations among non-native speakers of English – five of them were voice-based sessions and the remaining five were text-based sessions. The findings showed a significantly higher number of repair moves in the case of voice chats than in text chats. However, the qualitative analysis of the repair moves in the voice chat showed that they were 'often' pronunciation related. Despite the various types of repair moves found in his oral and written data, Jepson reported that self-correction, which was considered evidence of noticing, was not among them. Jepson therefore suggested that SCMC may not be conductive to self-corrections. Later text-SCMC research, however, challenged Jepson's suggestion, providing evidence that self-repairs do occur in text-SCMC (e.g. Lee, 2008; Sauro & Smith, 2010;

Smith, 2008) and in voice-SCMC (e.g. Sotillo, 2009). One such contention from Smith (2008) stated that the source of data Jepson relied on (i.e. printed chat logs) led him to "a faulty conclusion" (p.96), arguing that text-SCMC interaction needs to be captured using audio, video and screen capture tools in order to capture the context nuances. Thus, relying solely on final chat logs is insufficient in the context of text-SCMC, as it cannot document the learners' monitoring and attention to language forms (O'Rourke, 2008; Smith & Gorsuch, 2004).

While Jepson's (2005) study constitutes an early significant comparison between the oral and written modalities of SCMC, two important issues should be noted. First, the participants were anonymous because Jepson collected data from random chat sessions taking place in an online English language school. Therefore, no personal profile data was available to the reader, so clear implications could not be inferred. Second, it was not possible for Jepson to have the same learners in the oral and written sessions, and thus, the inconsistency of learners' characteristics and the tasks they engaged in could raise doubts about the validity of this cross-modality comparison. To help provide a more valid comparison, the present study sets out to examine the effects of the oral and written modalities of SCMC on learners' interactions with the same set of learners across the two contexts and under the same task conditions.

Young and Edwards (2013) also explored the benefits of text chat versus voice chat, by examining the occurrences and characteristics of LREs, as well as participants' answers to exit questionnaires. This descriptive exploratory study highlighted distinct advantages of each interaction modality and, while voice chat was more advantageous in promoting listening and pronunciation, as well as negotiation for meaning and modified output, text chat was more conductive to the grammatical/lexical accuracy and in developing communication skills. In a following study, Edwards and Young (2016) conducted a case study to examine the effectiveness of the two online synchronous modalities on lexical acquisition. Results from the immediate posttest scores did not reveal any modality effects on retention of lexical items, but results from the delayed posttest scores showed a significant disparity in favour of voice chat. Interestingly, in contrast to the test scores, learners' responses to the questionnaire items showed a general consensus in favour of text chat over voice chat. While these studies

were apparently descriptive and lack researchers' detailed reports of data collection and analysis, they have helped to provide some understanding for the potential of oral and written SCMC and their relevance to language learning.

The comparative research has been extended to account for the potential of text-SCMC in comparison to video-SCMC on L2 interaction. For example, Van der Zwaard and Bannink (2014) investigated the occurrence and nature of negotiation for meaning in NS-NNS task-based interactions in text chat compared to video call. In a counterbalanced design, eight dyads completed one-to-one task-based telecollaborative interaction in each synchronous modality.[3] Findings revealed that negotiation for meaning episodes occurred in both contexts, but the synchronous modality affected the nature of the negotiated interaction. Moreover, negotiations were completed successfully and effectively in text chat but not in video chat. In text, learners and native speakers asked questions more freely and confidently until the trouble source was resolved, whereas in video chat, most of the negotiations were aborted before resolving the trouble sources. The researchers suggested that, due to the presence of an image along with a voice, the communication made via video calling may trigger issues of NS' politeness and NNS' potential loss of face, which consequently impede upon successful negotiations and task completion.

Very recently, Hung and Higgins (2016) also examined learners' use of communicative strategies in text chat compared to video chat. Participants were six Chinese-speaking learners of English and six English-speaking learners of Chinese, who were paired up as tandem learning. All dyads completed four interactions: 1) English text-based SCMC, 2) Chinese text-based SCMC, 3) English video-based SCMC, and 4) Chinese video-based SCMC. To examine the similarities and differences between the two modes of SCMC, Hung and Higgins analyzed the learners' use of communication strategies in open-ended conversational tasks, along with an after-task questionnaire and stimulated reflections that were carried a week later from the last online interaction. Six categories of communication strategies were defined and coded:

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[3] This study is a part of a large intercultural collaborative project between Dutch and Australian students working together via several digital patterns, both synchronous and asynchronous.

1. **Interactional strategies** - strategies used to repair and manage conversational discourse, such as request for clarification and comprehension checks,
2. **Compensatory strategies** - strategies used to solve language problems of expression through manipulating the available language knowledge, such as self-rephrasing and approximation,
3. **Reduction strategies** - strategies of expression used to tackle language problems of expression by changing the intended message, such as message abandonment or replacement,
4. **Focus-on-form strategies** - strategies used to attend to target-like forms such as self-correction and meta-talk,
5. **Sociocultural strategies** - strategies used to sustain collaborative interaction, such as code-switching,
6. **Paralinguistic strategies** - strategies used to facilitate expression, such as miming in video chat or use of emoticons in text chat.

The results revealed that the learners used sociocultural strategies frequently and compensatory and reduction strategies rarely in both video and text chat, but they did use the other communication strategies differently within the two synchronous modalities. That is, they used more interactional and focus-on-form strategies in video than in text chat (47.82% vs. 14.6%; 15.34% vs. 3.84%, respectively), whereas paralinguistic strategies were adopted more in text than in video chat (57.14% vs. 5.11%). The examination of learners' reflections showed that two thirds of the learners believed they performed better and had more confidence in text chat than in video chat, which was due to the less time pressure and because they had easy access to online resources, such as Google Images and dictionaries.

Hung and Higgins' (2016) findings raise issues as to the potential benefits of text-SCMC for L2 development. Despite the availability of negotiated interaction in text-based interactions, their results suggest that learners actively engage in the target language, solve communication problems and attend to language forms more in oral than in written interactions.

Furthermore, Yanguas (2010, 2012) performed a series of investigations that extended this area of SCMC research by examining the potential L2 benefits of oral modalities of SCMC (i.e. voice- and video-SCMC) in comparison to FTF communication. Yanguas' (2010) study explored the differential effects of communication mediums (i.e. audio chat vs. video chat vs. FTF chat) on learners' negotiation for meaning during task-based interactions. In particular, he explored how learners of Spanish negotiated meaning when communication breakdowns occurred in these different contexts. Fifteen learner-learner dyads were randomly assigned to an audio group, a video group and a FTF control group, and were then asked to complete a jigsaw task. Results revealed that voice-SCMC generated the highest percentage of negotiation for meaning episodes. Interestingly, the percentage of negotiation episodes was fairly similar for video-SCMC and FTF conditions, resulting in 48% and 50% respectively, but it was somewhat higher in the condition of voice-SCMC (57%). In comparing his findings with previous text-SCMC literature, Yanguas noted that turn-taking patterns were more versatile in audio chat than in text chat; that is, turn-taking patterns in voice chat were found to be very similar to FTF patterns but opposite to those observed in text-SCMC.

Yanguas (2012) further examined the differential effects of vocabulary negotiations in the same communication mediums on L2 vocabulary acquisition. A within-group experimental design was employed, in which a total of fifty-eight learners of Spanish participated, and recognition, production and listening comprehension measures were used to investigate possible differences. Results revealed no statistical differences between the FTF group and either SCMC groups for production or recognition measures, but a significant difference was found among the groups in the listening comprehension measure. The voice-SCMC group outperformed the other groups. Yanguas (2012) suggested that learners in voice-SCMC group could have been forced to pay more attention to spoken words because of the lack of visual support in this medium, and consequently performed better in the oral comprehension.

3.4.3 Commentary

Overall, these studies provide evidence that interactive features found to be facilitative for L2 learning development in FTF interaction, such as negotiation for meaning, corrective

feedback and modified output, do also occur in oral and written computer-mediated interactions. As most of these studies were predominantly concerned with the text-based SCMC, they advocate the potential of this medium of interaction in increasing the likelihood that learners would notice linguistic forms and gaps in their interlanguage (e.g. Kitade, 2000; Pellettieri, 2000). Nevertheless, this suggestion merits further investigation. These studies only identified interactional moves that were held to facilitate learners' noticing, without actually measuring noticing or tracing it, leaving a gap as to a more comprehensive account of learners' cognitive processing whilst engaged in negotiation work. That is, even though negotiated interaction takes place in these studies, with learners receiving interactional feedback and probably incorporating the target-like forms in subsequent turns, it remains unclear as to whether these negotiations facilitated cognitive comparisons and promoted noticing to occur. Only a relatively small subset of SCMC studies has delved into the cognitive process of noticing and provided empirical evidence for learners' noticing in text-SCMC while working on meaning-focused activities. A detailed review of these studies is provided in the following part (Section 3.5), with particular focus on studies that examined noticing in text-SCMC alone or in comparison to FTF interactions, utilizing performance and introspective measures.

3.5 Noticing in SCMC
3.5.1 Empirical research

Lai and Zhao (2006) were the first to empirically examine and compare learners' noticing of interactional feedback and self-correction in the text-SCMC mode with the FTF mode. Twelve ESL learners were paired into mixed-proficiency dyads, and were then asked to carry out two spot-the-difference picture tasks, one in each interaction mode. The SR sessions were then held on the following day to identify instances of noticing for two types of feedback: recasts and negotiation moves. Recasts were operationalized as episodes in which the interlocutors implicitly corrected the participants' mistakes without breaking the flow of the communication, while negotiation moves were operationalized as episodes in which the interlocutors indicated non- or misunderstanding. Self-corrections were operationalized as episodes in the chat logs where the participants immediately corrected their own errors without prompts from their interlocutors. The results showed that the noticing rates for

recasts were similar in both modes, but the noticing rates for negotiation moves were higher in the text-SCMC mode than in FTF, though the difference was not statistically significant. When examining noticing with regard to the linguistic categories of negotiation episodes, the findings demonstrated that lexical items were noticed more in FTF communication, but that text-SCMC provided a more facilitative context for the noticing of grammatical items. While no differential impact was found between the communication modes with regard to noticing of interactional feedback, the text chat was found to elicit significantly more self-correction than the FTF interaction. In addition, the findings indicated that learners had the same amount of opportunities in both modes to modify their output after receiving feedback. Both modes resulted in nearly comparable opportunities, resulting in 70% modified output in SCMC and 71% in FTF.

Gurzynski-Weiss and Baralt (2014) identified some key limitations with Lai and Zhao's (2006) study that may render their findings' generalizability to other contexts. First, the SR sessions took place the day after the treatment, which is somewhat problematic. As argued by Gass and Mackey (2000, 2017), the timing of the SR session can be very critical, and a long waiting period may result in the participants being inaccurate in recalling what they were thinking at the time of the interaction. Second, participants watched the whole video recording of their FTF task-based interactions, but only watched the feedback clips in text-SCMC; this could have primed the participants to be more focused on the feedback provided during their online interactions. Lastly, Gurzynski-Weiss and Baralt (2014) reviewed how the researchers carried out the SR and found a limitation with the researchers' questions, which violated Gass and Mackey's (2000) recommendations on how to conduct SR protocols (e.g. 'fishing' for answers if participants indicate they do not remember).

Due to these discrepancies, Gurzynski-Weiss and Baralt (2014) aimed to extend this line of research by examining the differential effects of text-SCMC in comparison to FTF interaction on the following: (a) learners' noticing of feedback, (b) learners' noticing of the different targets of feedback (i.e. lexis, semantics, morphosyntax, phonology/spelling), (c) opportunities for modified output, and (d) learners' production of modified output. Twenty-four intermediate-level learners of Spanish as a Foreign Language were paired with an interlocutor to complete two information-gap tasks, one in each mode, in a one-shot,

counterbalanced experimental design (i.e. the mode of the interaction and the task version were counterbalanced to prevent carry-over effects). Immediately following the completion of each task in each mode, participants were engaged in a SR session to elicit their perceptions of feedback during the task-based interaction. Participants were shown negotiation episodes that contained an error, an interlocutor's feedback and the learner's response (if any), and were then asked what they remembered at the time of the interaction. Findings revealed no statistical differences in the learners' ability to notice feedback based on the mode of interaction. Additionally, they showed no statistical differences between learners' noticing of feedback according to the mode on any of the linguistic foci addressed. However, significant differences were found in the number of opportunities learners had to modify output, and in the frequency with which they took advantage of these opportunities to modify their non-target-like output. More precisely, the FTF mode gave the participants significantly more opportunities to modify output after feedback, and the participants modified their output significantly more in the FTF mode than in the text-SCMC mode.

In relation to the earlier claims that text-SCMC may enhance the learners' noticing of feedback, the findings from both Lai and Zhao (2006) and Gurzynski-Weiss and Baralt (2014) do not support such claims. However, in relation to the claim that SCMC may encourage more opportunities to modify output, Lai and Zhao (2006) reported nearly identical opportunities in both modes, while Gurzynski-Weiss and Baralt (2014) found significantly more opportunities to modify output in the FTF mode than in text chat. A point worth mentioning here is that Gurzynski-Weiss and Baralt (2014b) hypothesized that this difference might be due to the different interlocutors that the participants were paired with in these studies. In Lai and Zhao's study, learners were paired with other learners, but in their study, they were paired with an expert interlocutor. They posited that learners in the text-SCMC mode of Lai and Zhao's study were not "as confident in taking on an expert role and, instead, chose to wait for their partner's response… as opposed to moving forward with the next message" (p.31).

Furthermore, Yuksel and Inan (2014) examined the differential effects of communication mode, text-SCMC versus FTF, on the occurrence of negotiation for meaning and noticing in learner-learner task-based interactions. Sixty-four EFL learners completed

two jigsaw tasks, one in each mode, with a different partner. Four days after completing the tasks, participants engaged in SR interviews to identify the instances where they had communication breakdowns. Interestingly, although the learners produced significantly more negotiations in the FTF mode than in text-SCMC mode, they noticed a significantly higher number of negotiation instances in text-SCMC than in FTF conversations. Based on these findings, Yuksel and Inan (2014) suggested that, while FTF promotes a better context for the occurrence of negotiated interaction, the text-SCMC context promotes more instances of noticing. Examining noticing according to the linguistic category of negotiation for meaning, Yuksel and Inan found that lexical and grammatical communication breakdowns were equally recalled by participants in both contexts (52% and 50% in text chat; 40% and 39% in FTF, respectively), suggesting that the mode of interaction might not affect the noticeability for any of the linguistic categories more than others.

Apart from these experimental studies examining noticing in text chat compared to FTF interaction, Kim (2014b) conducted a descriptive investigation as to whether text-SCMC facilitates learners' noticing of corrective feedback, drawing upon a performance (i.e. chat logs) and introspective measures (i.e. SR interviews). Twenty-eight intermediate-level ESL learners, of eight different L1 backgrounds, were paired and asked to complete a spot-the-difference task in text online chat. Immediately after the completion of their online chat, learners participated in SR sessions, whereby the researcher elicited their thoughts every time they received corrective feedback. Results showed that both explicit and implicit feedback were provided during synchronous written interactions. However, the rate of students' uptake and their recall of feedback during the SR sessions were very low (resulting in 7% and 8%, respectively). Therefore, Kim's results conflicted with previously assumed pedagogical benefits of text-SCMC and suggested that learners do not benefit from this medium's features in noticing feedback.

Before concluding this review, the evidence provided by research examining noticing in text-SCMC utilizing other measures will be succinctly presented in the following.

A great number of studies have examined whether text-SCMC could facilitate noticing by employing experimental pretest-posttest designs (e.g. Lee, 2008; Shekary & Tahririan,

2006; Sotillo, 2005; Zeng & Takatsuka, 2009). It should be noted though, that these empirical studies were motivated by the sociocultural theory and assessed noticing by first identifying incidents of LREs in chat logs, and then ascertaining their subsequent effects on L2 acquisition via tailor-made immediate and/or delayed posttests. Overall, these studies revealed that learners collaboratively attend to language forms during written synchronous interactions, and this focus on form positively correlates with subsequent posttest success (i.e. L2 acquisition), therefore motivating the researchers to suggest that interactions in text-SCMC are facilitative for learners' noticing of language forms.

In relatively recent studies, other researchers have utilized methodological advancements, such as the eye tracking technology, to scrutinize learners' attentional focus during synchronous written exchanges, often triangulated with SR data and/or posttests (e.g. O'Rourke, 2008, 2012; Smith, 2010, 2012). This research has focused on learners' attention to particular categories of interactional feedback (i.e. recasts), and thus, the researchers instructed their NS interlocutors to provide extensive recasts on learners' errors once they appear during task-based interactions. These studies have provided insights into what learners tend to address during task-based text-SCMC. For example, Smith (2010) found that learners noticed lexical recasts more frequently than grammatical recasts, with those recasts leading to successful uptake and resulting in short and middle-term gains. In a following study, Smith (2012) also found that morphological target items were noticed less frequently than syntactic and semantic categories. In this particular study, Smith compared the eye tracking heat map records and SR data in terms of noticing of recasts and posttest scores. Smith found that both SR and eye-tracking records were favourable predictors of noticing, with the heat map records being slightly more discerning in its ability to predict posttest success. In relation to the present study, although eye tracking is a valuable source, it was not feasible to utilize in the present study given its comparative nature between the oral and written computer-mediated interactions.

3.5.2 Limitations with research on noticing in SCMC

Most of the experimental research comparing L2 noticing in text-SCMC and FTF communication do not support the claims associated with the text-SCMC potential to

promote greater opportunities for noticing of feedback. An exception was Yuksel and Inan (2014) who found that text-SCMC was significantly more facilitative for learners' noticing than FTF interaction. However, a critical examination of this study reveals two issues that could question this conclusion. First, the SR sessions were carried out four days after the completion of the task-based interactions. This time-gap between the treatment sessions and the SR interviews constitutes a major limitation and raises the issue of veridicality (Mackey & Gass, 2015). Due to the potential of memory decay, the participants could have provided erroneous information on what they actually noticed during the treatment sessions. One could also argue that the permanent visibility of the text from the printed chat logs might have helped their memory of negotiation episodes during the written interactions in comparison to the video recordings of the oral negotiations. Second, the conceptualization of noticing in Yuksel and Inan's (2014) study was not really clear. The researchers did not explain how they operationalized the construct of noticing and did not provide any guiding examples from their dataset. In their description of the SR procedure, however, they stated that learners were asked to point out instances where they had communication breakdowns and they looked for ways to overcome the situation. It seems that their participants were asked to indicate each time they experienced a communication breakdown, but their thoughts during the negotiation incidents and the reasons of incomprehensibility were not elicited.

Despite the inconsistent and inconclusive findings of the previous studies on noticing in SCMC, there are certain limitations that appear to direct and guide this specific study. First, while these experimental studies examined the learners' noticing of feedback in text-SCMC in comparison to FTF interaction, the researchers generally approached the construct of 'noticing' and did not consider the different levels of awareness outlined by Schmidt's (2001) noticing hypothesis; namely, awareness at the level of noticing and awareness at the level of understanding. While the former refers to access awareness of forms in the input/feedback, the latter refers to a conscious understanding of the relationship between the target-like and the deviant forms, and the ability to analyze and compare hypotheses pertaining to the target linguistic input. Given the theoretical framework of Schmidt's noticing hypothesis (1990, 2001) and the several accounts of attention, which posit the different levels of processing (e.g. Gass, 1988; Tomlin &Villa, 1994), this study aims to examine the potential of text chat,

not only on drawing learners' attention to gaps in their interlanguage, but also in affecting the levels of their attention.

Second, the majority of these studies have exclusively looked into the process of noticing mitigated by external feedback (i.e. interactional feedback from a conversational partner), but ignored incidents of self-repairs, which according to Swain's (1995) output hypothesis, are taken as evidence of noticing initiated by internal feedback (i.e. monitoring of own productions). The very few studies that have included incidents of self-repairs in their examinations have yielded inconclusive findings. While Jepson's (2005) comparison of repair moves in text versus voice chat found no incidents of self-repairs in both contexts, Lai and Zhao's (2006) study found that the rates of self-repairs were significantly higher in text-SCMC than in FTF interaction. These findings, however, have been disputed due to the researchers' mere reliance on printed chat logs. Chat logs, also called chat transcripts, are textual records of chat sessions, which correspond to dialogue as it appears in the output window of chat participants. O'Rourke (2008) argues that chat logs are "impoverished" since they exclude the "private space" in which learners construct their utterances in text chat (p.236). In support of this argument, Smith (2008) studied self-repairs in text-SCMC by first evaluating the data provided by the printed chat logs, and then examining the files of video-screen capture of online interactions. The analysis of both data sources revealed that when using the final product of chat logs, much of the information on self-repairs is neglected (i.e. over eight-fold of the number of self-repairs that actually occurred were not present in the final chat logs). In a following study, Smith (2009) supported the usefulness of video-enhanced chat records in offering insights into learners' monitoring and drafting processes during text chatting. Accordingly, this study attempts to address this gap and to enlarge this kind of research by examining learners' noticing in relation to their internal feedback as well as to interactional feedback. The use of video screen capture is of crucial importance for this study, in order to better account for learners' self-repairs and cognitive processes during text chatting.

While these studies have mostly considered the quantitative aspects of noticing incidents, they have failed to offer insights into the qualitative aspects of learners' noticing during text-SCMC. In Lai and Zhao's (2006) study, twelve learners were paired together, and

when coding their interactions, it was found that only four of them made use of very few recasts. Therefore, the researchers could not make any interpretations over how text-SCMC could have impacted the learners' attention to recasts. Conversely, Gurzynski-Weiss and Baralt (2014) paired their learners with an expert interlocutor who provided several forms of corrective feedback. However, when analyzing their results, the researchers did not shed any light on the frequency of noticing incidents on the different types of feedback. Therefore, little is known about the occurrence of noticing in terms of the type of interactional feedback and the linguistic foci of negotiated forms in online written interactions, in order to ascertain their potential in enhancing the salience of certain feedback types and language forms. This study seeks to address these issues.

In addition to the aforementioned limitations, unlike text-based SCMC, there is a lack of research that has explored the cognitive process of noticing during audio-mediated SCMC. Although the previous research has informed about the effects of FTF oral interaction, in comparison to text-SCMC, on learners' cognitive process of noticing, sufficient consideration to the contextual dimension of voice-mediated SCMC should be given. In fact, many researchers have stressed the point that speaking online is significantly different from FTF interactions, arguing that the functionality of an environment impacts how people interact within it, and this, in turn, could affect how language learners handle and process language (Kenning, 2010; Lamy, 2004; Stockwell, 2010). Kenning (2010) explains that oral online interactions could share broad features with oral FTF interactions; however, it is important to note that there are many factors that could exert an influence on synchronous voice-based interactions, such as voice quality, the anonymity with interlocutors, the design of the interface, to mention only a few.

Findings from previous research on voice-SCMC support this medium's potential for L2 negotiated interaction. However, in their recent review of interactional feedback in SCMC, Ziegler and Mackey (2017) declare that research in voice chat is still small, and "this is clearly an area of growth and requires further investigation" (p.86). There is still much to be done with regard to investigating how learners cognitively engage in this context. In order to come to a better understanding of SCMC potential for L2 learning, this study examines and evaluates its written and spoken modalities in regards to how they could affect learners'

negotiated interaction and cognitive engagement. Examining closely how learners discursively attend and engage with language forms could subsequently enrich our understanding and discussion of each medium pedagogical implication.

3.5.3 Challenges with text-SCMC

All of the aforementioned advantages of text-SCMC presented in Section 3.3.1 have the potential to enhance the salience of linguistic input/feedback and consequently draw learners' attention to it (i.e. the permanency and re-readability of written messages and slower pace of interaction). Nonetheless, interactions in text-SCMC could also posit certain challenges that may hinder these advantages in practice, which researchers have highlighted to explain learners' infrequent noticing of feedback or insignificant L2 gains in their examinations of L2 interactions in text-SCMC. One of these challenges is the turn-taking nature of SCMC discourse, which could cause a lack of adjacency between the signal (i.e. the interactional feedback) and the trigger (i.e. problematic utterance). This in turn, could become difficult for the learners to make a distinction and comparison between them.

Research has revealed that text chat does not adhere to the same patterns of turn adjacency found in oral interactions (Herring, 1999; Smith, 2003). Therefore, negotiations are likely to experience delays between the trigger and signal moves. A number of researchers assumed that this delay might impede learners' noticing of the gaps between their non-target-like utterances and the correct ones (Lai & Zhao, 2006; Sauro, 2009; Smith, 2003). Loewen and Erlam (2006) and Lai, Fei and Roots (2008) provided support to this view. The former, Loewen and Erlam (2006), conducted a quasi-experimental study to examine the effects of *recasts* and *metalinguistic information* provided during text-SCMC on learners' development of the regular past tense. The findings revealed no statistical gains in response to either type of feedback. One of the reasons the researchers postulated for this was the reduced immediacy of the feedback; that is, the interlocutor's feedback often followed several intervening turns unrelated to the learner's error. A seminal study on this issue is the work of Lai et al. (2008), who conducted an empirical investigation to closely examine the issue of contingency, and whether this had an effect on learners' noticing of recasts during synchronous interactions. Seventeen ESL learners of high-low intermediate level chatted with

one of the researchers on two dyadic tasks, and data were collected using think-aloud protocols and stimulated recalls. The findings revealed that participants noticed contingent recasts significantly more than the non-contingent recasts, demonstrating that learners noticed 53% of contingent recasts compared to the noticing of only 35% of non-contingent recasts.

In addition to the problem of contingency, the dual processing nature of text-SCMC might posit difficulties for the learners to process the linguistic input/feedback, as learners read and write simultaneously. Moreover, the learners' familiarity with typing in the L2 may be poor and thus, the task of typing their messages could distract their processing of feedback that is provided. Previous studies have demonstrated that the burdens of typing can considerably hinder learners' noticing (e.g. Hamano-Bunce, 2010; Kim, 2014b; Sauro, 2012). The feedback from their participants regarding their unfamiliarity with the keyboard, coupled with their problems in typing, indicated that learners' attentional resources could have been directed towards keyboarding and not to their language.

These limitations, then, could cause concerns for the usefulness of text-SCMC for noticing. In addition to these limitations, one also could argue that text is impoverished in comparison with speech. This study argues that voice chat has a number of affordances that could be more facilitative for the usefulness of interactional feedback. One of these affordances is the availability of prosodic cues, which may play a role in drawing learners' attention to provided interactional feedback. No study to date has addressed whether (and how) prosodic cues accompanying feedback influence learners' noticing of it, however, the importance of prosody is drawn from some research. Ladefoged and Johnson (2014) argue that increased efforts in the suprasegmental features (i.e. stress, length, tone and intonation) result in an increase in the perceptual salience of segments. In line with this, Brown (2016) suggests that stress and intonation determine the impact of interactional feedback, while Doughty and Varela (1998) could provide a level of support for this argument, based upon their investigation of corrective feedback, particularly recasts, in a classroom context, where they asked the teachers to recast learners' errors. This was done by first having teachers repeat the learners' utterance with stress on the erroneous word(s), and second, by reformulating the complete utterance. The results of this study found that learners' uptake was more likely to occur when the recasts were acoustically more stressed.

Furthermore, some recent studies examining learners' perceptions towards the different modalities of SCMC have suggested that oral interactions (whether voice or video-based) are more effective in promoting consciousness of natural communication and perceived consciousness of language learning, thus, learners are engaged more emotionally and intellectually (Ko, 2012; Yamada, 2009; Yamada & Akhori, 2007). Notwithstanding, the potential of oral video-SCMC to promote a more active and effective L2 communication has not been fully supported by Van der Zwaard and Bannink' (2014) study. Their findings suggest that, due to the lack of audio-visual registration in this context, text-SCMC promotes increased and successful negotiated interaction. The present study could reevaluate these findings and advance the understanding on the potential effects of synchronous modality (voice vs. text) on learners' interactions, noticing and perceived L2 benefits.

3.6 Learners' Perceptions of SCMC

Only a limited number of studies have investigated learners' perceptions towards SCMC and their potential to the development of L2 learning. Those that exist, however, have demonstrated that learners' responses to the potential of SCMC were almost unanimously positive (e.g. Kern, 1995; Kitade, 2000; Smith et al., 2003). Kern (1995) has been credited as the first to shed light on learners' attitudes towards written SCMC. Participants' responses to evaluation questionnaires administrated at the end of the study were overwhelmingly positive, with 93% agreeing that text-SCMC is useful to their L2 learning. They particularly appreciated this medium, as it allowed them increased time to compose messages and review input, so they felt more confident about participating. Similarly, in Kitade's (2000) study, participants reacted positively to the completion of collaborative meaning-oriented activities via text chat, revealing that text-SCMC provides a useful learning environment that enabled them to practice their L2 and advance their L2 knowledge.

With regards to voice-SCMC, Yanguas (2012) probed into learners' attitudes towards the synchronous oral interactions (voice-based vs. video-based) in comparison to traditional FTF L2 communication. Learner' responses to exit questionnaires suggested their positive attitudes towards both voice and video chat, and their attitudes did not suggest any difference

between either voice or video-SCMC and FTF interaction in terms of quality of learning and L2 benefits. Furthermore, Bueno-Alastuey (2011) explored the EFL learners' perceived benefits and drawbacks of voice-SCMC by means of diaries and exit questionnaires. Her participant appreciated the following benefits of voice-SCMC: the authenticity of the situation, communicating in a safer environment than FTF situations (due to the anonymity of the medium and the lack of visual cues), the increased use of L2, and the feeling of improvement. With regard to its drawbacks, technical glitches, such as connection breakdowns and problems with sound, were identified as the main problems, with some participants expressing their dissatisfaction with their partners, mainly due to differences in their proficiency levels or the partner's tendency to remain silent.

Another important study in this vein is Satar and Özdener (2008), which, while examining the effects of SCMC (text versus voice chat) on L2 learners' speaking proficiency and anxiety levels, took into account learners' perceptions regarding the chat tools, particularly in terms of their potential to decrease anxiety and to develop language skills. The results of the questionnaire data showed that 53% of the participants in the voice chat group believed that their online interactions decreased their anxiety, but only 20% of the participants in the text chat group believed this was the case. Also, the results demonstrated that 87% of the text chat participants and 50% of the voice chat participants believed that their writing skills had improved. Interestingly, the results were reversed in relation to their speaking skills, with 87% of the voice group and 50% of the text group believing that they had improved. Despite these differences, both groups reacted positively to their online experience and stated they enjoyed chatting in L2 with a friend they already know, without using their native language.

As reviewed thus far, a number of studies has demonstrated that learners engaged in SCMC contexts have overall positive attitudes. However, these studies have informed about learners' perceptions regarding a single chat tool: either text or voice chat. Given the repeated-measure design of the present study, its query of learners' perceptions would add to this line of research by offering a comparative evaluation of the two synchronous modalities, highlighting the perceived benefits and drawbacks of each context to L2 interaction.

3.7 Summary

This chapter has reviewed the literature concerned with interactional and attentional engagement in SCMC contexts. Firstly, it started with a description of text- and voice-SCMC, outlining the arguments that have advocated their potential for language learning based on the observed beneficial effects of L2 interaction within these contexts. Consequently, the empirical research has attempted to verify these purported benefits, by closely examining L2 interactions and the cognitive process of noticing in SCMC. A consideration of L2 learners' perceptions of SCMC then followed.

Despite the wealth of studies suggesting increased opportunities for negotiated interaction and noticing in text-SCMC, and consequently more developmental opportunities than might be encountered in oral FTF interactions (e.g. Beauvois, 1992; Kern, 1995; Warschauer, 1997), the mixed findings of the empirical research raise issues as whether the argued attentional affordances of text-SCMC are exploited during real task-based interactions. In addition, much of the SCMC research in the cognitive-interactionist tradition of SLA, has been conducted in text chat environments (Jenks, 2014; O'Rourke & Stickler, 2017), leaving many concerns for interactions in voice chat. More specifically, there is a lack of research that investigates their potential for the cognitive process of noticing.

Building upon previous research that has been reviewed in this chapter, this study sets out to verify the alleged arguments and the current findings for the potential of text-SCMC in enhancing learners' interactional and attentional processes, and extend this line of research to the oral modality of SCMC. In particular, this thesis aims to illuminate whether L2 interaction-driven learning opportunities, both in terms of negotiated interaction and noticing, are affected by the oral and written modalities of synchronous interaction. To provide a rich account of their potential to L2 learning, this study adopts a mixed-methods approach to comparatively examine the effects of voice versus text chat on, not only whether it promotes incidents of negotiated interaction and learners' internal and external noticing, but also in influencing the features of their negotiations, levels of their noticing and qualitative aspects of their mental processes when receiving interactional feedback. The following chapter will present the rationale of the mixed methods approach of this research study, and the choice of research methodology.

Chapter 4: Methodology

4.1 Introduction

This chapter deals with the methodology that was adopted to carry out this research study. It starts with a reiteration of the research aim and questions, and then presents the research paradigm and strategy best suited to examine the impact of synchronous modality on learners' interactions and cognitive processing. As a result, a mixed methods approach is proposed and justified. Following this, the chapter provides information on the participants that were recruited for this study, and then proceeds with the description of the overall study design. Further to this, the research apparatus and instruments that were used to conduct the study are described in detail. The chapter subsequently gives a detailed description of the procedures that were used for data collection and analysis. In addition, ethical procedures are clarified and the pilot study is presented. Lastly, the chapter concludes with a brief summary of the preceding sections.

4.2 Overview of Research Aim and Questions

As mentioned in Chapter 1, the main aim of this present study is to investigate how the oral and written modalities of SCMC (i.e. voice chat and text chat) would facilitate L2 learners' interaction and cognitive process of noticing, whilst engaged in learner-learner task-based interaction. Therefore, the research questions that guided this study were:

RQ1.   What is the impact of modality (voice chat vs. text chat) on the frequency of negotiations in task-based interactions?

RQ2.   What is the impact of modality (voice chat vs. text chat) on the characteristics of negotiations:

   a) Type of negotiation

   b) Type of interactional feedback

   c) Linguistic foci of negotiation

RQ3. What is the impact of modality (voice chat vs. text chat) on the frequency of noticing during task-based interactions:

   a) Self-repairs (i.e. self-initiated noticing)

b) Noticing of corrective feedback

RQ4. What is the impact of modality (voice chat vs. text chat) on the quality of noticing during task-based interactions?

RQ5. What are the learners' perceptions of the strengths and limitations of voice chat and text chat?

4.3 Research Paradigm and Strategy

The philosophical perspective underpinning this research study is pragmatism. Pragmatism seeks to utilise multiple quantitative and/or qualitative methods that work best to address a particular research phenomenon, "rather than committing to a particular research philosophy which may have a specific view of what constitutes reality" (Phakiti & Paltridge, 2015, p. 17). Essentially, pragmatists do not have to commit to a traditional system of reality arguments, such as viewing reality as something independent of human minds (positivism) or something socially co-constructed (constructivism) (Ivankova & Greer, 2015; Phakiti & Paltridge, 2015). Rather, they focus on the need to apply different methods from available research paradigms, to advance knowledge and understanding of the phenomenon under investigation. In relation to epistemology, pragmatists acknowledge that research takes place in a social setting, and to be objective or subjective depends on what is socially accepted (Phakiti & Paltridge, 2015). As this study involves comparing and evaluating learners' interactional and attentional processes in the oral and written modalities of SCMC, objectivity was necessary. However, as the object of inquiry is also related to the individuals' cognitive processing and their attitudes towards their learning experiences, subjectivity was critical to facilitate insights into the participants' minds and perceptions.

Pragmatism is very consistent with CALL evaluation studies. As Chapelle (2017) explains,

In CALL evaluation studies, it is not unusual to see the mixing of theoretical perspectives, constructs, data collection methods, and frames of interpretation because of the pragmatist's stance that underlies much of the evaluation of technology for language learning. The pragmatist wants to gain an understanding of how things work in order to be able to make recommendations for use and improvement. (p. 385)

In order to obtain as much information on the pedagogical affordances of the oral and written modalities of SCMC on L2 interaction-driven learning processes, a concurrent quantitative + qualitative mixed method strategy for data collection and analysis was adopted (Ivankova & Creswell, 2009). That is, both quantitative (i.e. interaction tasks, SR interviews and debriefing questionnaire) and qualitative (i.e. SR interviews and debriefing interviews) methods were employed, with the aim of contributing a better understanding on the impact of modality on L2 interactional and attentional processes, as well as on learners' perceptions and reflections of their online interactions.

Considering the limitations identified with the provision of 'uptake' (see Chapter 2, Section 2.3.4.1), this study did not rely exclusively on transcripts of oral interaction and printed chat logs, but rather employed stimulated recalls that could ascertain the occurrence of learners' noticing during their engagement in L2 interactions, and further allow to gain a deeper insight into the qualitative aspects of the learners' mental processes involved in recognizing interactional feedback. In addition, within this study, qualitative data - in the form of semi-structured debriefing interviews - was employed to ascertain the learners' perceptions towards the different synchronous modalities and to inform a greater understanding of the results generated from the quantitative measures.

Although it is useful to incorporate quantitative methods to examine relationships and patterns, statistical inferences alone do not provide the necessary in-depth explanation and evidence, which are paramount in developing a better understanding of how synchronous platforms contribute to language learning (Huh & Hu, 2005). The usefulness of a mixed methods approach, however, lies in its capacity to compensate for one approach's inherent deficiencies by the other approach's strengths, thereby producing a comprehensive understanding of the phenomenon under investigation (Benati, 2015; Cresswell & Plano Clark, 2011; Mackey & Gass, 2015; Tashakkori & Creswell, 2007). In this study, the quantitative methods collected numerical data on the participants' negotiations and noticing that were objectively analyzed using statistical techniques, whereas the qualitative methods attempted to provide an in-depth understanding of the participants' underlying cognitive processes and their experiences with the central issues. The analyses from both methods were

synthesized to provide a triangulated interpretation, and a more thorough insight into the impact of synchronous modality on L2 learning.

4.4 Participants

Forty EFL adult Arabic learners (26 male, 14 female) attending general English language courses were recruited for this study. They were recruited on a voluntary basis using a convenience sampling, whereby they were chosen due to their availability and willingness to participate in the study (Creswell, 2003). The potential participants were asked to contribute to the study through a general call for volunteers, which was circulated among Arab pre- to upper-intermediate level EFL learners attending English courses in three language institutions across the North East of England.

Prior to the experiment, participants completed a background questionnaire that gathered bio-data and information regarding their familiarity and experience with online chatting. Participants were all native Arabic speakers from different Arabic countries (Saudi Arabia, Kuwait, Oman, Qatar, Bahrain and Syria), and ranged in age between 18 to 34, with the average age being 23 years old. They had an average of eight years of formal English learning prior to the study (ranging from 6 to 12 years), and their average length of studying English in English-speaking countries at the time of the study was 6 months (ranging from 1 month to two years). Participants were placed in pre-intermediate to upper-intermediate (B1 and B2 in terms of CEFR) English proficiency levels in their respective language schools, and among these participants, only 23 had an IELTS (International English Language Testing System) score that ranked between 4 and 7.

Based on the information collected from the background questionnaire, all the participants had previously used online chatting in their L1 to communicate with family and friends, with text chat being the most commonly used method on a daily basis, while voice and video chat were used on a weekly basis (i.e. 2-3 times a week). In addition, all participants, with the exception of one, had also used online chatting to communicate in English with their friends, native English speakers or other learners of English. While they all had experienced using text chat to communicate in English, only 28 had experienced the

voice-based interaction and a smaller number of them (n=12) had experience in using video-based interaction. The indication here is that, prior to this study, the majority of the participants were familiar with both modalities of interaction that this study seeks to investigate, however the extent to which they use them in their L2 communication differed. That is, participants used text chat in their L2 either on a daily basis (n=14) or 1-3 times a week (n=17), whereas they used voice chat 1-3 times a week (n=13) or 1-2 times per month (n=10). Yet, in terms of their typing abilities in L2 (English), 21 participants used the peck method (i.e. two-to-five fingered typing), 17 used the hunt and peck method (one/two-fingered typing), while only two were touch typist (i.e. typing without looking at the keyboard).

Previous research has revealed that adult learners engage in more negotiation of meaning in mixed-proficient dyads than in same-proficient dyads (Blake, 2000; Lai & Zhao, 2006; Pellettieri, 2000; Varonis & Gass, 1985). With this in mind, and to stimulate instances of negotiations, participants were paired to form 20 mixed proficiency dyads of low-high intermediate English level.

To categorize the participants into high and low groups, a measure of L2 proficiency was necessary. During the first pilot study, it was noted that a number of participants did not appear to have any IELTS scores, and those who did report similar IELTS scores were actually placed in different proficiency levels, which were based on their specific institutional assessment. This meant that using their IELTS scores or reported levels, as a measure for L2 proficiency, was not possible. As a result, an elicited imitation test (i.e. a language proficiency assessment) was utilized for this purpose, as it has been shown to be a valid measure of L2 proficiency (Gaillard & Tremblay, 2016; Thomas, 2006) (further details are provided in Section 4.7.2).

Based on their performance in the elicited imitation test, a high proficiency participant was paired with a low proficiency participant.[4] Assignment to dyads were initially random,

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[4] In the second pilot study, the median score of twelve learners' performance in the EIT was 69.6 =70, and this was used as a cutoff point for discrimination of the low and high proficiency participants in the main study.

with some adjustment based on the participants' availability for the experiment sessions and their familiarity with each other. That is, every effort was made to avoid placing peers who were familiar with one another, in order to ensure acquaintanceship was not a variable that could affect the results. In addition, individual gender preferences were honoured whenever requested.

4.5 Study Design

This study adopted a one-shot, within-participants (repeated-measures) experimental design. The independent variable was the communication modality (voice vs. text chat), in which participants performed two task-based activities. The dependent variables that were selected for comparison between voice chat and text chat were: 1) the frequency of the negotiation episodes, 2) the features of the negotiation episodes in terms of: (a) the type of negotiation, (b) the type of interactional feedback and (c) the linguistic foci of negotiations, 3) the frequency of noticing: (a) noticing of self-errors and (b) noticing of interactional feedback, and 4) the level of noticing: (a) simple noticing and (b) elaborate noticing.

The study used a "one-shot design" (Mackey & Gass, 2015, p. 210), as it investigated learners' performance in a single session, rather than tracking language development or acquisition. In addition, the within-subjects design involved using the same set of participants in all levels of the independent variable. This design provides two advantages: first, it offers a practical advantage, in that fewer participants are needed, and second, this choice reduces any background variation (i.e. eliminating any possible individual differences amongst participants that could affect the impact of the IV on the DVs) (Harris, 2008). However, there is a disadvantage in using this specific design, which is that it introduces the order effect (also known as the carryover effect). Harris (2008) outlines two kinds of order effects: (a) those that lead to an improvement in the participants' performance (e.g. increasing familiarity with the communicative tasks, practice, increasing awareness of the task procedures), and (b) those that lead to a deterioration in the performance, such as loss of concentration or interest due to fatigue and boredom.

In an attempt to regulate the order effects, each dyad was randomly assigned to one of four treatment groups to counterbalance the order of the two modalities (i.e. voice chat and text chat) and the order of the two treatment tasks (i.e. Task1 and Task2). Table 4.1 presents the study design.

Table 4.1

Study Design (counterbalancing for modality of interaction and task version)

	Treatment groups			
	Group 1 (n= 10)	Group 2 (n= 10)	Group 3 (n= 10)	Group 4 (n= 10)
Phase /Dyads	1-5-9-13-17	2-6-10-14-18	3-7-11-15-19	4-8-12-16-20
1	Warm-up, voice-chat	Warm-up, text-chat	Warm-up, voice-chat	Warm-up, text-chat
2	Task 1, voice-chat	Task 1, text-chat	Task 2, voice-chat	Task 2, text-chat
3	Task 2, text-chat	Task 2, voice-chat	Task 1, text-chat	Task 1, voice-chat

Note. n represents the number of individual learners.

As Table 4.1 shows, all dyads completed two treatment tasks, one in each modality of interaction. The warm-up activity was completed in the same modality as the first task-based activity. Half the dyads carried out the first task in voice chat (Groups 1 & 3) while the other half completed the first task in text chat (Groups 2 & 4). Similarly, half of the dyads first completed Task 1 (Groups 1 & 2) while the other half completed Task 2 first (Groups 3 & 4).

4.6 Apparatus

Various technological instruments were necessary to carry out the present experiment. Two laptops were used - one for each learner in the dyad[5] – and the synchronous chat software, Skype, was downloaded on both laptops. Skype was specifically selected, as it is a free chat programme that is widely used for synchronous communication between two or more Internet users, and it is compatible with Windows or Macintosh computers, as well as most handheld devices. Moreover, it was used for its functionality, as it allows both voice- and text-based interactions (Gough et al., 2006) - the modalities of interest for this study's comparison. In

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[5] One laptop belonged to the researcher while the other was generously loaned from the Department of Education at University of York so that this research project could be carried out.

addition, the history function of Skype was instrumental in helping to automatically save the chat scripts, including intervals of time between turn-taking. This was particularly important because a lengthy interval between turn-taking could be assumed to be a sign of engagement in cognitive comparisons (O'Rourke, 2008).

Pamela-for-Skype, a third-party audio-recording software, was downloaded on one of the laptops to record the voice chat interactions, while Snagit, a screen capture software (techsmith.com) was installed on both laptops to record all of the text chat interactions. Participants were notified of the recordings, and informed consent was obtained. The rationale behind selecting Snagit was based on a number of its features, which are as follows: it is found to be inexpensive (i.e. reasonably priced, with the special discount for educational use), easy to install, easy to operate and compatible with PC and MAC systems. The software also allows the user to capture all computer screen actions – text inputs, cursor movements, keyboard strokes - while simultaneously recording audio. In addition, it allows for a limitless amount of time to be recorded and it creates automatic video files to be saved.

In terms of why the screen capture software was initially considered and utilized, the reason is two-fold. First, it is regarded as a method of data collection that allows gaining insights into the learners' cognitive processes while completing a task in text chat (Hamel, 2012; O'Rourke, 2008; Smith, 2009). This technology documents moment-by-moment on-screen activity, subsequently uncovering hidden learning events that might not be available in the final chat logs. Moreover, it has the potential to record how learners construct and change their utterances before contributing them, thus revealing information about the processes under scrutiny, such as changes in the choice of lexical tokens, grammatical forms, spelling (i.e. self-repairs) or any changes resulting after receiving feedback. As for the second reason, screen capture software allows more information to be revealed on whether learners benefit from modality-specific affordances, such as opportunities to scroll back to previous turns. A number of studies in SCMC utilizing screen capture technology (e.g. Smith, 2008; Smith & Sauro, 2009; Sauro & Smith, 2010) provided guidance to this study on how to utilize this technology effectively, including how to process the data from screen capture and how to code the resulting information.

In addition, a digital audio recorder was used to record participants' performance in the elicited imitation task, as well as their answers in the SR sessions and the debriefing interviews. Finally, an online cloud source 'i.e. Google Drive' was kept open on the two password-protected laptops so data could be uploaded and saved. No trouble shooting occurred with the apparatus during the task-based interactions.

4.7 Materials

The materials for this study comprised of: 1) learner's background and online chatting questionnaire, 2) elicited imitation test, 3) warm-up activity, 4) treatment tasks, 5) stimulated recall, 6) a debriefing questionnaire, and 7) a debriefing interview. A detailed description of each material follows.

4.7.1 Learner's background and online chatting questionnaire

For the sake of generalizability and to account for the possible confounding variables, all participants were asked to fill in a background questionnaire. The first half of the questionnaire was designed to collect the learners' biographic data (e.g. such as age, gender and nationality) and information pertaining to their learning of English (e.g. their age onset of learning English, the number of years of learning English, their length of residency in an English-speaking environment, and their proficiency level of the English language) (see Appendix A).

In accordance with the purpose of the study, the second half of the questionnaire sought to obtain information concerning the participants' familiarity and experience with online chatting. They were first asked whether they had used online chatting in their L1 before (i.e. Arabic), and if so, they were asked to indicate who were their chat partners, which type of online chatting they have used, and how frequently they used them. Similarly, the participants were asked to indicate whether or not they have engaged in online chat in their L2, with whom, which type and how often. Finally, the participants were asked to choose one of three methods that best describes their typing skills in English (i.e. hunt and peck, peck or touch-typing).

Following the answers from the questionnaire, participants' bio-data were quantitatively coded. All the variables were tallied, entered into SPSS, and reported accordingly (under Section 4.4).

4.7.2 Elicited Imitation Test

The Elicited Imitation Test (EIT), also known as the sentence repetition task, is a language testing technique, whereby a certain number of sentences are orally presented to participants, and they are required to repeat what they hear (Sarandi, 2015). This study used the English EIT, developed by Ortega, Iwashita, Norris and Rabie (2002), and the rationale of utilizing it was to have a valid and reliable measure of the participants' overall L2 proficiency (Gaillard & Tremblay, 2016; Thomas, 2006), which would help in assigning them to dyads of low-high mixed proficiency levels. This test includes thirty sentences, varying of different length from seven to nineteen syllables, and with the sentence stimuli presented in order of lowest to highest number of syllables (see Appendix B). All the sentences are grammatically correct, containing a wide range of vocabulary and grammatical structures.

In addition to its validity and reliability, EIT is a practical tool for assessing L2 proficiency in L2 research, as it takes fewer than 20 minutes for each participant to complete (Gaillard & Tremblay, 2016). In addition, it has less extraneous variables in administration with recorded stimuli, and it is less subjective in scoring, with well-developed scoring criteria (Tomita, Suzuki, & Jessop, 2009). Thus, in order to meet these conditions, Park's (2015) recording of the test was used to conduct the EIT, and the scoring rubric developed by Ortega et al. (1999), which is used widely in the research employing EIT as a measure of L2 proficiency, was used to assess the participants' performance.[6]

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[6] The test, its oral recording, and the scoring rubric were all found available in IRIS: the digital repository of instruments and materials for research into second language (www.iris-database.org).

4.7.3 Warm-up activity

Prior to engaging in the computer-mediated task-based interactions, learners completed a very short warm-up activity, in which they were asked to interact with each other for a few minutes, allowing participants to introduce themselves and briefly get to know one another (i.e. discuss how their day was, or what are their plans were for the rest of the day – see Appendix C). The inclusion of this activity was deemed necessary as it helped participants become comfortable in using the online chat facility, as well as a means of breaking the ice and building rapport before carrying out the treatment tasks. Rapport building is crucial, as it has the potential to motivate the learners and reduce their anxiety (Jiang & Ramasy, 2005).

4.7.4 Treatment tasks

As explained in Section 2.4.3, a spot-the-difference task (also known as picture difference task) was chosen for this study. This type of task is a communicative task in which the dyadic interlocutors are provided with two pictures that are similar in most details, but differ in some aspects; thus, to figure out the differences between the two pictures, the participants need to interact with one another.

Two different spot-the-difference tasks (Task 1 & Task 2), with two versions of each (Sheet A & Sheet B), were used in the treatment sessions (see Appendix D).[7] In these tasks, participants were given pictures of a bedroom: one of the pairs was based on an adult bedroom scene (Task 1: A & B), and the other pair was based on a child bedroom scene (Task 2: A & B). The tasks were provided on paper in the two chat conditions, and the participants were instructed to find at least five differences from within the pictures.

4.7.5 Stimulated recalls

Stimulated recall (SR) is "one subset of a range of introspective methods that represent a means of eliciting data about thought processes involved in carrying out a task or activity" (Gass & Mackey, 2000, p.1). SR was utilized in the current study for two main reasons. First, it taps into what learners attend to during the instances of negotiations, thus helping to

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[7] I am thankful to my PhD colleague who shared these tasks that he used in his research in developing strategic competence through task-based language teaching (Alahmed, 2017).

determine if noticing took place or not. Second, it allows to gain a deeper insight into the qualitative aspects of learners' noticing, thus helping to understand the level of learners' attention, and characterizing their underlying mental processes when receiving feedback in online oral and written interactions.

According to its procedure, SR is normally carried out with some degree of support, known as a stimulus, such as audio and/or video recordings and transcripts of lessons/interactions (Gass & Mackey, 2017). In this study, the audio-recordings of voice-based interactions and the chat logs of text-based interactions were used as stimuli to activate the participants' recall of their thoughts during the task completion.[8] To help facilitate the conduct of SR interviews, a SR protocol was prepared (Gass & Mackey, 2017). This included the instructions for the stimulated recall (SR) interview that were read at the beginning of the SR session to the participants. It also contained questions that were used to prompt the learners to recall their thoughts during the task-based interaction (Appendix E).

Recommendations outlined by Gass and Mackey (2000, 2017) were taken into consideration and adhered to, in order to avoid procedural pitfalls associated with the conduct of SR interviews. These recommendations were as follows: First, the SR interviews were conducted immediately after the learners completed the task-based interactions in both synchronous modalities. This was done to minimize potential problems associated with memory and retrieval, by capturing the learners' thoughts before the memory fades away. As Gass and Mackey explained, if the event becomes a distant memory, it may result in recall inferences, whereby the learners may say what they think the researcher wants them to say. Second, before conducting the SR session, participants were familiarized with the procedure of the interview and given simple and clear directions in both English and Arabic. Third, audio-recordings of voice chat and saved chat logs of text chat were used as stimuli to activate participants' memory of their thoughts during the completion of the tasks. Fourth, the focus during the SR interviews was only on the negotiation episodes, rather than replaying the whole audio recording; this was done to avoid fatiguing the participates unnecessarily. Fifth, leading questions like "*did you notice anything here*?" were avoided. This was particularly important, given the focus of the study on examining the impact of modality on

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[8] It was not feasible to print the chat logs; thus, they were presented on the computer screen.

learners' noticing; that is, using direct questions may stimulate participants towards reporting noticing. To tackle this issue, the prompt questions were formulated in a more general manner, such as, "*what were you thinking here/at this point/right then?*" and "*can you tell me what you thought when your partner said that?*". The participants were also given a choice in the language they wished to use when reporting their thoughts, either in English or Arabic. As a result, the SR interviews were all conducted in the participants' L1, which also helped to reduce the cognitive demand of the SR task and allow them to express their thoughts fully. Finally, the SR interviews were audio-recorded.

4.7.6 Debriefing questionnaire

A structured debriefing questionnaire, modelled after the one used by Kaneko (2009), was constructed to gauge learners' perceived evaluations of their L2 interactions in the two modalities of SCMC. Questionnaires allow information that learners are able to report about themselves to be gathered, such as their beliefs, attitudes, motivations or their reactions to learning (i.e. information that are not typically available from production data alone) (Mackey & Gass, 2015).

The questionnaire consisted of 12 statements (i.e. closed questions), which learners were asked to respond to by choosing whether they experienced each statement more in either voice or text chat, or there was no difference between the two interaction modalities (Appendix F). These statements followed three pre-defined categories: (a) completing the task-based interactions (Statements 1-4), (b) monitoring and processing of the language (Statements 6-11) and (c) L2 benefits (Statements 5 and 12).

4.7.7 Debriefing interview

A debriefing interview was constructed to comprehensively explore the learners' perceptions of their interactions in the two modalities of SCMC. More specifically, it sought to reflect upon the learners' answers in the debriefing questionnaire and prompt them to elaborate upon their choices, as well as identifying the strengths and limitations of each synchronous modality that could have affected their L2 chatting experiences. Qualitative data yielded from

the participants' answers in the debriefing interview could illuminate the findings indicated by the quantitative analyses, and as Levy (2015) proposes,

> Whatever the broad conclusions of the research study on statistical grounds, adding a qualitative dimension enables the researcher or the designer to be made aware of the variation that often arises as a result of individual characteristics and behaviours. (p.559)

A semi-structured interview is well suited for this because it is made up of specific core questions that are already defined, yet at the same time, it allows for subsidiary questions to be introduced by the interviewer, who may probe the interviewee accordingly to seek elaboration on the answers they give (Bryman, 2012). The questions that were pre-defined for this study sought to ask the participants of their thoughts on the differences between completing the tasks via the two modalities of communication (text chat and voice chat), what they felt were the best and worst aspects of completing the task in each modality, as well as determining whether they had learnt anything from these interactions. In addition, the questionnaire asked for elaboration on the learners' choices, such as why they felt more relaxed during the voice/text chat, why they felt they paid more attention to how they articulated themselves during voice/text chat, and why they felt they paid more attention to how their interlocutors were saying things in English during voice/text chat (see Appendix G).

The debriefing questionnaire and interview were all administrated in Arabic - the L1 of all the participants - so as to make the learners feel more confident and comfortable in their responses.

4.8 Procedure

In relation to the procedure that was implemented for this research, this one-shot experimental study was completed in two sessions, as shown in Figure 4.1.

Session 1

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┌─────────────────────────────────────────────────────────┐
│      Consent sheet, Background questionnaire, EIT        │
└─────────────────────────────────────────────────────────┘
                            │
                            ▼
┌─────────────────────────────────────────────────────────┐
│   •   Forming low-high proficiency dyads                 │
│   •   Allocating to treatment groups                     │
└─────────────────────────────────────────────────────────┘
                            │
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Session 2

1. Online task-based interactions	• Instructions • Warm-up activity • Task 1 • Task 2
2. SR interview	• SR procedure with P1 • SR procedure with P2
3. Debriefing questionnaire and interview	• Completing the questionnaire • Interview with P1 • Interview with P2

Figure 4.1. Experimental procedure

4.8.1 Session 1

This session was carried out with each participant individually in a small quiet room available in the participants' language school.[9] In this session, the participants were asked to read the information sheet that described their involvement in the study (Appendix H), and to ask any questions, if they had any, about their participation. If the participants were fully willing to participate, they were asked to sign an informed consent sheet (Appendix I), and to fill in the background questionnaire. Following this, the participants performed the EIT.

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[9] The participants were from three different language schools, which all approved that their students could participate voluntarily and were able to allocate a room to conduct the first session, either during the daily one-hour break time or after 4pm when the participants finished their everyday sessions.

The EIT audio was presented on a laptop, and participants' responses were audio-recorded using a digital audio-recorder. Each sentence was orally presented only once, followed by a "beep" sound after a 5-second time delay. Participants were instructed not to repeat the sentence they heard until the beep had sounded. This time delay that was created between the listening and repetition of the sentences is assumed to avoid rote repetition (Sarandi, 2015). Also, participants were instructed not to pause the audio at any time nor ask for this. At the end of Session 1, the participants were asked to indicate their preference for days and times to complete Session 2. Each session lasted between 20-25 minutes.

Following Session 1, the participants' performance in the EIT was transcribed and then assessed using Orteag et al.'s (1999) five-point scoring rubric (0-4) (Appendix J). The scoring was done twice, with a relatively long interval time between them (i.e. one week) to ensure scoring agreement with high intra-rater reliability (Tomita et al., 2009). The intraclass correlation coefficient for intra-rater reliability was .99 (interval of .99 to 1.0 with 95% confidence). These values are indicative of excellent intra-rater reliability (Koo & Li, 2016).

After scoring the EIT, all the high proficient learners were paired randomly with low proficient learners, taking into consideration the days and timings they were available. Once a dyad was formed, it was arranged with the two participants to meet for Session 2. This involved extensive pre-planning with participants, whereby the data collection took place during the weekdays, in the evenings, and also at weekends, in order to accommodate participants' schedules and the one-to-one nature of the experimental sessions. Each participant was given a number (i.e. an identification code), which served to preserve their anonymity and allow to relate the data generated from the study's different instruments.

4.8.2 Session 2

This session was conducted with each dyad at a time and regulated under lab setting conditions. It took place in two booked seminar rooms located side-by-side at the University of York. All necessary data collection, interaction equipment and materials were prepared and ready to use before the participants' arrival. Once there, the participants signed up

separately, arriving at separate times and being kept apart in the separate rooms. All activities that took place during this session consisted of several steps that are described below:

Step One: online task-based interactions
Upon their arrival, the participants received instructions for the overall task procedures. These were delivered both orally and in writing, in both English and Arabic. Before continuing, I checked that participants understood the procedure and answered any questions that they had at this point. Once this was complete, the task began.

To break the ice and introduce themselves to each other, the participants were asked to begin with the warm-up activity in the first modality of interaction. Then, they were asked to complete the two task-based activities they had, one via voice and the other via text. In both tasks, the participants were instructed to describe the picture to each other and find five differences. They were also instructed to complete the tasks in English and not to use any external resources (e.g., the Internet, dictionary). They were also told that they could take notes while chatting with their partners.

The task-based interactions were conducted through Skype accounts created specially for this research study. The two tasks were conducted one after the other, with 3-5 minutes break in between. They were not timed; this was to ensure that each interaction stayed true to the modality of interaction, as previous research has shown that the completion of tasks takes a considerably longer time in text-SCMC than in oral interactions (Gurzynski-Weiss & Baralt, 2014; Lai & Zhao, 2006). Although the task completion was not the focus of this study, participants were encouraged to achieve the task goal (i.e. to find five differences) and to take their time to complete the task without rushing.

Whilst the tasks were being completed, I remained unobtrusively in one of the seminar rooms for two main reasons. First, to be readily available in case of any technical issues, and second, to observe the participants' voice chat, so that I could fill in an observational sheet that was used to log any negotiation episodes by the participants; this would be used to help replay these incidents in their SR interviews. To achieve this, I started a timer in synchronization with the voice chat interaction, so each time the participants engaged in

negotiations, I noted down their timings, who initiated the negotiation and who received the feedback. To minimize the effect of my presence whilst the learners engaged in the tasks, I sat away from them and pretended to involve myself with other work.

After the completion of the two task-based interactions, participants were given a 5-7-minute break. During this time, I collected the audio/video recordings and the chat logs. The chat logs were copied and saved into a word file, and along with the recordings, they were uploaded and saved to the Google Drive. Furthermore, I immediately went through the learners' chat logs and highlighted the negotiation episodes. The audio recordings and the chat logs were prepared for the SR interview.

Step Two: SR interview

The SR interviews were conducted with each participant in the dyad individually. At the beginning, participants were given instructions for how the interview would be conducted, and they were then given an opportunity to ask any questions regarding the procedure. They were told that they would be reviewing episodes from their online chats that had just taken place, and would need to recall their thoughts at the time when the interaction was occurring. They were asked not to comment if they did not recall thinking anything at that particular time (Mackey & Gass, 2017). Participants were also encouraged to refer to any particular point in the interactions if they wanted to describe their thoughts about it. In addition, they were provided with the pictures that they had described during their online interactions in order to facilitate recall of their thoughts.

The extracts where learners had engaged in negotiations during voice chat were replayed and a verbalization of their thought processes was elicited. The participant was asked what s/he was thinking at the time, and what s/he believed the partner was trying to communicate. In the case of text chat interaction, chat logs were used as the stimulus, with negotiation episodes highlighted, and the participant was directed to each episode to again recall his/her thoughts at that time. As previously discussed, the questions were formulated in a general way, such as, "*what were you thinking here/at this point/right then*?" and "*can you tell me what you thought when your partner said that*?", and although participants were asked at the beginning not to report anything if they did not actually reflect on it at the time of the

interaction, they were constantly reminded during the interview to report what they were thinking 'during the chat', not what they were thinking 'right now' (i.e. during the SR session) (Gass & Mackey, 2017; Smith, 2012).

The duration of each interview varied between 10 to 20 minutes, and the whole interview was audio-recorded.

Step Three: debriefing questionnaire and interview
Once the SR was complete, participants were asked to complete the debriefing questionnaire. Following this, the debriefing interview was conducted with each learner separately. These two data sources were administrated to elicit learners' perceptions towards their L2 online chatting experiences in the two synchronous modalities.

Session 2 was repeated for each dyad. In total, the whole session took around two hours for completion, with approximately 30-35 minutes of downtime for each participant in the dyad (i.e. a break while the procedure was carried out with the other participant).

4.9 Pre-analysis Procedures
As stated in Section 4.3, a mixed method approach was employed for data collection and analysis. Four different instruments were utilised to examine the modality impact on learners' interactional and attentional processes: interaction tasks, SR interviews, debriefing questionnaire and debriefing interview. This section presents the pre-analysis procedures employed for the analysis of data obtained from these different instruments.

4.9.1 Transcription and preparation of the data
The recorded voice chats, consisting of a total of 2 hours and 30 minutes, were fully transcribed orthographically. Due to a number of features it exhibits, CLAN, a free transcription speech software, was used to transcribe the recordings of the voice chats. The features include the ability to highlight segments of speech, allowing playing and replaying the segment in isolation until it is transcribed (i.e. looping), without wasting time looking for

its start and end points. Moreover, it allows for direct continuous or segmented playback of linked audio, with highlighting of active segments, and lastly, it is compatible with built-in analysis programmes, allowing data to be sent to sound acoustic analysis software (MacWhinney, 2016). The last two features were particularly relevant, as the negotiation episodes needed to be checked several times, as well as further observations of any prosodic information, mainly changes in intonation and stress, that were accompanying the interactional feedback. This observation was done first with the auditory perception, and then instrumentally using a specialist sound analyzer software (i.e. PRAAT). GAT transcriptions conventions were used to mark any changes in prosody. The transcription conventions can be found in Appendix K.

In the case of text chat, the chat logs were developed to video-enhanced chat logs. As previously mentioned, the chat logs were copied and pasted into a Word document. Then, the corresponding Snagit video files (i.e. the screen-capture chat for participant1 (P1) and the screen-capture chat for P2) were viewed in their entirely for each participant and inspected for any revealing information. In total, forty video files, comprising around 7 hours of recordings, were inspected and transcribed using the coding system outlined in Smith and Gorsuch (2004). This coding system (see Appendix L) has been utilized by a number of researchers in their investigations of text-based interactions (Smith, 2008, 2009; Smith & Sauro, 2009), and the rationale behind using it is that it helps to capture the aspects of interaction under scrutiny, such as deletions, editing moves, self-repairs and scrolling. To facilitate the process of analysis, the video-enhanced chat logs were formatted into three columns: the left column presents the final chat logs, the middle column shows the video-enhanced transcripts, while the last column provides an explanation for the observed actions. An example of one of the video-enhanced chat logs can be found in Appendix M.

In addition to the chat transcripts, the recorded SR sessions were fully transcribed verbatim and then translated into English. A task that was executed concurrently was segmenting the transcriptions of the learners' SR reports, and arraying them with the corresponding negotiation episodes in the transcripts. Thus, each segment represented the negotiation episode and learners' recalls of thoughts during this episode.

Furthermore, all of the participants' answers in the debriefing interviews were transcribed verbatim in full and also translated into English. Therefore, the dataset comprised of the following:

1. The interaction data: (a) the transcripts of the voice chats and (b) video-enhanced chat scripts (20 transcripts of each),

2. The SR data: transcripts of 40 recorded SR sessions, segmented and presented in line with each corresponding negotiation episode,

3. The debriefing questionnaire (40 questionnaires),

4. Written records of the debriefing interviews (40 interviews).

Blinding procedures were not necessary as all data were saved with identification code from the start of data collection. That is, each participant was given a number that was consistent among all dataset. Nevertheless, any information that might establish their identity was removed from the transcribed data files (e.g. in text chat, participants occasionally addressed their partners by their names).

4.9.2. Calculation of language production

Due to the significant differences in examining the duration to complete the tasks in the two interaction modalities, it was necessary to calculate the language (i.e. number of turns and words) that learners produced while completing the actual task in each modality. Therefore, the total number of turns and words contributed by each participant was calculated. This information was deemed necessary to have a language production measure, which could be used as a basis for standardizing the scores of the dependent variables across the two modalities.

Number of Turns

Using the transcripts, the total number of turns of each interlocutor was carefully counted by hand, and the total number of turns produced by each dyad in the two chat environments was calculated.

Despite the different turn-taking systems in voice-based and text-based SCMC, a turn was counted each time there was a transfer of the floor from one participant to the other, regardless of its length (Smith, 2003; Tudini, 2003). Excerpt 4.1 illustrates how turns were particularly counted in the transcripts of oral interactions. Turns that contained no L2 utterances were not counted (like 'yeah', line 115). Conversely, even if the turn contained only one L2 word, it was considered to be a turn (line 120). In addition, any pauses between the turns were disregarded (line 117), and pauses within the speaker's utterances were not taken as an end for one turn and the beginning of the other; this was because the speaker might have still been completing the thought s/he was trying to express (lines 118-119).

Excerpt 4.1

P1 Turn 1	114	P1:	the vase
-	115	P2:	yeah
P1 Turn 2	116	P1:	and in the second roof there is clock
-	117	PPP:	(4.0)
P2 Turn 1	118	P2:	there is aaa (2.2)
	119		ha (.) heredore
P1 Turn 3	120	P1:	what?
P2 Turn 2	121	P2:	something like aaa

(Voice chat 1, P1 & P2)

Number of Words

The total number of words contributed by all the participants in each interaction modality was also calculated. For this investigation, words were counted using the *freq* command in CLAN tools, which was conducted on the pruned transcripts of dyads' interactions in the two interaction modalities.[10] Pruned transcripts refer to the transcripts where false starts, functionless repetitions and self-corrections were excluded (Foster, Tonkyn, & Wigglesworth, 2000). A false start is defined as, "an utterance which is begun and then either abandoned altogether or reformulated in some way" (Foster et al., 2000, p.368). A repetition is where the learner repeats the same produced speech; a device that may be used to hold the floor or to allow time for planning online. Self-corrections occur when learners identify an error during or immediately following production, and then stop and reformulate the speech.

---

[10] The pruned chat logs of text chat were entered into CLAN.

Where a self-correction occurred, only the final production was counted, with previous productions excluded in the pruned transcripts.

It should also be noted that any backchannels/fillers that were uttered in voice chat (e.g. 'yeah', 'oh', 'ermm'), as well as any copied messages and emoticons used in text chat, were also deleted from these transcripts, while discourse boundary markers (e.g. 'good', 'okay', 'thanks') were retained.

4.9.3 Coding

This section reports on the coding of the interaction data and the SR data, presenting the coding systems and operationalizations that were used in this study, with original examples from the study dataset. Operationalization means that the abstract phenomenon or construct we want to investigate is transferred into a measurable variable (Lowie & Seton, 2013).

4.9.3.1 Interaction data: Chat transcripts

Adhering to the research goals, both the transcripts of voice chat and the developed chat logs of text chat were coded for: (a) negotiation episodes and (b) incidents of noticing, both self-initiated (i.e. self-repairs), and following interactional feedback from the interlocutor (i.e. repairs).

4.6.3.1.1 Negotiation episodes

The transcripts of learners' task-based interactions were first coded for instances of negotiation episodes. Negotiation episodes were operationalized as, "the conversational exchanges that arise when interlocutors seek to prevent a communicative impasse occurring or to remedy an actual impasse that has risen" (Ellis & Barkhuizen, 2005, pp.166-167).

Varonis and Gass' (1985) model for negotiation of meaning was used to identify negotiation episodes. This model has been widely used in both traditional FTF studies and in the SCMC studies grounded in the interactionist perspective (e.g. Bower & Kawagushi, 2011;

Lee, 2008; Mackey et al., 2000; Smith, 2003; Tudnin, 2003; Yanguas, 2010). This model has been outlined and described in detail in Chapter 2, Section 2.2.2.

Nonetheless, two main points need to be highlighted here. First, although Varonis and Gass' model was originally developed for the analysis of instances of non-understanding, it is used in the current study, as was done in previous interaction studies, to include all occasions of interactional feedback, including negative feedback, such as recasts and explicit corrections. Second, although Varonis and Gass' model has been shown to hold in text chat interactions (Smith, 2003; Yanguas, 2010), Smith (2003) proposed a developed model for negotiations in text chat to adequately account for the slow and disturbed turn-taking in this medium. Therefore, the coding of negotiations in the present study follows Smith's model's modifications, which allow for a delay between the trigger and signal moves, as well as for the occurrence of non-contiguous utterances, in what Smith referred to as 'split negotiation routines'.

After identifying the negotiation episodes in the chat transcripts, these episodes were further subjected for coding at a micro level to examine: (a) the type of negotiation, (b) the type of interactional feedback, and (c) the linguistic foci of the negotiation episode.

First, the type of negotiation was coded as either meaning negotiation or form negotiation. As explained by Ellis et al. (2001), the meaning negotiation episode is "entirely communicative in orientation, as it is directed at enabling the participants to achieve mutual understanding in order for communication to proceed" (p.414). The form negotiation episode, on the other hand, is "didactic in orientation, as it is directed at improving accuracy and precision when no problem of understanding has arisen" (Ellis et al., 2001, p.414). While non-understanding or misunderstanding is indicated in meaning negotiations, mutual understanding is maintained in the case of form negotiations, as the learner captures his/her partner' meaning intention, but reformulates this meaning intention into formally correct forms than s/he managed to do. Each negotiation type is illustrated in Examples (1) and (2).

Example (1): Meaning negotiation

(a) Example from voice chat

```
130  <T> P14:     ok what about that hurt in the
131              we have some hurts two hurt
132      P13:    where is it
133      P14: aah behind that behind the bed
134  <I> P13: you mean hearts?
135  <R> P14: yeah heart
136  <I2>P13: in the cupboard
137  <R2>P14: yeah hehehe                    (Voice chat 7, P13 & P14)
```

(b) Example from text chat

42 <T> [18:06:15] P9: do you have pink suitcase beside the closet?

43   [18:06:33] P9: yes 3 differences till now

44 <I>   [18:06:53] P10: what is suitcase ?

45 <R>   [18:07:29] P9: a big bag we use when we travel

46 <RR>[18:08:03] P10: no i do not have   (Text chat 5, P9 & P10)

Example (2): Form negotiation

(a) Example from voice chat

```
16      P12: ok so (4.0)
17  <T>     do you have two bads
18  <I> P11: two beds-
19  <R> P12: in the yeah one of them is in the grounds
20          one in the up
21  <RR>P11: yeah                          (Voice chat 6, P11 & P12)
```

(b) Example from text chat

41 <T> [17:47:30] P6: do you have time clock op of the brd

42 <I>   [17:48:07] P5: umm i have a clock on the left shelfs not on the shelf

                    on top of the bed

43 <R> [17:48:36] P6: yes I thinh

44   [17:49:42] P6: yes I think this diferenes   (Text chat 3, P5 & P6)

Learners' negotiations were then coded for instances of three types of interactional feedback (i.e. the indicator/signal move): (1) recasts, (2) explicit correction and (3) negotiation moves. Recasts were operationalized as utterances in which the interlocutors implicitly corrected their partners' erroneous productions without breaking the flow of the communication. Explicit corrections, on the other hand, were operationalized as utterances that both rephrase the partners' erroneous productions into correct forms and also explicitly indicate the source of error. As for negotiation moves, they were operationalized as instances when interlocutors indicated their non-understanding or misunderstanding, and were coded as: (a) clarification requests, (b) confirmation check or (c) comprehension check (Bower & Kawagushi, 2011; Oliver, 1995, 2000). Table 4.2 presents the definition of each of these coding categories, with illustrating examples. The definition of feedback types was guided by previous interaction research (e.g. Bower & Kawagushi, 2011; Foster & Ohta, 2005; Fujii & Mackey, 2009; Lyster & Ranta, 1997; Mackey et al., 2000; Mackey, Oliver, & Leeman, 2003; Oliver, 1995).[11]

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[11] I acknowledge there are other feedback types mentioned in the literature of interactional feedback (e.g. elicitations, metalinguistic feedback, etc.), but as they were not present in the data, they were not included here.

Table 4.2

Definitions and examples of the types of feedback

Feedback type	Definition	Example
(1) Recast	A reformulation of a speaker's erroneous output into a more target-like form, without interrupting the flow of the interaction.	P4: ok earmm and also there is like maybe <T> small big bag <I> *P3: a small bag –* <R> P4: do you have a small bag <RR>P3: no i don't have
(2) Explicit correction	A correction of a previous utterance, indicating the source of error and sometimes with a metalinguistic explanation.	<T> P30: we call troof <I> *P29: ok no it is called shelf* <R> P30: ok
(3) Negotiation move		

(a) Clarification request	Utterances that indicate a problem in comprehension and encourage the speaker to rephrase the previous output. Clarification requests are mostly formed by wh- or tag questions; however, statements such as '*I don't understand*' or '*try again*' can also function as CR.	<T> P5: do you have high heel
		<I> *P6: what ?*
		<R> P5: next to the bed
		       high heels
		       shoes
		<RR> P6: no

(b) Confirmation check	Utterances in which the interlocutor checks if s/he correctly understood what his/her conversational partner is saying. These are in the form of questions, with or without a tag, and they involve full or part repetition of the interlocutor's preceding utterance.	<T> P14: ok what about that hurt
		   in the we have some hurts
		   two hurt
		  P13: where is it
		  P14: aah behind that behind
		   the bed
		<I> *P13: you mean hearts?*
		<R> P14: yeah heart

(c) Comprehension check	Utterances in which the speaker checks if the interlocutor has understood what s/he said. The speaker here might have some idea that their partners did not understand some part of their utterances, and they check whether this is the case or not.	[17:07:18] P16: yes [17:07:19] P15: what? [17:07:37] <u>P15: do u understand what wall</u> <u>is mean ?</u> [17:08:18] P16: I think this defferent

Note. The examples included here for illustration are taken from voice chats, with the exception of the example of comprehension check, which was only found once in the text chat.

A point worth mentioning here is that the coding of some feedback moves can be problematic "because negotiation and recasts are not mutually exclusive categories" (Mackey et al., 2003, p.39). For instance, confirmation checks, normally considered negotiation moves, can also incorporate recasts. To deal with this issue, I have considered a contextualized analysis of the feedback move by considering the surrounding context,

examining the way in which the feedback was provided (i.e. observation of prosodic cues), and also taking into consideration the participants' reports in the SR interview. In cases where there was no apparent breakdown of communication, it was coded as a negative feedback move (recast), whereas in cases where the feedback was triggered by non-comprehension, usually accompanied by a rising intonation, the feedback was coded as a negotiation move (usually comprehension checks). In Example 3, the feedback was coded as a recast (line 72), as the whole utterance was provided with a level intonation and there was no apparent breakdown of communication. Example 4 shows the same learner (P3) eliciting confirmation that she has correctly heard or understood her partner (P4), while simultaneously recasting P4's utterance with a target-like version.

Example (3): recast

```
70      P4: ok earmmm
71 <T>     and also there is like maybe small big bag
72 <I>  P3: a small bag-
73 <R>  P4: do you have a small bag
74 <RR> P3: no i don't have
```

Example (4): comprehension check + recast

```
78 <T>  P3: can you see a butterflies on the floor
79      PPP: (2.9)
80 <I>  P4: butterflies?
81 <R>  P3: i think it is a butterfly hehehe i am not sure
82 <RR> P4: aah yes there like pieces on the floor      (Voice chat 2, P3 & P4)
```

After coding the type of the negotiation episode and the type of feedback, the coding was concerned with the nature of linguistic foci of the negotiation episode. This relates to the trigger move (i.e. the erroneous utterance that initiated the negotiation episode). Overall, negotiations of meaning were caused by two broad categories of triggers: either global or linguistic. Global triggers referred to problems in discourse and pragmatics, whereas linguistic triggers referred to errors in: (a) lexis, (b) morphosyntax, (c) pronunciation (in voice chat) or spelling/orthography (in text chat). As for negotiations of form, they occurred in response to any of the aforementioned linguistic triggers. Definitions and examples of the different linguistic categories are provided in Table 4.3.

Table 4.3

Definitions and examples of categories of linguistic foci

Linguistic foci	Operationalization	Example

Lexical	Cases where the problematic utterance can be clearly linked to a specific lexical item, e.g. use of unfamiliar words, inaccurate or inappropriate choices of lexical items and non-target derivations of nouns, verbs, adverbs and adjectives.	<T> P10: do you have a painter on the right side ?
		   P9: do you have a big window on the left?
		   P10: yes i have
		<I> P9: you mean painting right?
		<R> P10: yeah
		(Text chat 5, P9& P10)

Morphosyntactic	Cases where the problematic utterance can be clearly attributed to aspects of English morphology or syntax, e.g. incorrect word order, lack of gender or number agreement, or incorrect verb tense or mood.	`P16: yeah i have red blanket`
		`<T>` `and i have man christmas`
		    `do you have`
		`P15:no i don't have man christmas`
		`<I>` `hehe christmas man you mean`
		`<R> P16:yeah christmas man`
		(Voice chat 8, P15& P16)

Phonological	Cases where the problematic utterance can be attributed to non-target phonetic production.	`<T> P38:  do you have bi low`
		`<I1>P37: what`
		`<R1>P38: bi low`
		   `P37: where`
		   `P38: in the bed`
		`<I2>P37: bi PILLOW you mean?`
		`<R2>P38: yes pillow`
		(Voice chat 18, P37& P38)

Spelling/ Orthographical	Cases where the problematic utterance can be attributed to errors in spelling/ the written form of a word.	<T> P32: raut or left <I> P31: u mean right ? <R> P32: yes **(Text chat 16, P31& P32)**

Global	Cases where the problematic utterances are related to the general coherence of the discourse or the conversation.	<T> P3: I got one boat
		   in the middle shelf I mean that one
		   above the bed
		<I> P4: sorry i don't understand what you mean?
		<R> P3: see there are 2 shelves above the bed
		   yeah
		   P4: yes
		<R> P3: the second one has a boat
		<RR>P4: no i do not have **(Text chat 2, P3 & P4)**

4.9.3.1.2 Incidents of noticing

Following the examination of negotiation episodes and their features, all the chat transcripts were then coded for incidents of noticing, both self-initiated (i.e. self-repairs), and following interactional feedback from the interlocutor (i.e. modified output/uptake).

Self-repairs

Self-repairs were operationalized as episodes in which the participants independently corrected their own productions, without being prompted to do so by their interlocutors (Foster & Ohta, 2005; Lai & Zhao, 2006; Smith, 2009).

Building upon van Hest's (1996) model of self-repairs, Smith (2008, 2009) included in his observations of self-repairs in text-SCMC the following different categories: (a) error repairs (i.e. repairs made because the speaker has made an error), (b) appropriateness repairs (i.e. repairs made because the speaker thinks the original message is inappropriate in some way), (c) different repairs (i.e. repairs in which the speaker interrupts his current message to introduce a new different topic) and (d) rest repairs (i.e. repairs that do not fit cleanly into any of the other categories). However, given the focus of this study in examining learners' noticing of errors in their productions and engagement in monitoring processes, only error repairs were coded and considered for analysis.

In addition to the identification of error self-repairs, they were further coded in accordance to their linguistic categories: lexis, morphosyntax and phonology (in voice chat), or spelling/orthography (in text chat). Lexical self-repairs referred to situations where the learner has changed the wrong word and substituted the correct one for it. In Example 5, for instance, P27 was referring to the wall cloak placed in the middle of his picture. He first produced the word 'watch', but then substituted it with a more correct form 'clock'.

Example (5): Lexical self-repair

```
104    P27:  you have a watch(.)a clock
105    P28:  no i can't see
106    P27:  clock in the middle of the picture
```

<div align="right">(Voice chat 14, P27 & P28)</div>

In contrast to lexical self-repairs, morphosyntactic self-repairs referred to situations where the learner corrected any morphological or syntactic errors. Example 6a shows a self-repair incident in voice chat, where the participant (P18) changed her morphological error into a more appropriate form. An example of morphosyntactic self-repair from text chat is revealed in Example 6b. In the video-enhanced chat log, it was revealed that P15 first wrote 'what is wall mean' (line 20). Then, she put the cursor on the word 'is', highlighted the word, deleted it and typed 'does' instead. In this case, she corrected a syntactic error, and this incident was coded as morphosyntactic self-repair.

Example (6): Morphosyntactic self-repair

(a) Example from voice chat

```
5      P18:  ok this picture is earmm bedroom
6            it has a picture (.) natural picture
7            on the wall
8            also it has a books lots of books
```

<div align="right">(Voice chat 9, P17 & P18)</div>

(b) Example from text chat

Final chat log	Video-enhanced chat log
17 [17:04:29] P15: do u mean wall paper?	~~oh do u mean a fram~~ do u mean wall paper?
18 [17:04:54] P16: and some colors on the floor	and some colors on the floor
19 [17:05:11] P16: colours	colours
20 [17:06:14] P16: what does wall mean ?	what [~~is~~] [does] wall mean [*] [-][+] ?

<div align="right">(Text chat 8, P15 & P16)</div>

Considering phonological self-repairs, they referred to situations where the participant mispronounced a word and then changed it to the correct pronunciation. For example, P28 in Example 7, mispronounced the word 'bed' at the first time; however, he then went on to pronounce it correctly afterwards.

As for spelling/orthographic self-repairs in text chats, they referred to situations where the participant corrected errors in spelling or orthography (i.e. capitalization and punctuation). Example 8 presents an incident of spelling self-repair. This example showed that, before sending his sentence, P27 moved the cursor using the arrow key to *p* of 'planket', deleted the *p* and replaced with *b*, to correctly spell the word 'blanket'.

Example (7): Phonological self-repair

```
37    P28:  earrr you can see
38          baby bad
39          baby bed
```
(Voice chat 14, P27 & P28)

Example (8): Spelling self-repair

Final chat log	Video-enhanced chat log
16 [14:01:26] P27: the mattress is the one under the blanket	the mattress is the one under [15] the [p̶][b]lanket [*][-][+]

(Text chat 14, P27 & P28)

Modified output/ Uptake

As mentioned in Chapter 2, incidents of learners' noticing of interactional feedback in the present study were assessed through performance (i.e. modified output/uptake) and introspective (i.e. SR reports) measures. Therefore, the negotiation episodes were looked at again, and the response move was specifically examined and coded as either the modified output was provided or not. It should, however, be noted that, before coding the incidents of modified output/uptake, I started with coding for opportunities for modified output. An opportunity for modified output was operationalized as an instance in which the interlocutor

provided time and space for his/her partner to modify output in the turn immediately following feedback. In contrast, no opportunity for modified output was operationalized as an instance in which the interlocutor did not provide space or time for his/her partner to modify output in the turn immediately following feedback. However, cases of no opportunity for modified output were only found in voice chats. In Example 9, P23 corrected his partner's lexical error 'roof' by supplying the correct word 'drawer'; however, he completed his description, which rendered a modification of output possible in discourse.

Example (9): no opportunity for modified output

```
64 <T> P24: in the middle but in the second roof
65 <I> P23: the drawer ok
66          but i have what they call it
67          a ship a small ship
68      P24: aha no i don't have any ship
```

(Voice chat 12, P23 & P24)

Once the opportunities for modified output were identified, the response move was examined and coded following the categories identified in Table 4.4. First, it was coded as either (a) no modified output, or (b) modified output/uptake. In the case of the latter, the learner's output was further coded for (a) non-successful modification, or (b) successful modification (i.e. repair). However, as suggested by a number of SLA researchers, the provision of modified output may constitute an evidence of the learner's acknowledgement of the provided feedback, and indicate that the learner has actively engaged in particular cognitive processes following the feedback (e.g. Ellis et al., 2001; Fujii & Mackey, 2009). In line with this, Swain (1995) argued that learners' attempts to modify their output may promote L2 development, even if the modified output is not more accurate. In addition to these views, I took into consideration the fact that the feedback move does not always contain negative evidence (i.e. error correction), as this was particularly the case of negotiation moves, such as the clarification request 'what'. Accordingly, in this study, both cases of modified output were taken as evidence of noticing, since learners' modifications, whether they were successful or not, could indicate their attempts to communicate more successfully during their L2 interactions.

Table 4.4

Definitions and examples of categories of the response move

Response move	Definition	Example
1- No modified output		
a) Acknowledgement	Incidents where the participant only responded with 'yes' to the feedback.	\<T\> P32: raut or left \<I\> P31: u mean right ? <u>\<R\> P32: yes</u> **(Text chat 16, P31& P32)**
b) Repetition	Incidents where the participant simply repeated the same non-target-like utterance, in whole or in part.	``` P32: do you have in your in right of your <T> picture three dolphin <I> P31: three what <R> P32: three dolphin <RR>P31: no i don't have``` **(Voice chat 16, P31& P32)**
c) Topic continuation	Incidents where the participants ignored the feedback and continued the topic.	```<T> P26: doesn't have wat wash <I> P25: no no i didn't have a clock <R> P26: ok number three``` **(Text chat 13, P25& P26)**
2- Modified output		
a) Non-successful modification	Incidents where the participant changed his/her response following the feedback, but his/her modification was still in a non-target like form that needed repair.	```<T> P32: yeah and two two things <I> P31: two pillows <R> P32: two polls yeah behind the two polls in the right you have…``` **(Voice chat 17, P33& P34)**
b) Successful modification	Incidents where the participant successfully modified his/her output in response to feedback, incorporating at least one of the corrections in case there were many.	```<T> P38: do you have bi low <I1>P37: what <R1>P38: bi low P37: where P38: in the bed <I2>P37: bi PILLOW you mean? <R2>P38: yes pillow``` **(Voice chat 18, P37& P38)**

4.9.3.1.3 Reliability of the coding

Reliability is defined as, "the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions" (Hammersley, 1992, p.67). To ensure the reliability of the coding process, another coder, who was a PhD researcher majoring in applied linguistics, was asked to code 20% of the data. A coding manual that included all the definitions and categories for each aspect examined was prepared (see Appendix N), discussed with the second rater, and presented to her during the coding process.

For the interaction data, inter-coder reliability, as measured by percentage agreement or Cohen's kappa[12], yielded high agreement rates: the identification of negotiation episodes, 94%; type of negotiation, κ= 1.00; type of feedback, κ= 1.00; type of linguistic foci of negotiation, κ= .94; occurrence of self-repairs, 91%; type of linguistic category of self-repairs, κ= 1.00; and type od response, κ= 1.00.

4.9.3.2 SR data

4.9.3.2.1 Occurrence of noticing

Learners' comments in the SR sessions were examined to investigate the effects of interactional feedback provided in text or voice chat on their noticing. They were coded as either they attended to the feedback [+N] or they did not attend to the feedback [-N]. Here, the noticing incidents [+N] were operationalized as situations where learners indicated that: (a) they were aware of the fact that they received a target-like model of the linguistic form, and/or whether their production of the form was problematic (Bao et al., 2011; Egi, 2007a); (b) the form was new to them (Mackey, 2006) and (c) the feedback led to revisions of their hypotheses about the target form (Izumi, 2003).

Conversely, no noticing incidents [-N] were operationalized as: (a) cases where learners' recall of the episode was mainly about the content of the picture, or (b) cases where they revealed that they could not remember what happened during the chat or they indicated that they just noticed a difference between their output and their interlocutor's feedback (i.e.

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[12] Cohen's Kappa was used as measure of inter-rater reliability for categorical data; however, with counts (i.e. the number of negotiations and number of self-repairs), the percentage agreement was used.

during the SR, upon prompting). Table 4.5 presents examples of noticing and no noticing incidents of interactional feedback.

Table 4.5

Examples of noticing and no noticing incidents

Code	Negotiation episode		SR report
[+N]	130 P14:	ok what about that hurt in the	R: what do you remember
	131<T>	we have some hurts two hurt	thinking at this time?
	132 P13:	where is it	P14: *aah two hearts I meant*
	133 P14:	aah behind that behind the bed	*hehehe. I wanted to ask about the*
	134<I> P13:	you mean hearts?	*hearts, but I pronounced it*
	135<R> P14:	yeah heart	*wrong. She got me. She corrected*
	136<I2>P13:	in the cupboard	*me.*
	137<R2>P14:	yeah hehehe	
		(Voice chat 7, P13 & P14)	
[-N]	43 P8:	ok do you have flower up	R: Do you remember thinking
	44	the bend up the bed	anything at this point during the
	45 P7:	what	task?
	46 P8:	flower	P8: *I meant the flowers and the*
	47 P7:	flowers	*vase (saying them in Arabic, and*
	48	no just outside	*pointing to them in the picture).*
	49 P8:	ok	R: do you remember any other
		(Voice chat 4, P7 & P8)	thing at that time?
			P8: *no*

4.9.3.2.2 Level of noticing

This study further aimed to scrutinize the extent at which learners were able to correlate their partner's feedback with problems in their L2 utterances. Therefore, the incidents of reported noticing [+N] were further closely examined to identify the type of noticing in which the participants engaged. Two reported levels of noticing were identified and coded for within this study: (a) simple noticing and (b) elaborate noticing. Simple noticing was operationalized as noticing incidents where learners simply reported or referred to the target-like linguistic form in the feedback or the problematic form in his/her utterance without further deliberation.

Elaborate noticing, on the other hand, was operationalized as incidents where learners deliberated over the language forms and provided explanations of the differences, as well as reasons for accepting the corrected forms or discussion of alternative forms.[13]

Simple noticing included descriptors such as repeating the feedback without focusing on the target-like form, noting being corrected without specifying the form that was corrected or the target-like form, and showing no potential for emerging form-meaning connection (in the case of lexical items). In contrast, elaborate noticing included descriptors such as commenting on the difference between the non-target and target-like forms, explaining why the form in the feedback was more accurate, identifying the problems in the non-target-like form, forming hypotheses or reflecting on alterative choices for the target-like form, and providing evidence of making some form-meaning connection (whether accurate or inaccurate).

Examples 10 and 11 include negotiations that were triggered by lexical items, which then resulted in the learners' noticing gaps in their L2 knowledge. Example 10 shows an incident of simple noticing during the voice chat interaction, where P9 begins a negotiation sequence as she struggles to remember the word '*heels*' (line 57). P10's following confirmation check provides the necessary word, which P9 catches on in the following turn and identifies in her stimulated recall. However, her recall only repeated the noticed form without explanation of her earlier version and the reformulated version. In contrast, Example 11 demonstrates an incident of higher level of noticing, showing P10's deliberation over the correct lexical choice during their text chat interaction (*painter vs. painting*). In this instance, P10 asks about the painter (line 37), but his partner questions his use of this lexical form, and asks if he meant the word 'painting' instead (line 40). In the SR interview, P10 deliberates over accepting the word 'painting' and provided an appropriate explanation for why this word was more accurate.

---

[13] These operationalizations were established based on the criteria posited by a number of researchers who examined Schmidt's (1995) proposed levels of awareness. It should, however, be noted that a problem appeared with these studies is the terminology. Leow (1997) referred to them as levels of awareness, Qi and Lapkin (2001) used the term quality of noticing, while Storch (2008) and Gracía Mayo and Azkarai (2016) discussed types of noticing.

Example (10): Simple noticing

```
56      P9:  yeah
57<T>        in the floor there is the aah high
58<I>   P10: high heels?
59<R>   P9:  high heels yeah do you have the same-
60<RR>  P10: yeah i have high heels
61           yeah
```

P9's recall: *yeah high heels* (when the learner was prompted to add any other thoughts, she said she had nothing).

(Voice chat 5, P9 & P10)

Example (11): Elaborate noticing

37 <T>   [18:09:20] P10: do you have a painter on the right side ?

38   [18:09:30] P9: do you have a big window on the left?

39   [18:09:39] P10: yes i have

40 <I>   [18:10:09] P9: you mean painting right?

41<R>   [18:10:18] P10: yeah

42<RR>   [18:10:29] P9: no I don't have

43   [18:10:41] P10: done

P10's recall: *painting is the canvas that we draw on. I said painter which is the person who paints, and it is painting. Her word is the correct one. Painter is the person.*

(Text chat 5, P9 & P10)

4.9.3.2.3 Reliability of the coding

As with the interaction data, the same PhD researcher coded 20% of the SR data. The kappa coefficients for both the occurrence and level of noticing were calculated, revealing a perfect agreement ($\kappa= 1.0$).

4.10 Data Analysis

Data analyses were carried out using both quantitative and qualitative approaches. Quantitative analyses were carried out using the statistical package SPSS for Mac (Version 24.0). Once the interaction and SR data were coded, numerical values were assigned to the different codes, which were then entered into SPSS. In addition, information regarding the amount of time-on-task and learners' language production, as well as learners' responses to the debriefing questionnaire items, were also entered into SPSS. After the completion of the data entry, the screening and cleaning stage took place to identify and correct any data entry problems (Phakiti, 2015).

Descriptive statistics (mean and standard deviations) were first calculated on the amount of time and language production, to ascertain any differences in learners' completion of the tasks in the different interaction modalities. Due to the great differences in examining the duration of time-on-task and the amount of learners' language production, the number of negotiations and incidents of self-repairs were converted into standardized scores in order to establish a baseline for statistical comparison (Rouhshad et al, 2016; Shekary & Tahririan, 2006). In addition, since the occurrence of noticing of feedback is determined by the provision of interactional feedback, it was necessary to obtain percentage scores of incidents of noticing of feedback in each interaction modality (Lai & Zhao, 2006).

Wilcoxon signed-rank test (i.e. the non-parametric analogue to the parametric paired-sample t-test) was used to examine the presence or absence of statistical significance. The alpha for achieving statistical significance (p-value) was set at 0.05, and the effect size was computed and categorized as small ($r = 0.25$), medium ($r = 0.4$), or large ($r = 0.6$), following Plonsky and Oswald's (2014) proposed field-specific benchmarks for interpreting effect sizes. An effect size is "a *magnitude-of-effect estimate* that is independent of sample size", and the rationale for examining and reporting the effect size is because "a magnitude-of-effect estimate highlights the distinction between *statistical* and *practical significance*" (Phakiti, 2014, p.204).

To examine whether the modality of interaction could have an impact on the frequency of negotiations (RQ1) and incidents of noticing (RQ3), Wilcoxon signed-rank test was run on

the standardized scores of negotiations, self-repairs and noticing of feedback. It should be noted, though, that the statistical test was only carried out on incidents of noticing of feedback revealed by the introspective SR measure. Due to their less frequency, the incidents of noticing resulting from the performance measure were dealt with as qualitative data. They were used to triangulate data generated from the SR measure and to inform about the consistency and/or discrepancy between performance and introspective measures of noticing. Similarly, because of the small number of the different categories of features of negotiations (RQ2) and of the levels of noticing (RQ4), it was decided to take a qualitative approach, rather than employing rigorous statistical analysis when examining these outcome measures. That is, they were qualitatively analyzed using a descriptive method to identify any similarities or differences across the two interaction modalities.

In addition, an inductive thematic analysis was conducted on the reported noticing incidents [+N] in the SR data to identify the characteristics of learners' underlying mental processes when receiving feedback in online oral and written interactions. Thematic analysis is an exploratory approach, which, as defined by Braun and Clarke (2006, p.79) involves "identifying, analysing and reporting (themes) within data". As a first step, learners' reports of noticing were read extensively, and carefully examined in light of the feedback provided to their deviant forms, taking into consideration any reasons they might have revealed as prompting them to attend to the feedback. The recurring themes characterizing learners' mental processes while engaged in L2 negotiations were identified and reported.

To gauge the participants' perceptions towards the oral and written synchronous modalities (RQ5), frequencies and percentages of their responses to the questionnaire items were first calculated. In order to add participants' voices to the quantitative results, their answers in the debriefing interviews were qualitatively analyzed using data-driven thematic analysis. The phases of thematic-analysis outlined by Braun and Clarke (2006) were adhered to (see Appendix O). In order to become familiar with the different perceptions and identify the common views and reasons that learners provided to support their choices between voice and text chat, I began by immersing myself in the data. Following this, I started generating initial codes and converting the comments to key words or phrases. Overall, the learners' comments were in relation to the aspects examined in the debriefing questionnaires, which

were: (a) completion of task-based activity, (b) monitoring and processing of the language, and (c) L2 learning benefits. As a result, I categorized the different codes into themes and sub-themes under these overall headings and added the relevant extracts from learners' responses to the specific themes. This was followed by a process of refinement, where I reviewed the data once again, studied learners' responses repeatedly, reassessed the themes and considered the similarities and/or differences across sub-themes. The final themes were assigned labels that captured their essence, presented in the Results Chapter and supported with illustrative quotes from the learners' responses.

4.11 Ethical Considerations

In any type of academic research, a thorough consideration of research ethics is extremely vital. Drawing upon De Costa (2015, 2016), this study made efforts to address the macroethical and microethical practices, which need to be considered before, during and after the conduct of the research study. Macroethics refer to the protocols and principles articulated in professional codes of conduct, whereas microethics refer to the dilemmas that arise in particular research contexts (De Costa, 2015, 2016).

On a macroethical level, an official approval from the Ethics Committee of the Department of Education at the University of York was obtained prior to embarking on any of the procedures of this study. Permission was also obtained form the different language schools to approach and contact participants. Upon this, the participant information sheet was distributed to potential participants. This sheet described the study's purpose and procedures, and explained the voluntary nature of the participation. It is worth noting that since this study focused on the impact of modality on learners' negotiated interaction and noticing, learners were told that the study was investigating the different patterns of their interactions when engaged in voice-based and text-based computer-mediated tasks, without reference to their negotiations and cognitive engagement. The participant information sheet also presented information on how the data would be used, explaining the procedures that will be taken to protect the participants' anonymity and confidentiality (e.g. safeguarding the location of and access to records, and using numbers instead of names to refer to participants). Moreover, it

informed learners about their right to withdraw from the study at any given time during the data collection and up to one week after the data is collected (see Appendix H).

Following this, signed written consent form was obtained from all participants prior to the commencement of the study (Appendix I). In consideration of the fact that the participants were learners of English and English was not their L1, the participant information sheet and the consent form used both English and Arabic to help the participants make a more informed decision about their participation in the study.

On a microethical level, a number of issues were considered after piloting the study's instruments and procedure (and before embarking on the main data collection), in order to weight any potential negative impact that the study may have on the participants. First, the language used in the questionnaires and interviews were translated to the participant's L1 and simplified to a level that is clear to their understating. Second, the spot-the-difference tasks were created with the goal of finding nine differences between the two pictures. However, as learners took a relatively long time to complete this, particularly in text chat, resulting in them becoming bored or frustrated, the goal of the task was changed to find five differences.

4.12 Pilot Study

The process of pilot testing the research instruments and procedures prior to conducting the actual study is firmly advocated by many researchers (e.g. Mackey & Gass, 2015; Seliger & Shohamy, 1989). In the present study, the pilot process involved two rounds. The purpose of the first pilot was to test and evaluate the type of treatment task that was to be used to examine learners' task-based interactions, whereas the purpose of the second pilot was to conduct a small-scale trial of the proposed materials and procedures of this study, thus envisaging any potential problems, and subsequently addressing them before the main study was carried out. The following sections succinctly describe each of these pilot studies, revealing the implications that were considered for the main study.

Piloting the treatment tasks

The key objective of this pilot was to test different types of communicative tasks and check for their potential in generating incidents of negotiated interaction among Arabic learners of English. The participants were six EFL Arabic learners (two males and four females) enrolled at an English language centre in the UK. Their proficiency level was graded at pre/upper-intermediate (B1 and B2 in terms of CEFR). The participants were put into dyads to carry out three communicative tasks in a single session. These tasks included,

A. A narrative story task: This was a jigsaw task, in which each participant was given four cut-up pictures from a story of Mr. Bean; two of which were similar to those with the other participant and two that were different. Participants were asked to take turns to describe their pictures, so that they can find the similar ones and draw or write down notes about the missing pictures. After exchanging information of the pictures, the participants were asked to work together and decide on a sequence of the pictures so they have a complete story.

B. A street description task: this was a one-way information gap task, in which the participants were given a similar picture of a street scene. The background of the two pictures was the same, but only one participant had four people in her/his picture. Participants were instructed to ask for/provide information about the missing/extra information.

C. Spot-the-difference task: this was the same task described in Section 4.7.4.

Participants' interactions were only carried out via voice chat, and they were recorded for transcription and evaluation. After the completion of the tasks, the participants were also asked to verbally evaluate the different tasks that they had just performed. The audio-recordings of the communicative tasks were transcribed and coded for instances of negotiated interaction.

Despite the small-sample scale of the participants, this pilot helped to confirm that this group of learners did provide feedback to each other and engaged in L2 negotiations. All the tasks were successful in engaging the participants in communicative interaction and in generating negotiation episodes, but the narrative story task (Task A) was found as the most challenging for the participants, as they did not follow the task instructions appropriately (e.g.

they avoided taking notes of the missing pictures and by the end of the task, none of the dyads was able to narrate the full story). Tasks B and C were carried out easily and successfully, as the participants were able to exchange the information concerning the four people in Task B and identify all the nine differences in Task C. However, for task B, it was very short and took little time to finish (i.e. 4-7 minutes). In addition, a problem raised with this task was associated with its nature of one-way flow of information (Ellis, 2003). That is, the person who has the extra information initiated most of the turns and talked more than the other participant, whose majority of turns were only confirmations (e.g. ok, aha). Thus, the spot-the-difference task (Task C) appeared to be the most appropriate, and one that was to be adopted for this research purposes. The participants, additionally, favored this type of task because they were most familiar with it, as they have encountered it in their English classes.

Another implication from this pilot was the need to utilize a language proficiency assessment, since only two of the six participants had IELTS scores. Although both had a score of 5, they were placed in different proficiency levels at the language centre, one in intermediate while the other was in upper-intermediate.

Piloting the study materials and procedures

This pilot was not conducted with the aim of conducting any data analysis, but rather to serve the following objectives: (a) to evaluate the planning and procedures of data collection, thus improving the reliability of the procedure (Seliger & Shohamy, 1989), (b) to assess the validity and adequacy of the research materials, (c) to practice coding and develop coding systems, and (d) to familiarize myself with the processes of collecting and analyzing the data, thus instilling me with a sense of confidence, particularly in terms of the practical and technical issues in relation to the collection and analysis of the data (Bryman, 2012).

The participants were twelve intermediate-level Arabic learners of English (nine males and three females) enrolled in different English language schools in the UK. Based on their performance in the EIT, the participants were put into six dyads to complete the spot-the-difference tasks in voice and text chat. Following their task-based interactions, SR interviews were conducted with each participant in the dyad individually, to elicit their thoughts during

task completion. During the SR sessions, the audio recording of voice chats were replayed and stopped each time the dyad engaged in a negotiation episode. Following the SR, the participants were asked to fill in the debriefing questionnaire, after which they were interviewed to elicit their perceptions of oral and written SCMC. At the end, the participants were asked to comment on the clarity of the instructions received throughout the procedure.

This pilot study revealed a number of implications for the main study. First, when filling in the questionnaires (i.e. background and debriefing questionnaires) and receiving instructions for the interviews (i.e. SR and debriefing interviews), the participants were constantly asking for clarifications and explanations in their L1. Therefore, the language used in the questionnaires and interviews were translated to the participant's L1 and simplified to a level that was clear to their understating. Second, some learners reported that they found it difficult to engage well with their partners at the start of the first medium of interaction. For this reason, the warm-up activity was incorporated, which could help learners break the ice and get adjusted to the dyadic interaction (Smith, 2003). Third, participants' fatigue was clearly an issue that arose in the piloting. Consequently, two decisions were taken to minimize the procedure time and help gather sufficient data against factors of fatigue or boredom. The first decision was to decrease the amount of differences learners needed to find between their pictures (i.e. finding five differences instead of nine), and the second decision was to observe the learners' oral chatting, and then only play those episodes where a feedback was given in the following SR sessions, as opposed to playing the whole recording for each participant.

4.13 Summary

This chapter has outlined the methodology adopted for the conduct of the present study. It began by restating the research aim and questions, followed by discussing the research paradigm and strategy (i.e. mixed method approach). That is, both quantitative (interaction tasks, SR and debriefing questionnaire) and qualitative (SR and debriefing interviews) methods were employed to gain a better understanding on the impact of synchronous modality on L2 interactional and attentional processes. Consequently, information about the participants of the study was provided. Then, the design of the study and the rationale for

counterbalancing the modality of interaction and task version have been illustrated. A detailed description of the data collection materials and procedure was then given. Following this, the pre-analysis procedures and the methods employed for the data analysis were presented. Efforts were then made to ensure the integration of ethical considerations into the research processes. The chapter concluded with a presentation of the pilot study.

Chapter 5: Results

5.1 Introduction

This chapter begins with an overview of the background information on task completion in voice- and text-based SCMC. Following this, a discussion is presented with regards to how the scores of the outcome measures were standardized across the oral and written modalities of SCMC. Then, the chapter pinpoints the normality of the data for each outcome measure, and outlines the type of tests that were executed for statistical analysis. Lastly, the chapter presents the results to answer the following research questions:

RQ1.   What is the impact of modality (voice chat vs. text chat) on the frequency of negotiations in task-based interactions?

RQ2.   What is the impact of modality (voice chat vs. text chat) on the characteristics of negotiations:

    d) Type of negotiation

    e) Type of interactional feedback

    f) Linguistic foci of negotiation

RQ3.   What is the impact of modality (voice chat vs. text chat) on the frequency of noticing during task-based interactions:

    c) Self-repairs (i.e. self-initiated noticing)

    d) Noticing of corrective feedback

RQ4.   What is the impact of modality (voice chat vs. text chat) on the quality of noticing during task-based interactions?

RQ5.   What are the learners' perceptions of the strengths and limitations of voice chat and text chat?

5.2 Overview of Task Completion: Background Information

Table 5.1 presents the descriptive statistics that were generated in voice-SCMC vs. text-SCMC, focusing specifically on time on task, pruned number of words, number of turns, words per minute, and lastly, turns per minute.

Table 5.1

Background information on task completion (n=20)

	Voice chat		Text chat	
	M	*SD*	*M*	*SD*
Length of time (mins)	7:05	3:04	20:30	8:09
Number of words	599.8	291.0	271.2	113.9
Number of turns	114.7	53.8	38.7	10.9
Words per min	81.2	17.7	13.9	3.6
Turns per min	15.6	2.5	2.0	0.56

As Table 5.1 shows, learners spent more than twice the amount of time completing the task-based activity during the text chat than in the voice chat interactions. That is, each dyad spent an average of seven minutes to complete the task in voice chat, whereas in text chat, it took each dyad an average of twenty to twenty-one minutes to complete the task. The data further shows that, despite the extra time taken in the text chat, the learners' interactions during voice chat resulted in more than double the amount of language production (*M*= 599.8 and *M*= 271.2 respectively). Moreover, the number of turns was greater, varying from 49 to 286 turns in voice chat (*M*=114.7), while in text chat, it varied from 21 to 55 (*M*= 38.7).

The data also shows that the voice chat interactions produced a considerably higher rate of words per minute (*M*= 81) than text chat (*M*= 13.9). During voice chat, each dyad produced between 11 to 21 turns per minute, with an average of 16 turns, whereas, these dyads produced between 1 to 3 turns per minute, with an average of 2 turns.[14] The raw data of each individual dyad can be found in Appendix P.

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[14] It should be noted that these numbers should be read with caution, because, while the on-task time was considered, it was found that few dyads showed a great interest in the task and therefore spent more time to spot more than five differences (i.e. the task outcome), but others gave up working on the task before achieving its outcome.

5.3 Standardizing Scores of Outcome Measures

Due to the significant differences in examining the duration to complete the tasks and the number of words and turns produced in the oral and written modalities of SCMC, the scores for some outcome measures were standardized across both platforms; namely, (a) negotiations and (b) self-repairs. This subsequently provided a basis for comparison.

Choosing a unit/measure to compute the standardized scores was challenging, as researchers of comparative studies have not discussed this issue in great detail,[15] nor have they justified their choices. That said, some researchers have calculated instances for their dependent variables using a 'per minute' measurement, which helped standardize their scores across the different modes/modalities of interaction (e.g. Loewen & Reissner, 2009; Loewen & Wolff, 2016). While this unit ('per minute') could provide a valid ecological comparison between the opportunities of negotiations across the oral and written modalities of SCMC, it does not control for differences in production. As the figures in Table 5.1 suggest, the type of interaction could have an impact on the learners' contribution to a task, and it should also be noted that equal amount of time does not necessarily result in equal amount of production in the different modalities (Shekary &Tahririan, 2006).

Building upon this, the measures 'per turn' and 'per 100 words' were considered to be more appropriate for this study, as they do account for the amount of language that the learners produced. However, the 'per turn' measure was anticipated to be problematic because a turn can be of different lengths and of different complexities, particularly when comparing turns across different modalities (voice vs. text). An examination of the learners' interaction transcript data revealed such differences, whereby the learners' turns in voice chat tended to be simple and short, while lengthy turns were produced in text chat. Therefore, to account for the time spent on a task, as well as the amount and complexity of language production, the measure 'per 100 words' was deemed more appropriate as a means of standardizing scores of negotiations and self-repairs across both the oral and written modalities of SCMC. In addition, this measure was envisaged to be helpful to achieve comparable analyses with previous comparative studies, which calculated negotiations/ LREs

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[15] Researchers who examined and compared text-based SCMC to FTF interactions (e.g. Rouhshad et al., 2016) or text-based SCMC to video-based SCMC (e.g. Hung & Higgins, 2016).

per 100/1000 words to standardize their scores across oral FTF interaction and written SCMC (e.g. Fitze, 2006; Rouhshad et el., 2016; Shekary & Tahririan, 2006; Yilmaz, 2011; Yilmaz & Granena, 2010; Zeng, 2017; Zeng & Takatsuka, 2009).

In relation to measuring the scores for noticing of interactional feedback, these were standardized in a different manner. Since occurrence of noticing is determined by the provision of feedback, it was necessary to obtain percentage scores; this was to establish a consistent baseline for statistical comparison, which in turn, would determine any differential effect of interaction modality on learners' noticing on interactional feedback.

Table 5.2 briefly illustrates how each outcome measure was standardized and prepared for the statistical analysis.

Table 5.2

Standardizing scores of outcome measures

Standardizing scores of…	
negotiations per 100 words	The raw number of negotiations generated by each dyad in each modality of interaction was divided by the total number of words produced by this dyad in the respective modality. This was then multiplied by100.
self-repairs per 100 words	The raw number of self-repairs produced by each participant in each modality of interaction was divided by the total number of words s/he produced in this modality, multiplied by 100.[16]
noticing of feedback	Instances of noticing were first tallied and then a percentage score for noticing of feedback was calculated for each learner within each interaction modality (i.e. total reports of noticing divided by total instances of received feedback, multiplied by 100).

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[16] As this analysis was carried out on an individual level, the number of words produced by each individual learner was used when calculating this figure, and not the total words produced by the dyad (Smith, 2008).

5.4 RQ1: Frequency of Negotiations across Modalities of SCMC

The first research question sought to determine whether there would be any modality effects on the frequency of negotiation episodes. The transcripts from the voice chat and the chat logs from the text chat were examined for instances of negotiations. From there, frequencies of negotiations were tallied for each dyad during each modality of interaction. Table 5.4 presents the descriptive statistics for raw frequency of negotiations that occurred in both voice- and text-based SCMC. These findings reveal that, on average, there were more than twice as many negotiations articulated in the voice chat than in the text chat. That is, interactions in the oral modality produced higher instances of negotiations (*Mdn*= 5.0), whereas the text chat generated a lower number of negotiations (*Mdn*= 2.0). More specifically, negotiations always occurred in all the dyads' oral interactions, but for the written synchronous modality, it was missing in four dyads' interactions (see Appendix P).

Table 5.3

Descriptive statistics for frequency of negotiations (raw and standardized per 100 words) (n=20)

	Voice chat			Text chat		
	Mdn	*Min*	*Max*	*Mdn*	*Min*	*Max*
Raw frequency of negotiations	5.0	1	13	2.0	0	6
Negotiations per 100 words	1.0	0.31	1.7	0.74	0.0	2.18

Table 5.4 also presents the frequency of negotiations per 100 words, revealing that the rate of negotiation episodes per 100 words in voice chat was slightly higher than that of the text chat. However, the findings from the Wilcoxon signed-rank test revealed that there was no statistical significance between the oral and written modalities in generating negotiation episodes (voice chat *Mdn*= 1.0, text chat *Mdn*= 0.74, *Z*= - 1.23, p=0.22, *r*=0.2).

In summary, the first research question asked whether there would be any modality effects on the occurrences of negotiations, and generally speaking, the oral synchronous modality generated more negotiations than the written modality. However, when language production was controlled for, there was no statistical difference between voice and text chat in generating negotiation episodes.

5.5 RQ2: Features of Negotiations across Modalities of SCMC

Even though there are no quantitative differences in negotiations between the oral and written modalities of SCMC, this section aims to consider whether there are any qualitative differences in the features of negotiation. That is, the second research question sought to determine whether there would be any modality effects on the characteristics of negotiations. To address this question, the negotiations that were generated in voice- and text-SCMC were subjected to further analysis and examination, and then compared in terms of: (a) the type of negotiation, (b) the type of interactional feedback provided in response to non-target-like utterances, and (c) the linguistic foci of the negotiation episode. A qualitative descriptive approach was taken to analyse this data, thus only reporting the frequency counts and percentages for the different categories to ascertain any similarities and/or differences across the different interaction modalities.

5.5.1 Type of negotiation

As previously explained, the type of interactional feedback determined the negotiation type, leading to either negotiation for meaning or negotiation for form. Negotiation for meaning was a result of communication breakdowns, and thus, had clarification requests, confirmation or comprehension checks as their indicators. As for negotiations for form, there was no apparent communication breakdown or non-understanding, and had recasts or explicit correction as their indicators.

It is worth noting that, where a recast was triggered by non-understanding, the negotiation episode was coded as negotiation for meaning. For example, in Excerpt 5.1, P35's reply to his partner's non-target-like previous utterance was coded as a comprehension check rather than a recast. This was because it was uttered with a rising intonation, and with a degree of emphasis placed on the sound /b/, suggesting that there was some ambiguity and P35 wanted to confirm his understanding. In the follow-up SR interview, P35 further explained: "*I did not get it properly because I was wondering whether he meant 'pen' or 'bin', so I asked him to confirm, but he didn't clarify it further*".

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Excerpt 5.1
28    P36:  do you have earrrr
29 <T>      bin (.) bin
30 <I>P35:  a Bin?
31 <R>P36:  a be a bin
32          i think its name bin bin


                            (Voice chat 17, P35 & P36)
```

Among the 162 negotiation episodes that were identified in the 17,419-word learner corpus (consisting of voice and text-based online interactions), 112 negotiations were focusing on meaning, as negotiation moves were used to resolve problems in comprehension during the interaction. The other 50 negotiations were focusing on form, as the interactional corrective feedback was provided in response to erroneous utterances. In form negotiations, only one interactional feedback move was consistently found in each negotiation episode, while in meaning negotiations, a number of interactional feedback moves were usually found, ranging from 1-4 moves per episode.

When comparing the negotiation types across the oral and written modalities of SCMC, Table 5.5 shows that in both contexts, there were more negotiations triggered by communication breakdowns (i.e. negotiations for meaning) than negotiations triggered by linguistic inaccuracies (i.e. negotiations for form).

Table 5.4

Negotiation types across the oral and written modalities of SCMC

	Voice chat		Text chat	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Negotiations for meaning	84	73	28	60
Negotiations for form	31	27	19	40
Total	**115**	**100**	**47**	**100**

5.5.2 Type of interactional feedback

Having examined the resulting negotiation types from the different forms of interactional feedback, a qualitative insight of feedback provided in the oral and written SCMC follows.

Upon analysis of the negotiation moves, clarification requests appeared to be the most common feedback type in both modalities (53% in voice chat, 63% in text chat), followed by confirmation checks (47% in voice chat, 34% in text chat). As for comprehension check, only one case of this was found in the text chat (3%).

Regarding other forms of interactional feedback, recasts (i.e. the interlocutors' correct reformulations on all or part of their partners' ill-formed utterances) were found to be the predominant type of feedback used by the learners in response to their peers' erroneous output. Only one incident of explicit correction was found in the voice chat, suggesting that explicit corrections may seem quite irrelevant in learner-learner interactions, particularly in oral and written SCMC.

5.5.3 Linguistic foci of negotiations

The third feature that was investigated was the linguistic foci of negotiation episodes in the oral and written modalities of SCMC. Meaning negotiations were caused by two broad categories of triggers: either global or linguistic. Global triggers referred to problems in discourse and pragmatics, whereas linguistic triggers were divided into: (a) lexical, (b) morphosyntactic and (c) phonological (in voice chat) or spelling/orthography triggers (in text chat). As for form negotiations, they occurred in response to any of the aforementioned linguistic triggers.

Before providing an analysis of this data, it is important to address two key points. First, some negotiations, particularly form negotiations, resulted from more than one type of a trigger. In such cases, each type of a trigger was considered and included in the frequency count. For instance, in Excerpt 5.2, P21's recast to his partner's non-target-like production addressed the missing indefinite article 'a', as well as the misspelling of the word 'clock'. Thus, the trigger in this episode was coded as morphosyntax + spelling, and one point was

added to the frequency for each trigger type.[17] Second, the linguistic focus of form negotiations were apparent (i.e. the linguistic errors targeted by recasts), but this was not the case in meaning negotiations. It was sometimes difficult to conclusively determine the problems that led to communication breakdowns in the incidents of meaning negotiations, and therefore, in such cases, the surrounding context and the learners' reports in the follow-up SR sessions were taken into account.

Excerpt 5.2

11 <T> [16:46:08] P22: and cloak

12 <I> [16:46:20] P21: there is a clock

13   [16:46:49] P21: do you have a trophy cup in yours ?

                                             (Text chat 11, P21 & P22)

Table 5.6 presents the frequencies and percentages of linguistic foci of negotiations across the two different modalities of interaction. These findings suggest that, different types of triggers initiated the negotiations in both voice and text chats, with lexical items triggering the majority of negotiations in both conditions (46% in voice chat, 36% in text chat). Moreover, global and morphosyntactic triggers equally led to negotiated interaction in voice chat (19%), while phonological triggers caused the least negotiations in this modality (16%). In text chat, spelling and morphosyntactic errors triggered some negotiations (31%, 22%-respectively), mainly form negotiations. Furthermore, global triggers were infrequent within text chat, leading only to a few incidents of negotiations (11%). What follows is a breakdown of the various types of triggers that provoked each type of negotiations (i.e. either meaning or form negotiation).

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[17] This would illustrate the frequencies of foci of negotiations provided in Table 5.6.

Table 5.5

Linguistic foci of negotiations across the oral and written modalities of SCMC

	Voice chat		Text chat	
	Frequency	Percentage	Frequency	Percentage
Global	23	19	6	11
Lexis	56	46	20	36
Morphosyntax	23	19	12	22
Phonology/Spelling	19	16	17	31
Total	**121**	**100**	**55**	**100**

The distribution patterns for the different types of triggers initiating meaning negotiations are shown in parallel (Figure 5.1). Similar results were found for both modalities of SCMC, in relation to the ranking of the four types of triggers: the greatest number of meaning negotiations was produced for lexical issues (58% in voice chat, 60% in text chat), followed by global triggers (25.8% in voice chat, 20% in text chat), then phonological and spelling/orthography triggers (10.11% in voice, 16.7% in text), and lastly, errors in morphosyntax were the least in triggering meaning negotiations, with only five incidents in voice chat and only one incident in text chat (equating to 5.6% and 3.3% respectively). Based on these results, one can argue that there was a close similar proportion of lexical communication breakdowns in the two modalities of SCMC.
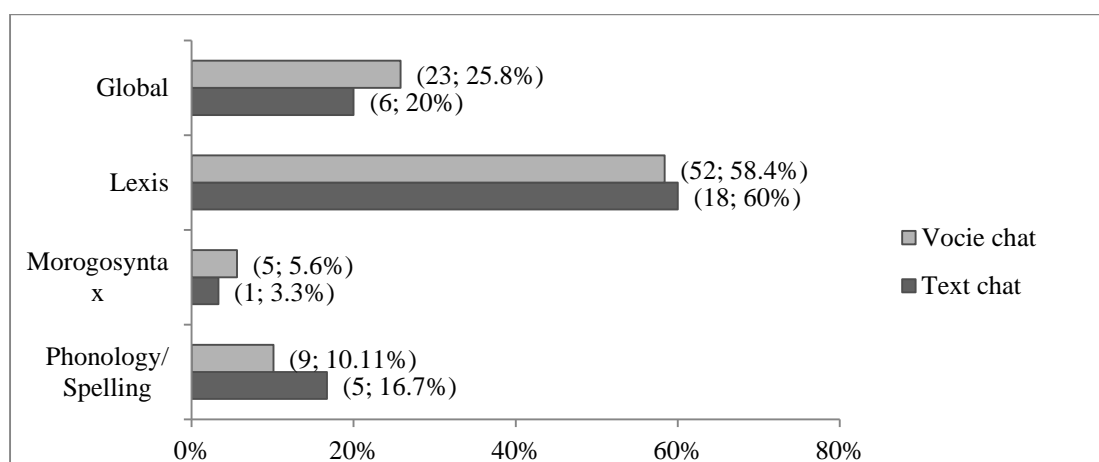
Figure 5.1. Linguistic foci of meaning negotiations across voice and text chat

Considering form negotiations, Figure 5.2 suggests that they were mostly triggered by morphosyntactic errors in the context of voice chat (56%), followed by phonological errors (31%). In text chat, morphosynatctic and spelling/orthography triggers were relatively equal in triggering form negotiations (44% and 48%, respectively). With regard to lexical triggers, the data shows that this initiated very few form negotiations in the two conditions (13% in voice chat, 8% in text chat).
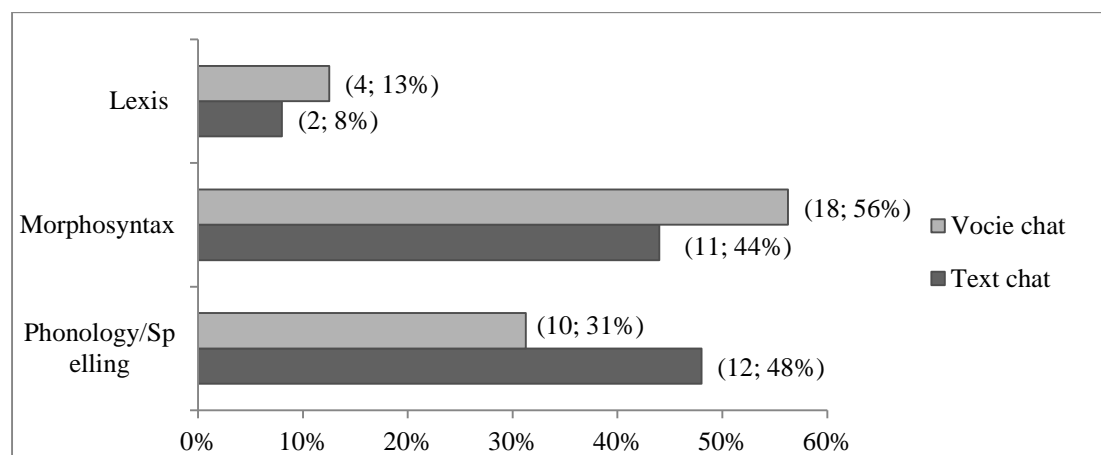
Figure 5.2. Linguistic foci of form negotiations across voice and text chat

5.5.4 Summary of the findings

Following the examination for the occurrences of negotiations to address RQ1, analyses examining the qualitative features of negotiations were subsequently conducted. In turn, the following findings were revealed:

- With regards to the type of negotiations, both the oral and written modalities of SCMC generated more meaning negotiations than form negotiations.

- When the different types of interactional feedback were examined, there was no apparent difference in their distribution across the different modalities. In meaning negotiations, clarification requests appeared to be the most common type of feedback, followed by confirmation checks, whereas in form negotiations, recasts were the only type of feedback used in response to linguistically erroneous productions, with the exception of one incident of explicit correction in the voice chat.

- The examination of the linguistic foci of negotiations revealed that the frequency of the different types of triggers was largely similar across the two modalities. That is, lexical and global triggers initiated the majority of meaning negotiations, while errors in morphosyntax and phonology/spelling led to most of the form negotiations.

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5.6 RQ3: Frequency of Noticing across Modalities of SCMC

Having examined the frequency and features of negotiations generated by dyads when performing task-based interactions in oral and written SCMC, this section seeks to consider the cognitive process of noticing of each learner during task performance in each modality of interaction. The third research question aimed to investigate how the oral and written SCMC would help EFL learners notice their problematic linguistic productions, either independently while forming and structuring their sentences, or after receiving negative feedback from their interlocutors. To answer this research question, incidents of noticing both self-initiated and following interactional feedback were quantitatively examined, and subsequently compared between the different modalities of SCMC. In addition, qualitative insights from the learners' reports in the SR and debriefing interviews were also taken into account, in order to obtain a more holistic view of the learners' noticing in voice and text chat.

5.6.1 Self-repairs

The noticing of one's own errors was measured by the number of self-repairs the learner made after noticing errors in his/her productions. Self-repairs (or self-corrections) were operationalized as episodes, in which learners independently corrected their own productions, without being prompted to do so by their interlocutors. The incidents of self-repairs were apparent in the transcripts of voice chat discourse, but in the case of text chat, they were examined using the video-enhanced chat transcripts that captured moment-by-moment reality of text-based interactions. Most of the self-repairs in text chat were covert (i.e. revealed only when the Snagit video files were examined), while very few were overt (i.e. present in the chat logs) - these represented the learners' immediate, subsequent changes to the text that was just typed. As previously mentioned, only error self-repairs were considered in this analysis.

5.6.1.1 Quantitative analysis

Descriptive statistics were first presented to provide a thorough overview for the occurrences of error self-repairs in the different online synchronous modalities. Inferential statistics were then carried out on the standardized scores of self-repairs, in order to determine the effect of interaction modality on learners' noticing.

Table 5.7 shows the descriptive statistics for frequency of self-repairs that occurred in voice- and text-based SCMC. On average, there were double the amount of self-repairs in text chat than in voice chat, and despite the fact that the learners produced more turns and words in voice chat than in text chat, the instances of their self-repair were more abundant and evident in the written modality.

Table 5.6

Descriptive statistics for frequency of self-repairs (raw and standardized per 100 words) (n=40)

	Voice chat			Text chat		
	Mdn	*Min*	*Max*	*Mdn*	*Min*	*Max*
Raw frequency of self-repairs	1.0	0.0	8	2.0	0.0	10
Self-repairs per 100 words	0.48	0.0	1.6	1.5	0.0	5.9

After controlling for language production, the results revealed that there was a statistical difference in the two modalities of interaction for the occurrence of self-repairs per 100 words (voice chat Mdn=0.48, Text chat Mdn = 1.5, Z= -4.179, p< 0.01), with a medium effect size (r=0.5). In conjunction with the descriptive statistics, statistical analysis showed that text chat was significantly more facilitative for self-repairs than voice chat.

5.6.1.2 Qualitative insights

The learners' responses in the debriefing interviews highlighted an important issue with regards to self-repair. Some of the learners revealed that they noticed their own errors, but because of the oral or written nature of their interaction, they did not feel it was necessary to correct them. This was reflected in the following comment voiced by one of the learners,

> *I normally corrected my errors when text chatting. In voice, I noticed my errors, but I could not repeat my sentences afterwards.* (P23)

Thus, this learner considered it unnecessary to repeat himself after he said something. In contrast however, one learner believed that the written and permanent nature of her messages in text chat would help her partner understand her, and hence, she did not attempt to correct her written productions.

> *I did not edit or correct my writing. I tended to correct my sentences in voice more than in text because I think, in text, it will be clearer and the interlocutor will get what I meant.* (P15)

5.6.2 Noticing of interactional feedback

There were two measures for the noticing of interactional feedback provided by the interlocutors: (a) performance measure (i.e. modified output/uptake) and (b) introspective measure (i.e. the SR comments). Analysis of the transcripts and chat logs provided apparent indications of the learners' reactions to feedback, whilst their introspective reports during the SR interviews on 149 negotiation episodes[18] were the primary data set for learners' noticing of feedback in both the oral and written SCMC.

In relation to the term, *noticing of interactional feedback*, this is meant as learners' noticing of negative feedback provided in response to their erroneous productions. Negative feedback refers to the provision of error correction or negative information, both orally and in writing (Sotillo, 2010; Sicola, 2010). This can be done either indirectly through the use of recasts, clarification requests, confirmation check and comprehension checks, or directly via metalinguistic explanations, definitions of terms for clarifying lexical confusion, or by supplying explicit information concerning vocabulary or morphosyntax. Subsequently, this analysis also excluded any performance data and introspective comments that were found in cases where feedback was provided to linguistically correct productions (see Footnote 19). Excerpts 5.3 and 5.4 provide examples of such cases, one from voice chat and the other from text chat. In both cases, the feedback move resulted from the listeners' unfamiliarity with the

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[18] In total, there were 162 negotiation episodes: 115 of these episodes in the learners' dyadic interactions of voice chat and 47 episodes in their interactions of text chat. In the SR interviews, I covered most of the negotiation episodes, with the exception of three episodes in voice chat and one episode in text chat, resulting in 158 episodes altogether (162-4= 158). Following this, any meaning negotiation episodes, where feedback was provided to accurate productions, were also excluded, which were nine episodes in total (six in voice chat and three in text chat), resulting in the final number of episodes to be 149 (158-9= 149).

content words provided by their partners. As the preceding output (i.e. the trigger move) did not contain any linguistic errors, it was irrelevant to include them in this analysis.

```
┌─────────────────────────────────────────────────────────────────────┐
│  Excerpt 5.3                                                          │
│                                                                       │
│  95<T> P5:   no i have a dartboard                                    │
│  96<I> P6:   what?                                                    │
│  97<R> P5:   you know dart                                            │
│  98          the game                                                 │
│  99          usually for boys                                         │
│  100   P6:   earrrrm                                                  │
│  101   P5:   the game where you have arrow and you throw it           │
│  102         and you get a score                                      │
│                                                                       │
│                                            (Voice chat 3, P5 & P6)    │
└─────────────────────────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────────────────────────┐
│  Excerpt 5.4                                                          │
│                                                                       │
│  [17:48:57] <T>   P11: how many toys do you have in the middle        │
│  [17:49:17]       P11: ?                                              │
│  [17:49:20] <I>   P12: what does toys means ?                         │
│  [17:50:02] <R>   P11: it is for children                             │
│  [17:50:14]       P11: children usually like to have one              │
│  [17:50:37] <RR>  P12: I don't have                                   │
│                                            (Text chat 6, P11 & P12)   │
└─────────────────────────────────────────────────────────────────────┘
```

5.6.2.1 Performance measure: Modified output/uptake

Each interactional feedback (i.e. indicator) was inspected to determine whether it was followed by modified output. In the case of meaning negotiations, responses to negotiation moves were examined to see whether learners modified their output or not. Following Pica et al. (1989), output modification could be semantic (e.g. providing synonyms and/or examples and paraphrasing), morphological (through addition, substation, or deletion of inflectional morphemes and/or functors), phonological, or syntactic (through embedding and elaboration clauses).

In the case of form negotiations, the move following corrective feedback was examined. In regard to instances where use/integration of the feedback was successful (incorporating at least one of the corrections in case there are many), the response was coded as a successful uptake (i.e. repair). However, if the learner's use of the target feature was still incorrect, his/her response was coded as a non-successful uptake. Following Smith (2005) and Rouhshad et al. (2016), the analysis allowed for delayed successful uptake in both conditions, up to seven turns following the corrective feedback.

Table 5.8 provides illustrations on the extent to which learners modified their output when given opportunities to do so after receiving feedback. It shows the frequency of interactional feedback (either negotiation moves or recasts), which could be followed by modified output, the number of identified modified output, and also successful uptake in the two modalities of SCMC. It should be noted that opportunities to respond to the feedback were also considered. In cases where there was no opportunity to respond to the feedback (as the interlocutor provided feedback and then continued speaking), the feedback indicator was not included in the frequency count.

Table 5.7

Frequency of modified output and successful uptake across voice and text chat

	Voice chat		Text chat	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Negotiation moves	**76**	**100**	**24**	**100**
Output modification	36	47	7	29
Successful uptake	25	33	4	17
Recasts	**28***	**100**	**19**	**100**
Output modification/uptake	6	21	2	10.5
Successful uptake	4	14	2	10.5

Note. Two cases of corrective feedback in voice chat where excluded as there was no opportunity for learners to use the feedback provided.

The data from Table 5.8 reveals that only 47% of negotiation moves were followed by modified output in voice chat. In the same modality, far fewer instances of modified output occurred after receiving recasts (n=6, 21%), among which, only four were successful uptake. In text chat, 29% of negotiation moves were followed by modified output, while only 10.5% of the recasts led to modified output, which were also successful uptake.

Following negotiation moves, learners were sometimes found to modify their previous problematic utterances by reformulating, whereby they provided examples or elaborated upon them, and in doing so, they occasionally corrected any non-target-like forms in their previous productions. Excerpt 5.5 shows the more common instances that occurred, where the negotiation move resulted in the participant providing an explanation without actually changing the linguistic errors. In this example, P25 responded to his interlocutor's (P26) clarification request, by explaining the word 'statue'; however, he neither corrected the wrong lexical choice of 'statute', nor included the missing indefinite article 'a'. In addition, Excerpt 5.6 shows the rare case where the negotiation move (i.e. clarification request in this example) resulted in a successful correction of the morphosyntactic error (i.e. the change of statue to statues). Interestingly, 33% of the responses following negotiation moves in voice chat included successful linguistic modifications, while only 17% included successful modifications in text chat.

Excerpt 5.5

```
84    P25:   ok
85           like vase?
86 <T>       like statute?
87 <I>P26:   <<p> statute>
88           what is it a statute?
89 <R>P25:   something sold put it in the house in the street
90           and people watch this
91           earrr this called statute
92    P26:   where?
93           where the left or-
94    P25:   no in the corner i talk in the corner
95    P26:   the corner
96           the corner i have fish
97           three fish                        (Voice chat 13, P25 & P26)
```

```
Excerpt 5.6
131  P31:    ok
132<T>      and how many statue do you have in
133         in earrrrr top of the bed
134<I>P32:  what?
135<R>P31:  how many STATUES do you have in your
136         in top of your bed
137  P32:   (counting)


                                    (Voice chat 16, P31 & P32)
```

While the results show a relatively small amount of uptake following the interactional feedback, they also reveal that learners took more advantage of the feedback provided in voice chat than that in text chat. Not only were instances of modified output higher in voice than in text chat (40% in comparison to 21%), but they were also more likely to result in a greater degree of successful uptake (28% in comparison to 14%).[19] However, one important point that should be noted here is that the presence and absence of uptake does not necessarily mean that the learners did or did not notice the feedback and learn from it (Bao et al., 2011); a comparison between the performance data and introspective data shall provide further clarification of this point.

5.6.2.2 Introspective measure: SR comments

Learners' introspective comments in the SR sessions were examined and analyzed quantitatively (statistical compilation of incidents of noticing). The comments were coded as evidence of noticing [+N] when learners indicated that: (a) they were aware of the fact that they received a target-like model of the linguistic form, and/or whether their production of the form was problematic (Bao et al., 2011; Egi, 2007b); (b) the form was new to them (Mackey, 2006) and (c) the feedback led to revisions of their hypotheses about the target form (Izumi, 2003). If the participants stated that they could not recall any particular thoughts

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[19] It should be noted that these percentages are a total percentage from all those that have been presented in Table 5.8.

during the episode, or if their recall was mainly about the content of the picture, then those instances were taken as no reported noticing [-N]. In addition, prior to conducting the SR interviews, although learners were asked not to report anything if they did not actually reflect on it at the time of the interaction, in cases where their recalls showed noticing of some difference between their preceding messages and their partners' feedback, they were asked again if they noticed the difference 'during the chat' or 'right now' (Gass & Mackey, 2017; Smith, 2012). In three cases, learners reported that their noticing of the problematic issues in their productions occurred to them during the SR interview and not during their online interactions, and hence, these cases were also coded as no reported noticing [-N].

It should be noted here that the negotiation episodes were shown to the two learners involved in the dyadic interaction. However, only comments of those receiving interactional feedback were considered in this analysis. Additionally, more than one noticing opportunity was often involved in the negotiation episode, because the feedback could have addressed more than one problematic linguistic issue. If the learners' comments showed attention to only one or all the problematic issues, they were coded as one incident of noticing [+N].

Descriptive statistics were first calculated to obtain a thorough representation of the learners' noticing in the different online synchronous modalities. Following this, inferential statistics were carried out on the ratio percentage scores of noticing of feedback for each learner. This was done to determine the effect of interaction modality on learners' noticing.

Table 5.9 shows the percentage of noticing [+N] and no noticing [-N] incidents occurring in each modality of online interaction. Examination of learners' introspective reports revealed that 52% (55 incidents out of 106) of the negative feedback provided in voice chat was noticed, and 37% (16 incidents out of 43) of feedback in text chat was noticed. More notably, the voice chat facilitated a higher percentage of noticing than the text chat did; however, when each learner's scores of noticing were observed across the two modalities, the results of the non-parametric test revealed that there was no statistical significance (voice chat *Mdn*= 50.0, text chat *Mdn*=33.3, *Z*= -1.505, p= 0.132, *r*= .22). It should also be noted that this statistical analysis was carried out only on the data of 22 participants (out of 40). The reason for this was because this was the number of participants

with valid values for comparison. In cases where the participant did not receive feedback in the two modalities, or received feedback in one but not the other, then their noticing data were counted as missing.

Table 5.8

Incidents of noticing and no noticing of interactional feedback

	Voice chat		Text chat	
	Frequency	**Percentage**	**Frequency**	**Percentage**
[+N]	55	52	16	37
[-N]	51	48	27	63
Total SR reports	**106**	**100**	**43**	**100**

In summary, the statistical comparison did not yield significant differences between the oral and written modalities of SCMC, and since the comparison was only based on 22 of the participants' data, the statistical analysis may not carry much weight. Descriptive noticing frequencies and percentages however, provided evidence that the oral and written modalities of SCMC do help learners notice and process specific language forms.

5.6.2.3 Qualitative insights

This study utilized both a performance measure (i.e. modified output/uptake) and introspective measure (i.e. stimulated recall data) to examine the learners' noticing of negative feedback provided in response to their erroneous productions. This is contrary to many descriptive and experimental SLA studies that seek to investigate the effect of SCMC interaction on learners' noticing of corrective feedback, as they have relied solely on the performance measure (i.e. uptake or repair) (e.g. Iwasaki & Oliver, 2003; Loewen & Erlam, 2006). Nevertheless, it was deemed relevant to examine consistency or discrepancy of the learners' introspective reports in comparison with their provision of uptake. To do this, the introspective and performance data were examined in comparison to each other, in order to see whether learners who produced the modified output/uptake following interactional feedback also reported noticing errors in their productions via SR, and vice-versa. Moreover, qualitative insights were drawn from this comparison, and also from some of the learners'

answers in the debriefing interviews, which subsequently revealed two major issues: (a) verification of noticing and (b) lack of self-reporting.

5.6.2.3.1 Verification of noticing

The comparison between performance and introspective data revealed that the introspective data provided more instances of noticing and clearer information of how the learners processed and made use of the feedback that they received from their partners. Overall, the rate of noticing in text chat was only 56% when measured by uptake (9 incidents of uptake in comparison to 16 [+N][20]), whereas, the rate of noticing measured by uptake in voice chat was even smaller (53% - 29 incidents of uptake in comparison to 55 [+N]). This suggests that only around half the proportion of noticing was represented by uptake in the online synchronous modalities of interaction. The following excerpts provide examples of where it was only through the introspective reports that verify learners' noticing.

In Excerpt 5.7, P12 mispronounced the word 'bed' (line 17), which is corrected with a recast (line 18), and recognized the correction, as evidenced through his reports in the SR interview. Though the recast served the purpose of drawing his attention to an error, he made no overt change in his language (i.e. he had no uptake). The recall comment, however, indicated and verified his noticing of the error in his production.

Excerpt 5.7

```
16     P12:  ok so (4.0)
17<T>        do you have two bads?
18<I> P11:  two beds -
19<R> P12:  in the (.)yeah one of them is in the grounds-
20           one in the up-
```
                                        (Voice chat 5, P11 & P12)

P12's recall: *There were some errors. I have a problem with pronunciation. Bed and bad.. I was also unsure about the word 'up' as I felt it was incorrect.*

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[20] Noticing incidents reported by SR data.

In the following excerpt (Excerpt 5.8), P28's mispronunciation of the word 'cupboard' triggered a number of negotiation moves (lines 49, 51, 53). In response to these moves, P28 did not make any changes or corrections to his language. In turn, his follow-up comment in the SR interview is constituted an evidence of noticing, as his partner's feedback moves led him to question and revise his hypotheses of the correct pronunciation of the word.

Excerpt 5.8

```
46      P27: annnd (2.3)
47           can you see two beds on the right
48<T>   P28: yeah one near keyboard-
49<I>   P27: one near what?
50<R>   P28: one near keyboard-
51<I2>  P27: keyboard?
52<R2>  P28: yeah
53<I3>  P27: what do you mean of keyboard?
54<R3>  P28: keyboard earrrr
55           earrmmm (2.1)
56           keyboard orrr
57           yeah yeah keyboard
58      PPP: (2.5)
59<RR>  P27: yeah i can't see a keyboard in the picture
```
                                              (Voice chat 14, P27 & P28)

P28's recall: *I wanted to describe the cupboard* (saying the word in Arabic and referring to it in the picture). *I thought the pronunciation was not correct, and that is why he could not get me. I wanted to find any other alternative word, but I could not.*

Excerpt 5.9 provides an example from the written chat mode on how noticing does not necessarily lead to uptake. In this example, P31's recast of his partner's misspelling of the word 'bin' was only followed by an acknowledgement, revealing no information as to whether P32 attended to the mismatch between his spelling and that of his interlocutor. It was only through his introspective comments that this information was provided.

Excerpt 5.9

[17:06:47] <T> P32: do have pen ander the kabet

[17:07:02]   P31: do you have books near of the top bed ?

[17:07:16]   P32: yes

[17:07:28] <I> P31: yes white bin #

[17:07:36] <R> P32: yes

(Text chat 16, P31 & P32)

P32's recall: *I am not really good in spelling. I did not know how to spell many words. For example, the word 'bin' here. I saw his spelling and it was different.*

Comparing the rate of incidents for noticing by the performance measure and by the introspective measure, one can argue that learner uptake cannot provide a full picture of the effect of SCMC on the cognitive process of noticing. As evidenced in the previous examples, noticing did not always lead to uptake in both modalities of interaction. In turn, the learners' introspective verbal reports may have helped to provide better and verified accounts of learners' noticing and use of interactional feedback during synchronous online oral and written interactions.

5.6.2.3.2 Lack of self-reporting

In addition to the previous finding in which the rate of noticing was higher when it was measured by introspective comments than by uptake in both modalities, the comparison revealed another crucial issue. For thirteen incidents of uptake in voice chat, the participants did not report noticing during the SR sessions. That is, the learners modified their erroneous productions in response to interactional feedback during their task-based interactions; however, they did not report why they did this in their introspective comments. Excerpts 5.10 and 5.11 provide examples from the participants of dyad two. In Excerpt 5.10, P4 was provided with correction about syntax (i.e. provision of the indefinite article '*a*'). P4 utilized the correction in her following question, but, as illustrated in her SR, the corrective feedback was not perceived (i.e. her comment was only concerned with the content of the discussion).

Similarly, in Excerpt 5.11, P3 had an uptake for her previous error in morphology, but she failed to report this in her introspective comment.

Excerpt 5.10

```
70      P4:  ok earmmm
71<T>        and also there is like maybe small big (.) bag-
72<I>   P3:  <<p> a small bag>-
73<R>   P4:  do you have a small bag?
74<RR>  P3:  no i don't have.
```
                                              (Voice chat 2, P3 & P4)

P4's recall: *I asked her about this bag (referring to it in the picture), and it appeared that she did not have it.*

Excerpt 5.11

```
78<T>   P3:  can you see a butterflies on the floor?
79      PPP: (2.9)
80<I>   P4:  butterflies?
81<R>   P3:  i think it is a butterfly hehehe i am not sure
82<RR>  P4:  aah yes there is like pieces on the floor
83      P3:  yeah yeah
```
                                              (Voice chat 2, P3 & P4)

P3's recall: *It was not clear heheh, but when she said 'pieces on the floor', I knew she got me.*

As these examples show, uptake did occur, but SR reports did not provide any corresponding evidence of the learners' internal process of noticing. This lack of self-reporting could have different interpretations. First, the learner's uptake might be a repetition, simply mimicking the interlocutor's utterance without much attention and comprehension invested in the act (as probably the case in Excerpt 5.10). As a result, the learner failed to provide an account for the corrective changes made in his/her output. Second, the learner might have noticed and corrected errors in his/her production, but failed to express that in the SR. As argued by some researchers, the lack of self-reporting should not be interpreted as a lack of awareness, as some thought processes are difficult to verbalize (e.g. Jourdenais, 2001;

Schmidt, 2001; Uggen, 2012). Thus, the lack of evidence of noticing in the SR does not necessarily imply absence of noticing, as this measure does have its limitations (Uggen, 2012).

5.6.3 Summary of the findings

Incidents of self-repair and noticing of interactional feedback were quantitatively examined to ascertain whether the different synchronous modalities of interaction had an impact on the learners' noticing. This examination suggested the following:

- The synchronous modality appeared to exert an influence in promoting noticing of own errors. More specifically, text chat generated significantly more instances of self-repairs than voice chat.

- In terms of noticing of the interactional feedback, the statistical analysis of the noticing incidents revealed that, regardless of the modality of interaction, neither of them impacted upon the learners' noticing of errors in their productions after receiving feedback. It should be noted, however, that differences were observed between the two modalities in the production of uptake after negative feedback. This analysis implied that the oral modality of SCMC may be more facilitative for L2 learners to modify output and successfully repair their erroneous productions following feedback.

- Despite these quantitative findings, the learners' comments in the interviews raised two important methodological issues. First, although self-repairs are useful in mirroring learners' noticing and reflections on errors in the use of their L2, they do not constantly provide the whole picture. In other words, the absence of self-repair does not mean that the learner has not attended to errors in his/her productions. Both the oral and/or written interactions may have influenced the occurrence of self-repairs, and therefore, depending on this measure of the learners' self-initiated noticing, it may pose as a limitation to the quantitative findings. Second, learner's uptake during SCMC may not be a reliable measure to examine whether they have noticed a linguistic form. That is, noticing does not necessarily lead to uptake, and the provision of uptake does not necessarily account for the learner's cognitive processing of feedback moves.

5.7 RQ4: Quality of Noticing across Modalities of SCMC

One of the primary aims of this study was to compare the relative merits of the different modalities of interaction in terms of learners' cognitive processing. Hence, it was decided that a qualitative approach to the data should be adopted, and not to solely rely upon the rigorous quantitative statistical findings. To obtain a more holistic view of learners' noticing in voice and text chat, the qualitative analyses first addressed the features of learners' self-repairs, focusing specifically on which linguistic categories the learners monitored and paid attention to during their interactions within the different modalities. Following this, noticing incidents [+N] of interactional feedback were examined with regards to the type of linguistic errors and type of feedback, whilst also examining the quality of the learners' noticing and engagement with the feedback. Incidents of reported noticing [+N] were closely examined to identify the type of noticing in which the participants engaged. In other words, learners' reports of noticing were closely examined to look at the extent at which they were able to correlate their partners' feedback with errors in their L2 utterances. The noticing incidents [+N] were then investigated for recurring themes characterizing the participants' cognitive engagement with the interactional feedback in online chatting. As [-N] incidents represented only learners' summative comments on their interactions, as opposed to their thoughts of the interactional feedback or the language use, they were excluded from this analysis.

5.7.1 Self-repairs

Self-repairs were further coded in accordance to their linguistic categories: lexis, morphosyntax and phonology (in voice chat), or spelling/orthography (in text chat). Table 5.10 provides all the instances of self-repair in relation to their linguistic categories. Results showed that, in voice chat, the learners engaged in more self-repairs of morphosyntcatic aspects of their own output (63%) than lexical and phonological aspects (21% and 16%, respectively). As for text chat, the majority of the self-repairs were for spelling/orthography errors, with 64% of all cases. In addition, self-repair of morphosyntactic items were also frequent, resulting in 33 incidents (31%), while self-repairs of lexical items were very rare, resulting only in 5 incidents (5%).

Table 5.9

Frequency of the types of error self-repairs across voice and text chat

	Voice chat		Text chat	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Lexical repairs	14	21	5	5
Morphosyntactic repairs	43	63	33	31
Phonological/spelling repairs	11	16	69	64
Total	**68**	**100**	**107**	**100**

These findings revealed that the learners' attention was mostly focused on spelling and orthography during text chatting. The increased attention could partially be due to the learners' unfamiliarity with typing in English, particularly typing on a computer keyboard with the English keyboard layout, as they are more accustomed to the Arabic keyboard layout. This was revealed by some of the learners, who admitted that their inadequate keyboard knowledge and skills were problematic, and consequently, they spent more time and made corrective moves to produce more accurate writing. For example, in the SR interview, P11 commented that, at the beginning of their written interaction, he did not know where the apostrophe key was on the keyboard, but later he recognized it. A further examination of the video recording of his written interaction revealed cases where he wanted to use the contraction form of certain words, but instead, he deleted them and subsequently produced the complete forms (see Figure 3).

Line	Final chat log	Video-enhanced chat log	Explanation
22	[17:42:00] P11: no i do not	no i do~~nt~~ not	Types 'dont' and immediately deletes 'nt' and then types 'not'.

Figure 5.3. Example of spelling/orthography self-repair resulting from inadequate keyboard knowledge

5.7.2 Noticing of interactional feedback

5.7.2.1 Noticing in terms of trigger and feedback types

A breakdown of noticing incidents in accordance to trigger and feedback types can be found in Appendix Q. Noticing incidents were inspected in terms of the linguistic category addressed by interactional feedback. This was done to ascertain if any of the linguistic features were noticed more than others, and whether the modality of interaction plays a role in enhancing certain linguistic features over others. As seen in Table 5.9, the participants reported noticing a total of 55 (out of 106) interactional feedback in voice chat. Of these, the lexical items accounted for the considerable majority of learners' noticing, with 34 out of 43 incidents (79%). In addition, phonological features were also attended to most of the time (15 out of 23, 65%), followed by a much smaller frequency of noticing grammar-oriented features (6 out of 40, 15%).

A similar pattern of frequency was obtained in the text chat, wherein sixteen feedback moves out of 43 incidents of feedback were attended to, with participants reporting noticing for most of the lexical forms (8 out of 10, 80%) and for some of the spelling features (7 out of 19, 37%). Only one grammatical feature was noticed in the text chat (out of 14, 7%). These counts indicate that the type of SCMC does not seem to enhance the salience of some linguistic features over another type, because, in both modalities, the learners focused primarily on lexical issues, with little attention paid to grammatical issues.

Noticing was also examined according to the type of feedback used, to examine the relative effects of negotiation moves (i.e. clarification requests and confirmation checks) and recasts[21] that were provided in the oral and written modalities of interaction. This examination revealed that participants in both SCMC environments noticed more instances of negotiation moves than recasts. In the voice chat interactions, 64% of total instances for negotiation moves were noticed by participants in the SR protocols, whereas only 24% of the total instances for recasts were noticed. Similarly, instances of negotiation moves were noticed more in the text chat interactions than recasts, with 52% and 17% respectively. This qualitative examination suggests that, regardless of the interaction modality, negotiation

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[21] Since there was only one incident of explicit correction, it was included in the count of recasts.

moves may encourage learners to be more careful and that they should attend to form. This substantiates previous research findings that reveal the potential benefits of negotiation moves in enhancing the learners' attention to new knowledge or gaps in their L2 productions (e.g. Fujii & Mackey, 2009; Lyster, 1998; Lyster & Ranta, 1997; Samani & Noordin, 2013). Recasts, on the other hand, may not encourage learners to actively engage in the process of noticing, particularly in the written form of interaction. That is, among the 18 incidents of recasts provided in the text chat, six were provided in a non-contingent fashion, and among these, only one incident was noticed. This also could suggest that non-contingency of recasts may have limited their usefulness and potential to draw attention.

5.7.2.2 Quality of learners' engagement

Current studies on noticing in SCMC contexts have revealed little focus on the quality of learners' noticing, and an in-depth investigation of learners' noticing has not been conducted thus far. Given the theoretical framework of Schmidt's (1990) noticing hypothesis and the several theoretical discussions about different levels of attention (Tomlin &Villa, 1994; Leow, 1997; Storch, 2008), this study attempted to assess the quality of learners' engagement with corrective feedback in the different modalities of SCMC. The analysis distinguished between two levels of noticing: (a) simple noticing, whereby learners simply reported or repeated the noticed linguistic form, and (b) elaborate noticing, where learners deliberated over the language forms and provided explanations of the changes, as well as reasons for accepting the corrected forms or discussion of alternative forms.

Table 5.11 shows the level of learners' engagement with negative feedback that was made during online chatting. As the table shows, 67% (37 out of 55) of all the noticing that took place in the oral modality involved an elaborate level of engagement with the provided feedback. A close proportion of elaborate noticing (56%) was also found in the written interactions. Although the voice chat enhanced more incidents of noticing, a rough comparison between the percentages of simple and elaborate noticing does not reveal distinct differences between the potential of oral and written modalities in enhancing the quality of learners' noticing and engagement with interactional feedback.

Table 5.10

Frequency of the types of learners' noticing of feedback in voice and text chat

	Voice chat		Text chat	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Simple	18	33	7	44
Elaborate	37	67	9	56
Total	**55**	**100**	**16**	**100**

These findings are perhaps best explained when we consider which linguistic items elicited the different levels of noticing and whether the modality of interaction modulates the relationship between the linguistic item and the different levels of engagement. Lexical issues tended to elicit more elaborate engagements in the two modalities (22 out of 34 cases in voice chat, and 5 out of 8 cases in text chat). Moreover, phonological issues mostly elicited elaborate noticing and reflections (13 out of 15 cases), but no difference was deduced from the comparison between simple and elaborate noticing of spelling items in text chat (4 simple and 3 elaborate). Furthermore, noticing of morphosyntactic issues in voice chat were more of a simple level (4 cases) in comparison to high level (2 cases), while no comparison could be made in the text chat, as there was only one incident of noticing of a grammatical feature.

5.7.2.3 Characteristics of learners' noticing of feedback in SCMC

All the identified noticing incidents [+N] were further analyzed along with the negotiation episodes through thematic analysis. The coding procedure was conducted according to the steps identified by Braun and Clarke (2006), and four major themes emerged from the analysis of noticing incidents: (a) noticing of gaps in their L2 knowledge, (b) reflecting on linguistic choices, (c) testing hypothesis, and (d) priority of some linguistic forms.

(a) Noticing of gaps in their L2 knowledge

The SR data revealed how interactional feedback helped learners to not only detect the differences between their erroneous productions and their partners' target-like forms, but also triggered their attention to problematic aspects in their L2 knowledge.

In Excerpt 5.12, the feedback move provided the target-like pronunciation for the word '*heart*'. P14 correspondingly modifies her ill-formed production and explicitly reveals her noticing in the SR comment. In the next excerpt (Excerpt 5.13), the feedback moves do not include any corrections; nevertheless, they help P4 to recognize the gap in her L2 knowledge, which she admitted need checking later.

Excerpt 5.12

```
130<T> P14: ok what about that hurt in the
131          we have some hurts TWO HURT
132    P13: where is it?
133    P14: aah behind that behind the bed-
134<I> P13: you mean hearts?
135<R> P14: yeah heart
136<I2>P13: in the cupboard?
137<R2>P14: yeah hehehe
```
                                               (Voice chat 7, P13 & P14)

P14's recall: aah *two hearts I meant hehhee. I wanted to ask about the hearts, but I pronounced it wrong. She got me. She corrected me.*

Excerpt 5.13

```
48<T>  P4:  and there is a hell under the bed
49<I>  P3:  what?
50<T2> P4:  a HELL
51<I2> P3:  i am not sure i can understand you-
52<R>  P4:  the spelling of hell h e e l  sorry-
53<RR> P3:  aah
54          no i don't have that
```
                                               (Voice chat 2, P3 & P4)

P4's recall: *I recognized that I did not pronounce it properly. The best way was then to spell it. I must check this later hehe.*

In relation to this, some of the SR comments pointed to awareness of limitations regarding L2 knowledge, and this, in turn, influenced the learners' noticing and reflecting of subsequent interlocutor's input and feedback. This point was illustrated in the following comments:

> *Because I was not really good in spelling, I was waiting for him to write back and then comparing my spelling to his. I benefitted from his spelling of the words 'clock' and 'chair'.* (P32)

> *At some points, the necessary vocabulary run out of my mind* (he couldn't remember them) *and I wished he could mention them so I can remember them, like when he said carpet, he helped me to remember it.* (P37)

These comments indicate that recognition of linguistic gaps and limitations may prompt learners to seek solutions in their partner's input, and thus, once they appear, learners promptly notice them.

(b) Reflecting on linguistic choices

Some SR comments further revealed how learners engaged in certain reflections on their linguistic choices when receiving interactional feedback. The interaction data revealed little or no information about these cognitive processes, but introspective recalls made it clear how learners engaged in some noticing activities and reflections on their productions. For example, in Excerpt 5.14, P31 did not modify his output or make any changes, and finally resorted to his L1 to solve the communication breakdown. His SR comment however, made it clear that although he made no efforts to change production, he was undergoing some reflections and suspicion about the precision of his pronunciation.

Excerpt 5.14

```
183     P31: no i have white (3.8)
184<T>      do you have a vase (pronounced as vaise)
185         in the left of your bed
186<I>  P32: what
187<R>  P31: VASE (pronounced as vaise)
188<I2> P32: vase? (pronounced as vaise)
189<R2> P31: VASE VASE (pronounced as vaise)
190<I3> P32: earrrmm don't know
191<R3> P31: vase (saying it twice in Arabic)
192<RR> P32: no don't have
```

(Voice chat 16, P31 & P32)

P31's recall: *In American English, it is called 'vase'* (pronounced as 'vaise')*, but I am not sure how it is said in British English. I suspected it might be pronounced differently. I remember one of my teachers pronounced it in this way. The spelling is v a s e* (spelled correctly).

Surprisingly, SR of this type emerged predominantly in the learners' comments on negotiations in their voice-based interactions, but few of them were found in the learners' comments on negotiation episodes in text-based interactions. This finding may challenge previous arguments advocating the greater potential of text-based SCMC against oral interactions in enhancing L2 learners' cognitive processes. That is, text chat is argued to be a more facilitative environment for reflection and analysis due to the slow pace of interactions, thereby allowing more time for such processes and reflections (Ortega, 1997, Warschauer, 1997).

(c) Testing hypothesis

During a number of SR, the learners went beyond noticing the form, and revealed how the feedback prompted them to test hypotheses. The following examples document how the feedback moves invited the learners to modify their forms, and in doing so, their SR comments subsequently revealed that they were trying alternative forms and testing out

hypotheses pertaining to their L2 knowledge. In Excerpt 5.15, P16 realized that her pronunciation for the word 'ship' was problematic, and thus, she produced it in a more target-like way; however, because her partner did not grasp what she was saying, she was still unsure about the accurate pronunciation of the word. Similarly, in Excerpt 5.16, P25 reflected on his linguistic choices and tested out hypotheses after being prompted by his partner's feedback.

Excerpt 5.15

```
86<T> P16:  and do you have sheep?
87<I> P15:  what?
88<R> P16:  SHIP
89<I2>P15:  what thats mean?
90<R2>P16:  earrr (3.3)
91          earrrrm
92          this for sea
93          if we need go travel with sea
94          you need ship
95          big ship hehehe
96<I3>P15:  sorry i don't get it.
97          can you tell me again What is that?
98<R3>P16:  hehe this earrr SHIP (.)SHEEP if you want to go inside the sea
99          you can't walk or swimming you need this thing
100<RR>P15: aaah
```

(Voice chat 8, P15 & P16)

P16's recall: *here I knew my pronunciation was problematic, so I tried again to pronounce it right. I then tried to explain it to make it clearer but it did not work. I am not sure if she could get me, but also I need to check how this word is pronounced.*

Excerpt 5.16

11<T>   [15:27:23] P25: how many light do you have

12<I>   [15:28:28] P26: what the men light

13<R>   [15:29:01] P25: lamp

14<RR>   [15:29:08] P26: ok

15   [15:29:25] P26: i don't have

(Text chat 13, P25 & P26)

P25's recall: *I remember I wanted to describe the 'light' here, but he did not get the word. I was wondering if this was the correct form, and how to best describe it in a bedroom. It is not a 'chandelier' really, but could not remember what to call it. I then thought to try the word 'lamp'.* (All the underlined words were said in English)

(d) Priority of some linguistic forms

When the negotiation episodes resulted from the need to produce a more target-like form to achieve more accurate and comprehensible output, the learners gave priority to some forms over others. In other words, some linguistic categories invited learners' attention more than others. For example, Excerpts 5.15 and 5.16 showed how learners were attending to gaps in their lexical choices and phonological aspects, but not towards grammatical aspects (e.g. the absence of indefinite article *a*).

5.7.3 Summary of the findings

Qualitative analyses of noticing incidents across the modalities of SCMC revealed the following:

- With regards to self-repairs, learners engaged predominantly in morphosyntactic/grammatical self-repair during voice chat, while in text chat, self-repairs of spelling items were encouraged.
- With regards to the occurrence of noticing by error and feedback types, regardless of the SCMC modality, learners engaged more in noticing after receiving negotiation

moves than recasts. Furthermore, learners engaged in more noticing of lexis and phonology/spelling than of grammar.

- Considering the quality of learners' noticing of interactional feedback, no great differences were found between the SCMC modalities in triggering low or high levels of noticing, with the lexical issues mostly prompting higher levels of noticing across both written and oral forms of interaction.

- Finally, the SR data yielded qualitative information that provided further insight into the participants' mental processes that they experienced when engaged in negotiations during oral and written SCMC.

5.8 RQ5: Learners' Perceptions and Experiences

To answer this research question, the learners' responses to the debriefing questionnaire and interview were examined. Debriefing questionnaires and interviews were administrated to solicit information concerning the participants' perceptions and experiences in completing the tasks in the different online communication modalities. In the questionnaire, they were asked to report whether they experienced particular L2 benefits in one modality of SCMC over the other, or whether this was the same for both. Interviews were then conducted to reflect on the learners' answers from the questionnaire, and subsequently prompted the learners to explain their choices. Learners' responses uncovered information about the inherent attributes and limitations imposed by each interaction modality, and helped provide a qualitative overview of the findings indicated by the previous quantitative analyses.

For clarity of analysis, the questionnaire statements were categorized into three groups according to the aspects investigated: (a) completion of the task-based interaction activity, (b) monitoring and processing the language, and (c) L2 learning benefits. Thus, statements 1-4 probed into the differences that the learners experienced when completing the task-based activity during the two interaction modalities, statements 6-11 probed into the learners' monitoring of language and noticing of interactional feedback, and lastly, statements 5 and 12 reflected on the learners' perceived L2 benefits and their perceptions on the potential of oral and written SCMC in relation to L2 learning.

The results for each of these aspects are presented respectively in Section 5.9.1 to Section 5.9.3, integrating the aforementioned quantitative descriptive responses to the questionnaire items, in conjunction with the data-driven qualitative thematic analyses of the learners' comments in the debriefing interviews. Tables or graphs were endowed to illustrate these findings, and for the most part, quotations that subtly captured the different aspects were also presented.

5.8.1 Completing the task-based interaction

The first four statements in the debriefing questionnaire elicited information about the learners' judgments in completing the task-based activities during the oral and written modalities of SCMC and their preference. Percentages of learners' responses to these statements are shown in Table 5.12.

Table 5.11

Percentages of learners' perceptions on completing the task-based interactions

Statement	More in Voice chat	More in Text chat	Same in voice and text chat
1. I liked doing the task.	80%	10%	10%
2. It was easy to complete the task.	70%	7.5%	22.5%
3. I cooperated well with my partner.	67.5%	7.5%	25%
4. I felt relaxed doing the task.	50%	17%	32%

As shown in Table 5.12, responses to completing the task-based interaction were favorable for the oral modality of SCMC. Among the findings were, 80% of the respondents preferred completing the task in voice chat, 70 % felt that the task was easily completed via voice chat, 67.5% believed that voice chat led to a more-friendly interaction, and lastly, 50% believed that this mode of interaction provided a less stressful environment.

In contrast, only ten percent of the respondents preferred completing the task more in text chat. A lesser percent (7.5%) indicated that the written synchronous modality helped them to cooperate more with their partners and to easily complete the task. In addition, 17.5% of the respondents experienced a more relaxing situation when completing the task in text chat. For the residuals, there was no difference between the two modalities in facilitating their task-based interactions.

The detailed responses elicited from the debriefing interviews with each individual participant uncovered features of each modality that were facilitative for their interaction and engagement whilst performing the task-based activity. The themes identified in the learners' responses are outlined in Table 5.13, and then elaborated upon in the following discussion.

Table 5.12

Modality features facilitative for learners' interactions

Voice chat	Text chat
• Authenticity ➔more similar to FTF interaction	• Permanence of text
• Immediate feedback ➔organized turns	• Slow pace of interaction
• Tone and prosodic cues	• Free from speaking
• Back-channeling cues	• Keyboard facilities such as Arabic numerals, brackets and emoticons.
• Free from spelling and writing	

5.8.1.1 Attributes of voice chat

The majority of the learners reported that they liked performing the task more in voice chat because this modality allowed for greater understanding and more exchanges, and thus, resulted in better interaction with their interlocutors. Moreover, it was easier for the learners to explain things and exchange information, and the delivery of information was faster and in a more organized manner. Learners utilised a number of features available in voice chat that were facilitative for their interactions (see Table 5.13). What follows is a breakdown of these particular features:

Authenticity: Learners asserted that their interactions in the oral modality were "*more real and closer to FTF interaction*" (P6) and "*more vivid*" (P11) than their interactions in text-based SCMC.

Immediacy and reciprocation: Immediate responses/feedback emerged to be a crucial aspect in maintaining mutual understanding and satisfaction during interaction. Learners' comments implied that immediate feedback helped them to follow and understand each other better. For instance, one learner stated, "*I felt as though we did better in voice chat. He asked and I answered, and vice-versa. We were more organized*" (P11). This organized turn-taking exchange of information was not easily attainable in text chat, and therefore, there were interruptions in the learners' written interactions. Learners complained that the interruptions in the text chat were very confusing, disruptive and time-consuming, which subsequently led to chaotic messages and interactional incoherence. As a result, the learners spent time linking

responses to their corresponding messages. For this reason, the learners declared that they could not maintain shared focus in text chat as they did in voice chat, and this negatively impacted the flow of their interaction and in the sharing of information. Additionally, in the text chat, the learners complained that they did not get answers to some of their questions and, on occasions, they had to delete their contributions to help manage the coherence of their interactions. Comments revealing these complaints include,

> *In the text chat, I was asking about something, and she was talking about*
> *something else.* (P17)

> *While I was formulating my questions in the text chat, my partner sent something.*
> *This interrupted me and I felt obliged to delete my question. Sometimes, I would*
> *rewrite and send them again afterwards.* (P12)

Another problem expressed by a number of learners within the text chat was that their partners provided a great deal of information within a single turn, either by asking for, or offering multiple aspects in one turn. This made it challenging to respond appropriately and attain all the information provided at once. A comment reflecting this is:

> *Some of my partner's messages were long and included much information. I took*
> *a long time to check what she was asking about and confirmed if I had them or*
> *not. I wished if we could have exchanged the information one by one as we did in*
> *the voice chat*. (P4)

P4 could not tolerate the lengthy messages she received via text, and she suggested that organized turn-taking, with the use of shorter sentences, may have helped her achieve better communication within the written modality. In contrast, this is something that naturally occurred during oral interactions.

As the oral synchronous modality helped learners to achieve better understanding through reciprocal question-answer sequences, learners felt more relaxed and more willing to exchange details. The ability to obtain immediate feedback and check the success of their messages was motivating for them (i.e. they felt good and wanted to share more information

and details). For instance, one of the learners favoured information exchange using the oral platform, and by contrast, she described the interaction in text chat as '*shallow*', commenting:

> *When we talked, we discussed things better…In text, I felt like we were just naming the objects in our pictures, but not describing them and discussing their details.* (P18)

As revealed in the interview data, the learners felt more engaged in the voice chat, adding extra motivation to their interaction. As a result, many dyads were more interested in completely describing the details available in their pictures, even after achieving the task goal (i.e. finding five differences between their pictures). Conversely, the learners could hardly complete the five differences in the text chat. In line with the previous comment, the following quotes reveal how the nature of voice chat allowed increased flexibility and more exchanges of information:

> *I felt like I was able to give and ask for more details in voice chat. In text chatting, this was not easy. I felt like we were only describing things, and I was only saying 'yes' or 'no' to my partner.* (P2)

> *I had more chance to talk in the voice chat. I could talk more with my interlocutor, but I didn't feel this in text chat.* (P6)

Tone and prosodic features: In addition to the smooth flow of interaction and increased engagement in voice chat, some learners revealed that the use of tone in the voice chat helped them to achieve a better understanding, and to convey their meanings more appropriately. In relation to this, the following comments were made by learners who voiced their dissatisfaction with completing the task in text chat.

> *The voice tone shows whether I understood or not, and whether the interlocutor had understood me.* (P15)

> *The ideas are transmitted in a clearer way in voice chat…maybe through the voice tone, I can know whether my partner's sentence was a question or an answer to an earlier question. Also, the voice tone could help in distinguishing whether my partner got my messages across or not.* (P21)

Voice tone helps expressing many things, not like text. Text is a bit cold. (P27)

From these responses, it is clear that the learners appreciated the availability of tone and prosodic information in voice chat, as well as how it helped them to achieve mutual understanding. In contrast, the impoverished written interactions resulted in 'cold' (see P27's comment), less effective exchange of information.

Backchannels: Learners commented on the usefulness of back-channeling cues available in voice chat, which they used to assess each other and to maintain the same rhythm of interaction. Several responses suggested a level of stress within the text chat, because of the lack of backchannels and immediate feedback. A significant example of this was expressed by one learner:

> *I really felt isolated when text chatting because there was no reactions to my messages… In contrast, we were on the same rhythm in voice chat and I was able notice her reactions, so I would slow down or speed up with her.* (P29)

P29's level of spoken fluency was relatively high, which meant her input was quite fast and rich for her partner, who was less proficient, and therefore had a need to speak slower. However, in the text chat, she found it difficult to ascertain whether her partner followed her or not, and thus, she felt hesitant to contribute and exchange more information throughout this interaction.

Free from spelling and writing: In addition to the aforementioned features of voice chat, a number of learners admitted that due to their poor spelling and typing skills in English, they enjoyed completing the task more in voice chat. One learner explained:

> *I have problems with spelling and writing in English, and that is why I favoured voice more than text. If I were more skilled with typing and I could spell words correctly, there might not be a difference between voice and text.* (P13)

Learners further explained that inappropriate spelling would hamper communication of their messages. This feeling caused anxiety for some learners, such as P26, who stated, "*I was afraid that my partner would not understand me because of my bad spelling*".

5.8.1.2 Attributes of text chat

Even though the percentages of learners' responses to statements pertaining to their completion of the task were substantially lower in favour of the text chat, it is worth highlighting some of the key aspects as to why this mode of communication was preferred by those learners, and used to help facilitate their interactions.

Permanency: Learners who preferred completing that task via text chat attributed permanency to help them gain a better understanding. They reported that the visual trace of written messages helped them understand their partners more, as they were able to revisit and review what was discussed. Texts are not ephemeral like oral input, and this was deemed as useful from two perspectives. First, learners did not need to ask their partners to repeat their utterances/productions, which they would have needed to do in voice chat if they did not hear their partner's utterances or understand them properly. Furthermore, few learners indicated that it was easier to understand and use the new vocabulary provided by their interlocutors in text chat than in voice chat. The visual record of their written interactions made input available, while in voice chat, they needed to remember them, which was challenging. Second, as learners were working on a picture difference task, they found this particularly useful, as they did not need to ask their partners to review the differences, as was the case in voice chat; rather, they simply went through their chat logs by scrolling up and down to trace and review the differences exchanged.

Slower interaction: Writing takes place at a slow pace; hence, the time available for these learners to compose their responses allowed them to feel more relaxed and more confident about participating. Consequently, they felt that they were more willing to participant in text chat than in voice chat. The following comments reveal this willingness to participate:

> In text chat, I felt I had more confidence because I was not afraid of committing mistakes since I can edit my sentences before sending them. (P10)

I did not feel relaxed while voice chatting. If I started speaking, then I had to complete…but in text chat, it was different. I had time to construct my sentences, to revise what I constructed, and to find other ways of saying the sentence clearly.(P22)

Because I was writing at my own pace, I felt more relaxed in text chat. (P34)

Due to the extra time that the learners had in the written modality, they felt more comfortable communicating with their partners in comparison to voice chat. However, two divergent and often conflicting issues emerged here. First, even though the slow pace of text chat made learners more relaxed and confident about communicating, they indicated that their written interactions were superficial. For example, P34 further admitted,

In text, I had time to construct my messages, but I did not have time to explain things properly…The problem I faced with text chat was that I couldn't clarify things. I was just asking him 'do you have this thing?', and he replied with 'yes' or 'no'. I didn't tell him about where I had them, but in voice, I was able to provide all the relevant details.

Second, a minority of participants who appreciated the usefulness of the slow pace of text chat in boosting their confidence and participation, also commented that, as a result of this, they had to wait for their partners' replies, and the "*long waits*" (P15) resulted in boredom and loss of interest. The following comments illustrate these sentiments:

The advantage in writing is that it allowed me to better understand my interlocutor's sentences and construct mine. But I hate the long waits. I had to wait for my interlocutor's responses. (P15)

Though I felt more confident about my sentences in text chat, I did not enjoy it because it was very boring, and most of the time, I was waiting for him to reply, and similarly he was waiting for me to reply. (P11)

Free from speaking: Among the reasons that the learners cited for being more relaxed in text chat was their perceived insufficient oral skills, which could have resulted in poor performance. For example, one learner commented,

> *Maybe because I am not really good in speaking… I stammer in speech, so I liked text chat more.* (P31)

In relation to this, one learner (P30) revealed that the written interaction was of particular help and a relief for her from the pressure she experienced in the oral modality, which was due to her partner's pronunciation and fast-paced speech. As she revealed, the lack of familiarity with her partner's pronunciation and fast tempo may have caused these breakdowns in their oral interactions.

Keyboard facilities: Other useful affordances that facilitated learners' interactions in the written modality were the keyboard facilities. Keyboard facilities reported by the participants included Arabic numerals, brackets, question/exclamation marks, symbols and emoticons. All of these features helped the learners to respond faster and ensure a smooth information exchange.

Instead of writing the numbers in full (and subsequently struggle with their spelling), the learners used numerals on the keyboard. In addition, one of the learners (P5) reported that she constantly helped her partner with content words that she was introducing, by providing their synonyms between brackets. She commented that their first interaction in the oral modality helped her to realize that her partner was struggling with some content words that she used. Therefore, because she could not assess her partner's understanding in the written modality, and to make things clearer for her, this learner provided synonyms and illustrations most of the time between brackets.

Question and exclamation marks were other keyboard facilities used by the learners to indicate problems in their understanding. These were used to signal their non-understanding, and to indicate that they needed more information and explanation. In addition, learners used letters and punctuations on the keyboard to make expressive emoticons, or they exploited various emoticons readily available to express their reactions and feelings. As such, there are

two key points that are worth noting. First, while symbols and emoticons were reported useful to help convey feelings and reactions, they also contributed to a decrease in output, as the information was provided by using them. Second, learners might fail to use or interpret emoticons properly. For instance, P30 reported that she used a sad face to express her frustration when not being able to understand her partner's previous move, but unfortunately, her partner did not clarify things and moved on with the discussion. When P29's thoughts were elicited in the SR interview, it was found that she interpreted the sad face as a no answer, and moved on to find other differences.

5.8.1.3 Similarities

Learners who saw no difference between the oral and written synchronous modalities in facilitating their interactions acknowledged the identified affordances and obstacles of each modality of interaction. However, as their interactions in the two contexts added benefits to their L2 practice and knowledge, they appreciated such interactions. Interestingly, the learners' responses highlighted issues that were of particular benefit to them. First, they appreciated the usefulness of both modalities in lowering their anxiety and motivating them to participate. One learner, for example, commented: "*In both cases, I was behind the screen so I felt relaxed and I could give all that I had*" (P33). Second, learners appreciated that they were engaged with another learner of English, rather than with a NS, when they were asked to complete the tasks. Peer task-based interactions helped them to feel relaxed and willing to participate, regardless of the modality of interaction. Some of the learners' comments in the debriefing interviews reflected this:

> *I felt relaxed during both. I did not feel afraid of committing mistakes because I was interacting with another learner of English.* (P27)

> *I have not tried task-based chat before, so I really liked it. I felt motivated as I had something to talk about. It is better to have a task, rather than a general topic chat.* (P40)

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5.8.2 Monitoring and processing the language

Statements 6-11 in the debriefing questionnaire probed into the learners' perceptions of their monitoring and noticing of input, errors and interactional feedback in the oral and written modalities of SCMC. The results are shown in Table 5.14.

Table 5.13

Percentages of learners' perceptions on monitoring and processing of the language

Statement	More in Voice chat	More in Text chat	Same in voice and text chat
6. I had enough time to construct sentences.	20%	55%	25%
7. I had enough time to understand what my partner said.	30%	52.5%	17.5%
8. I paid attention to how I was saying things in English.	37.5%	47.5%	15%
9. I paid attention to how my partner was saying things in English.	37.5%	40%	22.5%
10. I corrected my own language.	25%	37.5%	37.5%
11. I noticed the corrective feedback provided by my partner.	17.5%	20%	62.5%

As can be seen in Table 5.14, in contrast to the findings of learners' perceptions towards their completion of task-based interactions, their perceptions on monitoring and processing of the language were slightly higher in favour of text chat. More than half of the participants perceived planning and processing time to be more abundant in text chat than in voice chat (statements 6 and 7), resulting in 55% and 52.5% respectively. In addition, high percentages were in favour of text chat with regards to paying attention to their language (statement 8) and correcting their errors (statement 10), resulting in 47.5% and 37.5%. However, while text chatting was appreciated more for its potential in promoting noticing of their own language and self-repairing errors, no great differences were found with regards to the potential of the synchronous modality to enhance noticing of the interlocutor's language (statement 9) and corrective feedback (statements 11).

Table 5.15 presents the recurrent themes in the debriefing interviews, followed by a detailed discussion of the perceived benefits and drawbacks of each chat modality that could have affected learners' monitoring and processing of the language.

Table 5.14

Modality features facilitative for learners' monitoring and processing of the language

Voice chat	Text chat
• Synchronicity➔Immediacy	• Permanence of text
• Apparent reactions (e.g. voice tone, backchannels)	• Slow pace of interaction
	• Requires accurate messages
	• Auto correction

5.8.2.1 Attributes of voice chat

As shown in Table 5.14, only 20% of the respondents perceived planning time to be more abundant in voice chat than in text chat (statement 6). These learners were able to construct their sentences better in voice because they were working on the same line with their interlocutors, and, although both modalities were synchronous, learners felt '*more closed*' (P30) and '*on line*' (P6) with their partners while engaged in voice chat as opposed to text chat. To put it differently, learners exchanged in the roles of a speaker and a listener, and took turns in an organized and sequential pattern of interaction in the oral modality, but not in the written chat. Therefore, learners took time to formulate and produce their language better in voice chat. As they asserted, if they received the turn, then their partner would wait to get a response. However, in text chat, these learners did not benefit from the time available to them as they felt the urge to reply quickly to catch up with the discussion. In addition, 30% of the respondents felt they had more processing time in voice chat (statement 7). They stated that their interactions in voice may have increased their understanding and processing of their partners' messages due to their immediacy.

In conjunction with statements 6 and 7, the next two statements were included to examine whether learners were able to use the time available to them (or any other modality features) to pay attention to their own or to their partners' constructions of language. The

results reveal that around 38% of the respondents reaped these benefits more in voice chat. Nevertheless, learners' responses in the debriefing interviews did not elaborate much into these benefits, other than confirming them and indicating that their partners' reactions and immediate responses in this modality helped them to judge the intelligibility and correctness of their productions.[22]

With regards to noticing of errors, 25 % of the respondents believed that the oral modality was more facilitative for self-repairs (statement 10), while approximately 18% believed that this modality made the corrective feedback more salient (statement 11). They further indicated that their partners' reactions and voice tones helped make it apparent if their productions were problematic, and hence, they attempted to produce more accurate productions. In contrast to these positive perceptions, other learners criticized this modality for not being advantageous for reflecting on language and correcting errors. Though learners may have noticed their errors in voice chat, the indications were that the nature of the voice chat did not encourage them to self-repair. One learner remarked:

> *The disadvantage of voice chat was that I was afraid of committing mistakes. I was afraid not to use good structures. And if I commit a mistake, I can't help improve it. It is already said.* (P9)

5.8.2.2 Attributes of text chat

As illustrated in Table 5.14, the participants' responses displayed more positive attitudes towards the potential of text chat to self-monitor their productions and to process the different language aspects. One of the comments reported by many learners with regards to text chat was that they had the time to look at their partners' texts, produce the language at their own pace, and modify what they wrote before sending their messages. A typical comment from participants was, "*I can take my time and read at my own pace*" (P28). A caveat to this however, was that some of the participants who acknowledged these benefits, also stated they could not take full advantage of them due to the '*pressure*'. Learners felt under time pressure in text-SCMC; that is, they felt more stressed when they took time to construct and edit their

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[22] It should be noted here, that statements 8 and 9 were problematic for some learners, as they equated 'saying' with 'pronunciation'; however, caution was taking by explaining the statements to learners in the debriding interview and modifying their answers in case they wished to.

messages, as they were concerned of replying late to their partners. As one learner stated,

I had more time in text chat, but this was not really helpful because she was

waiting for me. (P4)

Nonetheless, the slow pace of interaction, coupled with the visible and permanent record of written messages, did help some learners to focus on structuring their sentences and to pay attention to spelling and grammatical aspects (i.e. editing their messages before sending them). One learner commented:

In speech, I don't usually focus on grammar. If someone asks me 'what did you

say?', I would then focus on the grammar and try to construct my sentence again

in a more appropriate way…but I did that from the beginning in text. (P16)

An interesting comment reported by some learners was that they paid careful attention to their language in text chat because written interactions necessitate proper and more accurate language than that used in oral interactions. They claimed that they paid attention because there was no other channels to help them deliver their points. While they appreciated this benefit, some also revealed that this put them under pressure, and was the main reason why they did not feel relaxed during their written interactions. Learners' comments pertaining to this included:

I felt more obliged to write carefully and correctly in text chat. In voice, we could

understand each other, even if we did not say things properly. (P6)

While typing, I was very concerned about my language. If I did not write things

correctly, my partner would not be able to understand me. I was concerned about

the way I structured my sentences and about my spelling. I thought texting was

easy, but no, it is not. It requires more attention and efforts. (P14)

In relation to the accuracy of language, some learners appreciated the auto correct feature available in text chat and they declared that it helped them acquire proper spelling.[23] This was affirmed from the video screen recordings of their text chat, where learners were

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[23] The spelling check was enabled in one of the laptops but not the other, and unfortunately, I did not find this out until I had collected data from pair no.4; therefore, I decided to keep it.

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found to compensate for misspelled words by using the autocorrect and look up the correct spelling from the suggested alternatives.

Some other learners declared that they would have favoured completing the task in text than in voice chat if they were given the opportunity to use virtual tools, such as Google translate or mobile-based dictionaries apps, which could be used to check spelling and the English version of certain words.[24] Reflecting on their overall experience to practice English online, the participants found these tools to be extremely useful to help avoid grammatical mistakes, and to help interaction with appropriate language use.

With regards to noticing self-errors, many learners declared that, while there was not much difference between the two modalities in helping them realize errors in their productions, they did tend to correct their errors more in text chat:

I corrected my errors in text many times. In voice, I knew there were mistakes, particularly in grammar, but only in text was I able to correct these errors. (P2)

I normally corrected my errors when text chatting. In voice, I noticed my errors, but I could not repeat my sentences afterwards. (P23)

In relation to noticing corrective feedback, few participants appreciated how the text chat could make corrective feedback more apparent (i.e. how the permanent nature helped identify mistakes and facilitated learning from them).

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[24] Participants were asked not to use online or mobile-based dictionaries.

5.8.3 L2 learning benefits

Statement 5 in the debriefing questionnaire aimed to explore the learners' perceived learning outcomes, while Statement 12 explored perceptions on the potential of voice or text online chatting for L2 practice and learning. Figure 5.4 provides a breakdown of these results.
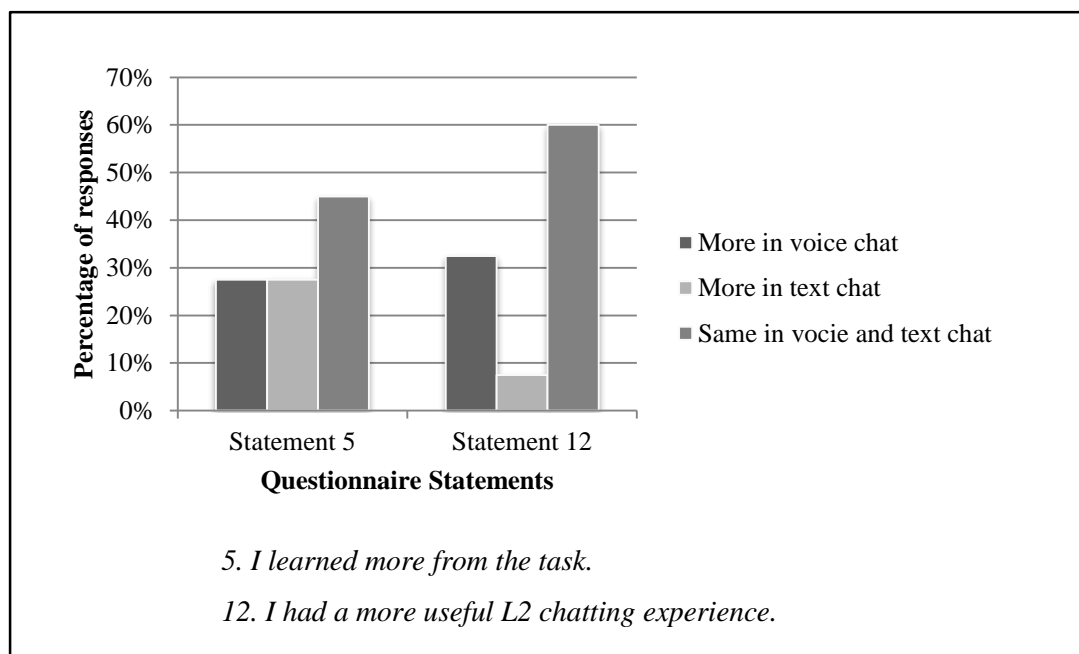

Figure 5.4. Percentages to statements addressing L2 learning benefits

5.8.3.1 Perceived learning outcomes

As shown in Figure 5.4, equal percentages of the learners' responses (27.5%) revealed that they did learn something from both their voice or text chat environments (statement 5). The remaining 45% declared that there was no difference between the two modalities. From their responses in the debriefing interview, the majority agreed that they learnt something from their interactions in the two SCMC modalities.

Participants reported benefits in the different language aspects (i.e. vocabulary, pronunciation and spelling), but only limited gains in grammar. They commented on the usefulness of both modalities to learn new content words, which in turn, enabled them to develop their vocabulary set. Moreover, not only did the learners appreciate the feedback moves that targeted their linguistic errors, but some of them also expressed how much they benefitted from their partners' pronunciations, spelling, expressions and sentence

constructions. That is, they learnt from the oral and textual examples provided by their interlocutors. For example, P10 was impressed with some expressions that his partner used and he found them useful:

I learned new words and expressions form my partner. In text chat, she wrote 'until now'. This was new for me. It means (providing the correct meaning in Arabic)*. Also, 'I think so' - she used that many times in voice chat…really useful expressions.*

In addition to these benefits, some learners acknowledged that their online interactions in the two modalities helped them to realize the gaps they had in their L2 knowledge.

Learners who benefitted more from voice chat commented on the usefulness of the pronunciation function. They also declared that oral chatting increased their self-confidence and motivation. In addition, some learners indicated that the easiness and immediacy of information within the oral platform motivated them to ask about new content words, whereas in text chatting, they ignored them. A revealing comment pertaining to this was made by P2:

I could learn new vocabularies in voice. When my partner used a new word, I asked for its meaning, but in text chat, I ignored words that I didn't know. (P2)

Considering the advantages of text chat for L2 learning, learners appreciated the pace of interaction in this modality and also how it helped them to utilize their L2 knowledge more efficiently. One learner commented: "*when I was writing, I remembered words that I have already known but never used them for a long time*" (P1). Adding to this advantage, learners declared that text chat helped to learn the correct spelling of certain words.

5.8.3.2 Potential of oral and written SCMC for L2 learning

When asked if the different modalities helped them in their experience of a useful L2 interaction (statement 12), responses from thirteen learners (32.5%) supported the usefulness of voice chat, while only three learners (7.5%) felt text chat was more useful. The majority (60%) reported that there was no difference. From the debriefing interviews, the participants

revealed that they were satisfied with the two interaction modalities and they appreciated their usefulness for L2 practice and learning, due to their availability and practicality. Though very few learners saw little or no value in text chat for their L2 learning, their comments made it clear that they appreciated its distinct advantages, even if they were more inclined towards voice chat as their general preference. The following aspects illustrated the benefits that were perceived in both synchronous modalities, thereby indicating their potential for L2 learning development.

L2 practice: Learners demonstrated satisfaction and enthusiasm for the use of synchronous online chatting to practice their L2. They believed that SCMC provides a comfortable setting to practice their language and improve it, and they also perceived that both online modalities could be of great value to practice their language outside classroom settings. This is particularly the case when they get back to their home countries, where access to learning English as a foreign language is limited.

L2 knowledge: Learners believed that both synchronous modalities provided avenues for authentic L2 interaction, which they viewed as a contextualized way of learning vocabulary and grammatical structures, as well as developing their English communicative skills. Their interactions in the two modalities helped them identify gaps in their L2 knowledge, and thus, they assumed that having regular online conversational practice would help them address such gaps, and subsequently develop their L2 competency. Moreover, learners appreciated the support and feedback provided by their peers during their interactions, and felt they gained significant benefits of tailoring their partners' input and feedback, in order to address gaps in their own L2 knowledge. In addition, as some of the learners declared that they were not good at spelling and writing, text chat could improve the development of their spelling and writing skills, while voice chat was perceived as a facilitative context to develop oral skills.

Increased self-confidence in L2: Learners commented that, as both modalities allowed them to increase their output of English, they would also help build their confidence in their oral and written abilities. Some learners suggested that regular use of oral interactions would help *'break the barrier of anxiety'* (P25). More interestingly, other learners suggested that text

chat could act as a bridge to develop oral skills and help learners feel more confident in using the language. For example, P23 (pair 12, group 4), who completed the task-based interaction first in text and then in voice chat, commented on how the written modality helped him to organize his ideas, remember the necessary vocabulary, and structure his sentences carefully - all of which instilled in him a sense of confidence, and facilitated his performance of the second task in the oral modality.

Learners were asked about their preferences for future use of online chatting (i.e. which modality would they prefer choosing). Several learners reported that both modalities are of equal value to their L2 practice and learning and therefore, they would seek opportunities to use both. Other learners however, expressed their preference either for voice chat or text chat. It should be noted that, the reasons that the learners gave to justify their preferences do not suggest their bias for one modality over the other, but rather, this was determined by how the features of each modality matched with their personal/learning styles. What follows are comments by the participants that elaborate upon this:

> *For me, I learn more from listening. If I hear words and sentences, I tend to use them. Once I develop my L2 knowledge from oral interactions, then I will move to written interactions.* (P19)

> *I am a visual person. I need to see things and look at them to understand and learn. So, I did not learn from voice chat as much as I did in text chat.* (P22)

5.8.4 Summary of the findings

Following the examination of the learners' interactions and noticing in the oral and written SCMC, qualitative analyses investigating their perceptions of the different modalities were conducted. Overall, the majority of participants favoured completing the task-based interaction in voice chat rather than in text chat. Regarding the benefits of completing the task in voice chat, five key benefits were stated: (a) it is more authentic and closer to FTF interactions, (b) reciprocation and availability of immediate/simultaneous feedback, (c) tone and prosodic features, (d) back-channeling cues, and (e) it does not require good spelling and typing skills. Due to these affordances, voice chat facilitated better understanding between

the interlocutors, and offered them a more relaxing and engaging platform for interaction. In turn, this led to greater information sharing.

With regards to completing the task in text chat, learners primarily commented on the following four benefits: (a) permanence of text, (b) slow pace of interaction, (c) it compensates for inadequate oral skills, and (d) keyboard features. These benefits helped the learners to better understand their peers, as well as feeling more relaxed and willing to participate. In terms of the negative aspects of completing the task in text chat, few perceptions were identified. First, the flow of information took a relatively long time, which caused frustration for some learners, and therefore, they perceived their interactions in the written modality to be '*very boring*' (P.11). Second, text chat turn-taking included many overlaps, as participants could contribute to the discussion simultaneously. These overlaps represented a challenge to maintain focus and successful communication. In addition, the lack of voice tones and backchannels affected the learners' understanding. Finally, text chat resulted in shallow interaction, where learners found themselves highlighting the differences during the picture description task, but without going into much detail of what each individual had in their picture.

With regards to the monitoring and processing of the language, the participants had different personal opinions and their responses displayed positive attitudes towards the two modalities. That said, most of the participants appreciated how the written form of SCMC allowed them more time to control their productions. Learners signalled out the slow pace and permanence of text chat as the main facilitative features. These affordances allowed them to be more deliberate in their message construction, as they had more time to form their messages and attend to their language. An issue that was commonly noted from the learners' responses was that the written modality gave them time and possibilities to attend to their output (i.e. the accurate construction of their messages). Nevertheless, very few learners mentioned whether this feature could have facilitated input/feedback processing. In other words, learners used these affordances to carefully monitor and edit their language, but did not really process and encode their partners' language. In relation to the noticeability of corrective feedback specifically, the learners' responses did not indicate a tendency in favour of one modality of interaction over the other. This was because, as the learners' responses

suggested, while voice chat may increase their focus on their partners' feedback due to their immediacy, text chat may enhance their noticing of partners' feedback due to their permanency.

Finally, learners appreciated their interactions in both modalities of SCMC and acknowledged that both have specific value for their learning experience of English. There was a general consensus that interactions in both modalities resulted in the L2 development of different language aspects, as well as in certain practices for their oral and written skills. Moreover, when asked to determine which modality holds more benefits for their L2 learning, the majority acknowledged the potential of both to enhance their L2 development and increase their confidence of speaking and writing in L2.

5.9 Conclusion

This chapter provided an extensive and detailed insight into the results of the quantitative and qualitative data that was gathered and analysed for this study. The findings were presented in accordance to each of the research questions, with further elaboration and supporting evidences that are based on relevant statistics and quotations from the participants' responses where necessary.

The key findings of the study suggested that, the synchronous modality does not influence the quantity and features of negotiations during online task-based interactions. That is, even though voice chat generated descriptively more negotiation episodes, the statistical analysis showed that there was no significant difference between the oral and written modalities in producing opportunities for negotiation episodes. In addition, both modalities generated more meaning negotiations than form negotiations, promoted the use of the same feedback devices (i.e. while clarification requests and confirmation checks were used abundantly to negotiate meaning, recasts were the only feedback device used to negotiate form), and encouraged meaning negotiations of lexical items and form negotiations of morphosynctactic and phonological/spelling items.

With regards to the effect of synchronous modalities on the quantity and quality of noticing, the findings showed that the modality appears to influence the occurrence and nature of self-initiated noticing (i.e. self-repairs), but not the noticing of interactional feedback. That is, text chat generated significantly more instances of self-repairs than voice chat, and while self-repairs in text chat were often spelling-related, voice chat encouraged more grammatical self-repairs. However, regardless of the SCMC modality, the findings suggested that both contexts are equally facilitative for enhancing noticing of interactional feedback, and in promoting high levels of learners' engagement with this feedback. Further to these findings, the comparison between the learners' comments in the SR interviews and their provision of modified output during interaction showed that the production of uptake was not predictive of learners' noticing. In some situations, noticing did not lead to uptake, while in others, the provision of uptake was not accompanied by a verbalization of any thought processes. This finding, therefore, highlights the limitation of the 'uptake' measure, and asserts the critical importance of employing SR protocols to elucidate data on noticing.

Finally, the results from the debriefing questionnaires and interviews revealed the learners' positive attitudes towards SCMC and identified the perceived benefits and drawbacks of the oral and written modalities that could modulate their effectiveness in facilitating interactional and attentional engagement. These findings will subsequently form the central discussion in the next chapter.

Chapter 6: Discussion

6.1 Introduction

This chapter provides an in-depth discussion of the key research findings presented in the Results Chapter. This discussion is subsequently organized around the main themes of the present research study, which is as follows: The first section discusses the differential effects of oral and written SCMC on the quantity and features of negotiation episodes. The second section reports and discusses findings pertaining to the differential effects of the synchronous modality on triggering learners' cognitive process of noticing, and the last section discusses learners' perceptions of voice- and text-SCMC, highlighting the relative merits and drawbacks of the two synchronous modalities. Many of these insights come from the participants of the present study, which is based on their reports in the debriefing interviews. Finally, the chapter concludes with a brief summary of the findings.

6.2 Learners' Negotiations in Voice and Text-based SCMC

The present study sought to determine the effects of voice-SCMC, in comparison to text-SCMC, on promoting negotiated interactions between intermediate-level EFL Arabic learners while they were performing a task-based activity. While the first research question addressed the online modality effects on the quantity of negotiation episodes, the second research question was concerned with identifying whether or not there would be any modality effects on the features of negotiations. Discussion of the findings pertaining to the frequency and features of negotiations are presented in Sections 6.2.1 and 6.2.2.

6.2.1 Frequency of negotiations

Negotiation episodes were first frequency counted and quantitatively analyzed to ascertain their distribution within the two modalities of SCMC. Generally speaking, the oral modality generated more negotiations than the written modality. That is, the overall frequency of negotiations generated in voice-SCMC was over twice as often as those generated in text-SCMC ($M= 5.75$; $M= 2.35$, respectively). This finding substantiates those from previous comparative studies motivated by the interactionist approach, shedding light on the quantity

of negotiations in learner-learner interactions across modes/modalities, and suggesting that oral interactions can foster more opportunities for negotiations when compared to text-SCMC, whether this was via FTF (García Mayo & Azkarai, 2016; Kaneko, 2009; Loewen & Wolff, 2016; Rouhshad & Storch, 2016; Sim et al., 2010; Yuksel & Inan, 2014) or SCMC (Edwards & Young, 2016; Jepson, 2005; Lee, 2009; Loewen & Wolff, 2016; Yanguas, 2010).

However, given the great differences found in the counts of language production within voice and text chat, this finding is not surprising and could be seen as controversial. All of the studies mentioned in the previous paragraph have also noted differences in language production across modes/modalities, but have not controlled for such differences, even though they have controlled for the time on a task. It is possible, however, that learners' increased negotiation in oral interactions is a result of their increased production in these contexts. Arguably, oral interaction generates more output in a shorter duration than text chat (Shekary & Tahririan, 2006), and thus, the average number of negotiations was found higher in voice than in text chat. In addition, an examination of learners' responses from the debriefing questionnaires and interviews demonstrated that participants felt more at ease in voice chat, and therefore this may have been a reason for their increased participation within this specific modality. The most striking responses that were expressed were, '*easier*', '*more engaging*' and '*more intelligible*', which were mentioned by most of the participants when describing their interactions in the voice chat. It seems, therefore, that since participants found their interactions via voice to be more enjoyable and intelligible, this may have encouraged more discourse quantitatively and consequently, more negotiations in this modality than in text chat. In light of this, it was of importance to consider the differences between modalities after controlling the language that learners produced.

When the amount of language was controlled for, the findings showed that the rate of negotiations per 100 words in voice chat was slightly higher than that of text chat (*Mdn*= 1.0; *Mdn*= 0.74, respectively). The statistical analysis, however, showed that this difference fell short of significance across the modalities, suggesting that learners might have equal opportunities to engage in negotiations across both oral and written modalities of SCMC. Fernández-García and Arbelaiz (2003) echoes similar findings, citing no significant

difference in the number of negotiations generated by the NNS-NNS group across modes (i.e. oral FTF versus written SCMC); however, it should be noted that this study neither controlled for time on a task nor for the language production.

To recapitulate, considering the differential effects of synchronous modality on the frequency of negotiations, the comparison of negotiations per 100 words did not reveal any significant effect for interaction modality in generating instances of negotiations. Whilst it should be noted that the comparison per 100 words did not show any significant difference, learners' responses in the debriefing interviews suggested that they may have experienced greater opportunities for negotiations in voice chat, with trends in actual negotiated interaction being noted, even though they were not statistically significant. This observation supports Jepson's (2005) earlier conclusion, which states,

> Although text chat is the more widely available and most studied form of chat, voice chat offers an environment in which learners are more apt to negotiate for meaning. (p.92)

In fact, some of the learners' responses in the SR interviews could explain that, whether learners engage in negotiated interaction, it is dependent upon the affordances and constraints of the interaction modality. It seems as though issues of immediacy and reciprocation are important to demonstrate non-understanding, and to ask for clarifications and details; hence engaging in negotiations was found to occur more often in voice chat than in text chat. In contrast, learners did not appear so willing to indicate and solve the source of non-understanding in their written exchanges. For example, during her SR interview, P14 referred to a number of incidents where she could not grasp what her partner was trying to communicate, and when asked why she did not ask for clarifications, she answered,

> *We were not on the same pace while text chatting as we were in voice chat, and thus, I ignored things that I did not understand.*

In addition, another learner's (P34) responses provided a further explanation as to why fewer negotiations could occur in text chat. During his SR interview, P34 referred to line 27 in Excerpt 6.1, and said that he did not understand what the word 'bear' meant, but because of his problems with typing and the time available to him, he preferred to find out what it

meant himself, rather than asking his partner. Unfortunately, he would not be able to get this yet, as there was nothing yellow in his own picture, which was the adjective used to describe the bear ("yellow bear"). In accordance to this, Fernández-García and Arbelaiz's (2003) anticipated,

> [Text chat], due to its written nature and the additional planning and processing time it allows, facilitates the codification and decodification of messages. If that were the case, fewer non-understandings and, consequently, fewer negotiation routines would emerge in this medium. (p.116)

Excerpt 6.1

27 [16:54:49] P33: yellow bear

28 [16:55:31] P33: I have small bycicle

29 [16:56:04] P33: i have white bin under the table in the left

30 [16:56:27] P33: belong a small pink chair

31 [16:57:05] P34: i dont have bycicle

<div align="right">

(Text chat 17, P33 & P34)

</div>

6.2.2 Features of negotiations

To complement the discussion on the quantitative analysis of negotiations, this section further expounds upon the quality and nuances of negotiations generated in the two synchronous modalities (i.e. voice vs. text).

Generally speaking, the results revealed no cross-modality differences with regards to the type of negotiation, the type of interactional feedback and the linguistic foci of negotiation. The key findings can be listed as follows: (a) learners negotiated each other's output at the level of meaning more than at the level of form while performing the tasks during the two online modalities, (b) clarification requests and confirmation checks were abundantly used to negotiate meaning, while recasts were the only feedback type used in response to linguistic inaccuracies, and (c) lexical items initiated the majority of negotiations

in both modalities, followed by global and morphosyntctic triggers in voice chat, and spelling and morphosyntactic triggers in the text chat. These findings will be further elaborated upon in the Section 6.2.2.1. to Section 6.2.2.3.

6.2.2.1 Type of negotiations

The occurrences of meaning/form negotiations, and their distribution across the oral and written synchronous modalities, were examined. Overall, negotiations for meaning and form were both found in the learners' dyadic oral and written interactions. The percentage breakdown of type of negotiations, however, was not vastly different for the two modalities of interaction; that is, each modality promoted more meaning negotiations (73% in voice chat, 60% in text chat) than form negotiations (27% in voice chat, 40% in text chat).

The results in Rouhshad et al.'s (2016) comparison between FTF and text-based SCMC suggested different outcomes. That is, while oral interactions generated more meaning negotiations than form negotiations (63% and 37% respectively), the written SCMC promoted more occurrences of form than of meaning negotiations (58% in comparison to 42% respectively). Rouhshad et al.'s (2016) statistical comparison of meaning and form negotiations per 1,000 words, however, demonstrated that the difference between the interaction modes was only significant in the case of meaning negotiations, but not in the case of form negotiations. That is, oral interactions generated significantly more meaning negotiations per 1,000 words than text-SCMC, but occurrences of form negotiations fell short of significance across the different modes.

The present findings showed that the modality of interaction does not appear to influence the negotiation type (meaning vs. form). Within the two conditions of SCMC, there were more negotiations triggered by communication breakdowns (i.e. negotiations for meaning) than negotiations triggered by linguistic inaccuracies (i.e. negotiations for form). To put it differently, learners focused more on the meaning of their communication rather than on the accuracy of their linguistic forms. These findings, therefore, ran contrary to the earlier alleged arguments, which advocate that the self-paced setting in text chat and the

visual trace of utterances are facilitative features that help learners to attend to both form and meaning (Blake, 2000; Pelletieri, 2000; Warschauer & Kern, 2000).

In light of the L2 learner-learner interaction research, the tendency to prioritise meaning over form was not an unexpected result, particularly as these learners were all at a low-high intermediate proficiency level, and therefore may not have the linguistic confidence and abilities to provide explicit corrections, recasts or metalinguistic explanations (Williams, 2001). This trend was observed in many previous studies on learner-learner interactions, which showed that learners focus more on meaning negotiations than on form negotiations (FTF contexts: Fujii & Mackey, 2009; Fujii, Ziegler & Mackey, 2016; Gass et al., 2005; Sato & Lyster, 2007) (SCMC contexts: Bueno-Alastuey, 2013; Jepson, 2005; Lee, 2001; Loewen & Reissner, 2009).

L2 researchers have suggested a number of possible explanations why a focus-on-meaning takes precedence over a focus-on-form in L2 learner-learner interactions, particularly in SCMC contexts. First, Lee (2002) surmises that SCMC inhibits learners from reflecting on the language accuracy, concentrating more specifically on conveying their meaning fluently and efficiently, much like they do in FTF interactions. As she stated, "in terms of linguistic accuracy, learners tended to ignore each other's mistakes and move forward with the discussions" (p.286). In line with this, Sotillo (2000) further adds that SCMC might be generally considered by learners as an informal mode of communication, where being fluent rather than accurate is of a primary concern. Second, in their review of corrective feedback in L2 language classrooms, Lyster et al. (2013) maintain that peer corrective feedback can be more face-threatening than a teacher's or NS's corrective feedback, and thus, learners are unwilling to correct their peers' linguistic errors. Third, several researchers argue that focusing on language forms might be difficult for learners, particularly those at lower proficiency levels. This suggests that learners may not focus on formal aspects of language unless they are instructed to do so (e.g. Fujii et al., 2016; Ware & O'Dowed, 2008). In order to counteract the avoidance of focusing on form, these researchers explicitly asked their participants to provide feedback on any linguistic forms they received as incorrect. Others may even go further and provide the participants with focused training prior to engaging them in L2 interactions (e.g. Jin, 2013; Lee, 2008; Oskoz, 2005). They

argue that, because learners do not have the linguistic and pedagogical skills to provide feedback in a subtle manner, they need to be trained. It should be pointed out that, in the current study, learners were asked to help each other and resolve problems in their communication, but they were not directly asked to correct linguistic errors nor were they provided with corrective feedback training, as was the case in many other studies. Approaching learners' interactions from an ecological perspective, this study is in full agreement with Dooly and O'Dowd's (2012) assertion that negotiation for meaning and peer corrective feedback are natural processes occurring when interlocutors seek to better understand each other, rather than being instructed to implement.

6.2.2.2 Type of interactional feedback

Having discussed the type of negotiations that the learners were engaged in during their interactions in SCMC, this section elaborates upon the type of feedback used. Of great interest was a closer look at the indicators that learners used in each modality, where the results revealed no difference. Clarification requests were the most salient feedback device used in both modalities when misunderstandings occurred, followed by confirmation checks. Interestingly, comprehension checks were relatively absent in this present study, resulting in only one incident in the written modality.

The literature on learner-learner online interactions has similarly revealed that clarification requests are the preferred means to provide feedback amongst learners during both their online written exchanges (Lee, 2001; González-Lloret, 2003) and in oral interactions (Jepson, 2005). Furthermore, in a comparative study (text-SCMC vs. video-SCMC), Hung and Higgins (2016) found that clarification requests and confirmation checks were used consistently in both text-based and video-based SCMC, while comprehension checks appeared only in five incidents of video-based interactions and were absent in text-based interactions. Hung and Higgins (2016) subsequently provided possible explanations for the infrequent use of confirmation checks in learners' synchronous interactions. As they envisaged, their infrequent occurrence in text-SCMC could be attributed to the fact that learners may have felt relatively more confident in their performance within this context, as their participants were able to consult online resources (such as Google Images and dictionaries). In relation to their infrequent occurrence in video-SCMC - and equally relevant

to voice-SCMC – this might have been because learners often showed their understanding simultaneously using backchannelling cues.

While clarification requests and confirmation checks were used to negotiate for meaning, recasts were found to be the predominant device of form negotiation. Interestingly, all of these interactional feedback devices fell into the category of implicit/indirect negative feedback.[25] In such instances, implicit negative feedback does not explicitly give any indication that an error has occurred, whereas explicit feedback does (Adams, Nuevo, & Egi, 2011). Only one case of explicit feedback was found in the oral SCMC, and thus, no generalization could be made in relation to explicit feedback and its occurrence in SCMC contexts.

This finding substantiates those reported by studies examining NS-NNS interactions, either in FTF (e.g. Mackey et al., 2000) or in SCMC contexts (e.g. Sotillo, 2005; Tudini, 2003). Despite the difference in the type of interlocutors, the findings of these studies imply that NSs tend to provide NNSs with primary implicit feedback,[26] including negotiation moves, recasts or a combination of both. However, when relating this finding to those reported by studies examining NNS-NNS interactions in text-SCMC, it supports some (e.g. Bower & Kawagushi, 2011; Morris, 2005) while contradicting others (e.g. Kim, 2014b; Oskoz, 2009; Pellettieri, 2000; Sotillo, 2005). In Bower and Kawagushi's (2011) study, they found that all of the negative feedback moves were mostly implicit, either negotiation moves or recasts, while only three incidents of explicit feedback were found during their investigation. Likewise, Morris (2005) found that learners in child-to-child interactions provided each other with exclusively implicit negative feedback. In contrast, the other studies revealed that learners provided both implicit and explicit feedback to one another during SCMC.

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[25] As Sotillo (2010, p.353) pointed out, the provision of corrective feedback or negative information, orally or in writing, should be referred to "as negative feedback since intentionally, that is, the interlocutor's intention to correct, cannot be assumed".

[26] The researchers did not dictate the type of feedback to be used by the NSs, rather the natural flow of interaction guided the type of feedback that was utilized.

6.2.2.3 Linguistic foci of negotiations

The findings of the linguistic foci of negotiations showed that lexical issues triggered the vast majority of negotiations in both contexts (46% in voice chat; 36% in text chat). That is, negotiations occurred most frequently when new words were introduced and their meanings were sought, as well as when words were inappropriately used. In comparison, morphosyntactic triggers were found in lower proportions (19% in voice chat; 22% in text chat). These findings are not surprising, as lexical negotiations have been identified to be the most predominant type of negotiations in learner-learner interactions, whether this is in FTF context (e.g. Williams, 1999) or in the context of SCMC (e.g. Blake, 2000; Kaneko, 2009; Pellettieri, 2000; Sotillo, 2000; Smith, 2003; Yilmaz & Granena, 2010). This tendency was also observed in some studies on NS-learner interactions in SCMC, in which lexical items were found to be the main triggers for negotiations, but grammatical errors were largely ignored (e.g. Tudini, 2003). In some other studies however, similar amounts of lexical and grammatical triggers caused negotiations in learner-learner interactions (Chen & Eslami, 2013; Loewen & Reissner, 2009; Yuksel & Inan, 2014).

From among the explanations that are put forward for the primary focus on lexical items and secondary focus on morphosyntax during task-based interactions include the following: First, lexical aspects of L2 production are important for successful L2 communication, and for this reason, they may be particularly amenable for interactional feedback (Lyster et al., 2013). Second, the tasks, which do not necessitate using particular forms, might have negotiations predominantly on lexical items (Kaneko, 2009). In his doctoral research, Kaneko (2009) used three types of tasks (role-play, spot the difference, and constructive tasks), and his findings revealed that the constructive tasks created a more balanced distribution of negotiations over lexical and morphosyntactic items. Accordingly, he made the suggestion that the type of task could determine whether learners need to consider and focus on particular grammatical forms. The task used in the current study involved the participants having pictures that were slightly different from each other, and they were required to find out five differences by exchanging their information. Particular grammatical forms were not focused upon or required, and therefore, this task might not have encouraged learners to use particular morphosyntactic items as they did to lexical items.

Furthermore, there were some cases of negotiations that were triggered by problems related to the general coherence of the interaction in both modalities. While they were abundant in voice chat (19%), they shared the least amount of the triggers distribution in text chat (11%). These type of triggers were also reported in few SCMC studies and were labeled as either global (e.g. Bueno-Alastuey, 2013) or discourse triggers (e.g. Yanguas, 2010).

In addition to the aforementioned triggers, errors in phonology within voice chat, and errors in spelling/orthography within text chat constituted a number of negotiation triggers (16%; 31%, respectively). In accordance with these results, previous interaction research has demonstrated that negotiations for phonological issues do indeed occur within interactional tasks, either in FTF contexts (e.g. Ellis et al., 2001; Gurzynski-Weiss & Baralt, 2014; Loewen, 2005; Mackey et al., 2000) or in voice-SCMC contexts (e.g. Bueno-Alastuey, 2013; Jepson, 2005). However, in these two studies of the voice-SCMC context, the highest number of repair moves (Jepson, 2005) and LREs (Bueno-Alastuey, 2013) focused on the negotiation of phonological features, followed by lexical triggers. In this study, the phonological triggers caused the least negotiations in voice chat. As Jepson's (2005) qualitative analysis showed that pronunciation-related repair moves constituted the bulk of negotiations in voice chats, he concluded that, "voice chat may be an optimal environment for pronunciation work" (p.92). While the present study findings confirm the potential of voice chat to negotiate and develop pronunciation-related issues, they also reveal that this is not its only benefit. Rather, they suggest its potential to tackle and develop different language aspects, including lexis and grammar.

6.3 Learners' Noticing in Voice and Text-based SCMC

In addition to examining the differential effects of voice- and text-SCMC on generating negotiated interactions between learners whilst performing task-based activities, this study also sought to provide an empirically-driven evaluation of the modality effects on facilitating the cognitive process of noticing during task performance on online interactions.

There is evidence in the SLA literature to suggest that some form of attention to input is necessary or at least advantageous for intake derivations (i.e. input is necessary for input to become intake for further mental processing) (Leow, 1997; Long, 1991; Schmidt, 1990, 1995; Tomlin & Villa, 1994). This insight stresses the importance of exploring the nature of noticing in producing output and receiving input while engaging in L2 interactions. Several researchers have argued that text-SCMC can maximize learners' opportunities to notice target language forms and make cognitive comparisons, offering rationales based on the unique features of written interactions (i.e. Abrams, 2003; Blake, 2000; Kern, 1995; Kim, 2014a; Lai & Zhao, 2006; Lee, 2008; O'Rourke, 2005; Pellettieri, 2000; Salaberry, 2000; Smith & Sauro, 2009; Warschauer, 1997). An important feature that was reaffirmed across these studies was the potential that online written interactions had in increasing the likelihood that learners would focus their attention to language forms and notice the gaps in their interlanguage. As stated by O'Rourke (2005), the nature of the written modality may bring language forms "more sharply into focus than is possible in oral conversation" (p. 438). Gilabert et al. (2016) further explain that speech may constrain the input/feedback processing, since it is characterized by the rapidity and evanescence of output, whereas writing could facilitate learners' processing of input/feedback since it is slow and it results in a permanent record. Due to the availability of time and visibility of text in text-SCMC, this medium of interaction is argued to work as a "cognitive amplifier" (Warschauer, 1997, p.472) or "intellectual amplifier" (Shetzer & Warschauer, 2000, p.173). That is, the affordances of the medium are assumed to liberate learners' attentional processes, and consequently, increase the likelihood of learners attending to language forms in input/feedback they encounter during the course of interaction

To examine whether EFL learners benefit from these affordances, the third and fourth research questions were concerned with what differential impact (if any) oral and written

SCMC have on the quantity and quality of learners' noticing. Since Swain's (1995) proposal of the output hypothesis places an emphasis on L2 learners' noticing as a result of internal (i.e. monitoring of own productions) or external feedback (i.e. interactional feedback provided by the interlocutors), this study therefore verified noticing incidents resulting from both types of feedback (i.e. self-repairs and noticing of interactional feedback). Analyses, carried out using both quantitative and qualitative approaches, yielded the following interesting findings: First, while both modalities appeared facilitative for the occurrence of self-repairs, the text chat significantly increased learners' self-repairs. However, the qualitative analysis of the type of self-repairs showed that, while the learners' attention was predominantly focused on spelling and orthography during text chat, it was mostly concerned with morphosyntax during voice chat. Second, both modalities appeared equally conductive in promoting incidents and higher levels of L2 learners' noticing of interactional feedback. Overall, these findings indicate that affordances of text chat may help learners more when monitoring their own productions, but not in noticing deficiencies and target-non-target mismatches in their L2 knowledge addressed by their interlocutor's feedback. These findings will be elaborated upon in Sections 6.3.1 and 6.3.2, together with the findings from the debriefing questionnaire, in order to obtain a more holistic perspective of learners' experiences and perceptions about their noticing in voice and text chat.

6.3.1 Self-repairs

Self-repairs are seen as evidence of noticing and they are used to infer that a learner has engaged in some monitoring processes, as well as indicating that they have noticed deficiencies in their own productions (Kormos, 1999; Swain & Lapkin, 1995). The findings of the present investigation showed that self-repairs appeared in both modalities of SCMC, offering evidence that learners can pay attention to their own output and make frequent modifications to their non-target-like productions, without receiving feedback in online interactions. These findings support previous examinations of learners' interactions in text-SCMC, which provide evidence that learners' self-repairs do occur in this context (e.g. Lee, 2008; Sauro & Smith, 2010; Smith, 2008; Tudini, 2003). They do, however, refute those of Jepson (2005) and Loewen and Reissner (2009). That is, after relying only on the transcripts of interaction when comparing voice and text chats, Jepson (2005) concluded that both

synchronous modalities may not be conductive to self-corrections. Smith (2008) challenged Jepson's findings and critiqued his data collection methodology (i.e. relying on printed chat logs), as it fell short of detecting learners' monitoring and attention to language forms within a text-SCMC context, which consequently lead to "a faulty conclusion" (p. 96). Conversely, Loewen and Reissner's (2009) compared between monitored and unmonitored students' interactions (i.e. the presence or lack of a teacher) in virtual classrooms (i.e. written chat). The findings showed that self-corrections were evident in the monitored interactions, while there was no self-correction in unmonitored SCMC. The researchers attributed this difference to the effect of teachers' presence, claiming that it is the reason why learners would pay closer attention to the accuracy of their productions. While this could be true, particularly in classroom contexts, one could still challenge this finding due to the researchers' mere reliance on printed chat logs. The current study debates these finding and argues that learner-learner interactions are facilitative for self-repairs in both voice and text chats. It also provides support to those who argued that evaluating instances of self-repairs on the basis of final chat logs is inadequate. Indeed, evaluating the occurrence of self-repairs on the basis of these "impoverished" chat logs (O'Rourke, 2008, p.236) failed to detect much of the "missing data" (Smith, 2008, p.89) that video-enhanced chat records have revealed.

6.3.1.1 Frequency of self-repairs

Considering the distribution of self-repairs across voice and text chat, the descriptive statistics first revealed that text chat promoted double the amount of self-repairs in voice chat (*Mdn*= 2.0; *Mdn*=1.0, respectively), despite the fact that more turns and words were produced in the oral modality than in the written one. When a statistical analysis was conducted on self-repairs per 100 words, the findings similarly revealed that text chat was significantly more facilitative for self-repairs than the voice chat.

This finding is in accordance with the findings of some previous studies that have compared self-corrections in text-SCMC with FTF interactions, after controlling for differences in the amount of language output produced in each interaction condition (e.g. Lai & Zhao, 2006; Zeng, 2017). In Lai and Zhao's (2006) study, the results showed that text-SCMC was superior to FTF interaction in promoting self-repairs, and similarly, when examining the mode effects (FTF vs. text-SCMC) on the type of LREs (i.e. self-correction,

negative feedback, metatalk and request for assistance), Zeng (2017) found that text-SCMC produced significantly more self-corrections than FTF interaction did. In addition, this finding supports many researchers' suggestion that, among the potential benefits afforded by text chat, is its capacity for frequent self-repairs (Kitade, 2000; Lee, 2001; Lee, 2008; O'Rourke, 2008; Pellettieri, 2000; Sauro & Smith, 2010; Smith, 2008; Warschauer, 1996; Warschauer & Kern, 2000). This might relate to the immediate visibility of learners' output, the slow pace of written interactions and the increase in planning and processing time, which consequently, could reinforce learners' tendency towards reflection and self-correction. In other words, due to these affordances, learners could have more cognitive resources to direct towards their messages in text chat than they have in voice chat, and thus, more self-repairs result in the written modality.

Additionally, some researchers have suggested that text communication, in which social and backchanelling cues are absent, may promote more frequent self-corrections than oral interactions, as learners rely solely on text to transfer their desired meaning and sustain the flow of their interaction (Lee, 2001; Smith, 2003). As Smith (2003) states, "the entire burden of communication on written characters" (p.47), could force learners to focus on language forms, monitor and review their messages for the sake of achieving clearer and more accurate messages to ensure comprehension. Interestingly, some learners' comments during the debriefing interviews provided further evidence to support this. For example, P2 reports, "*in writing, I need to be precise to transit the idea and this is why I restructured my sentences many times*", and P6 states,

> *I felt more obliged to write carefully and correctly in text chat. In voice chat, my partner could understand me and I could understand her even if we did not say things properly.*

Before concluding the discussion of the occurrence of self-repairs in oral and written SCMC, it is important to consider findings yielded by the debriefing questionnaires and interviews. Interestingly, one should note that the results from the debriefing questionnaire support the quantitative findings. Although different perceptions were indicated, suggesting that learners did benefit from both modalities in terms of noticing and correcting their L2 productions, more positive attitudes were in support of the text chat rather than voice chat

with regards to the potential of modality to draw attention to own language (47.5% vs. 37.5%) and to correct own errors (37.5% vs. 25% respectively).

Nevertheless, the results of the debriefing interviews suggest that there may be a potential bias in these findings. During the interviews, some participants indicated that they noticed some of their own errors, but because of the oral or written nature of their interaction, they did not feel it was necessary to correct them. For example, P23 indicated that the ephemeral nature of speech did not encourage him to repeat and modify his errors, while P15 declared that the written nature of text would help her partner to understand her, so there was no need to correct errors. This observation supports Lai and Zhao (2006), who note that learners' self-repairs may be, "an underestimation of their noticing of their own errors" (p. 117) in the different modalities of interaction. In other words, self-repair alone does not provide the whole picture of learners' noticing of own errors.

6.3.1.2 Features of self-repairs

In terms of which types of self-repairs each synchronous modality encourages, the findings showed that both modalities encouraged learners to reflect and evaluate the different linguistic forms they used in their output. In the voice chat, the morphosyntactic self-repairs accounted for the majority of self-repairs in this context, resulting in 63%, followed by 21% lexical self-repairs and 16% phonological self-repairs. In the text chat, self-repairs of errors in spelling and orthography constituted as the majority, at 64%, followed by 31% morphosyntactic self-repairs and 5% lexical self-repairs. A comparison between the modalities therefore suggests a slight difference: while voice chat encouraged more self-repairs of the morphosyntactic errors, the text chat promoted more self-repairs of errors in spelling and orthography. These results are in support with the existing self-repairs literature, either in FTF context (e.g. Kormos, 1999) or in text-SCMC context (e.g. Smith, 2008), particularly with the distribution of grammatical and lexical error self-repairs. One finding that seems to be consistent among these studies is that learners seem to self-correct grammatical issues more often than lexical issues.

As highlighted in the data from this study, spelling/orthographical errors were those that the participants self-repaired the most in text-SCMC. Interestingly, studies examining self-repairs in text chat have excluded spelling/orthographical errors from their counts (e.g. Lai & Zhao, 2006; Smith, 2008; Tudini, 2003). While these researchers did not justify this exclusion, this study argues that such repairs are important as they signal the learners' attempt to achieve more accurate production, and consequently, successful communication with an interlocutor. A note of caution is due here, since learners indicated in the debriefing interviews that their increased attention to spelling/orthography could be partially due to their inadequate familiarity with typing in the English language, particularly on a computer keyboard using the QWERTY keyboard layout.

6.3.2 Noticing of interactional feedback

No study, to the best of my knowledge, has compared incidents and levels of noticing during negotiations across oral and written SCMC. Previous research that have informed on the effects of the communication modes, namely FTF and text-SCMC on learners' noticing of negative feedback, revealed mixed and inconclusive findings. Thus, because noticing is a crucial aspect of L2 development and acquisition (Schmidt, 1995), this study sought to ascertain opportunities of noticing in synchronous interactions, and more specifically, determine the modality of interaction (i.e. oral vs. written) in promoting or precluding this cognitive process. The quantitative and qualitative findings will be presented and refined in Section 6.3.2.1. and Section 6.3.2.2.

6.3.2.1 Frequency of noticing of interactional feedback

In the present study, learners' noticing of interactional feedback was examined utilizing two measures: performance (i.e. provision of modified output/uptake) and introspection (i.e. SR comments). Findings to each measure are presented and discussed in a separate section, followed by a note on the consistency and/or discrepancy of the two measures.

6.3.2.1.1 Performance measure

When comparing the occurrence of modified output in the two modalities, the results showed that the extent of output-modification was higher in voice chat than in text chat (40% vs. 21%, respectively). Moreover, voice chat was not only more facilitative for the production of modified output, but also for the production of successful uptake (28% in comparison to only 14% in text chat). However, given the discrepancies found between the performance and introspective data, these findings need to be interpreted with caution.[27]

Theoretically, it is argued that negotiations provide opportunities to modify output and produce uptake, not only to make discourse comprehensible, but also linguistically more accurate (Doughty & Varela, 1998; Fujii & Mackey, 2009; Shehadeh, 1999). The present findings add to the CALL-SCMC research, which has lent support to this argument, showing that L2 learners' uptake occurs in text-SCMC (e.g. Kim, 2014b; Iwasaki & Oliver, 2003; Loewen & Erlam, 2006; Smith, 2005) and extended it to the context of voice-SCMC.

However, due to its slow and self-paced setting, text-SCMC has been argued to be facilitative to produce modified output/uptake (Kern, 1995; Pellettieri, 2000; Salaberry, 2000). While incidents of modified output/uptake occurred in text chat, their small rate in comparison to those found in the oral modality suggests that text chat might be less advantageous for the production of modified output. This small rate of uptake during text-SCMC has yielded similar reports in the findings within SCMC literature. Iwaskai and Oliver (2003) found that around 23% of corrective feedback led to uptake, while Smith (2005) found only 7 moves of uptake in the 66 negotiated focus on form episodes (10%) in his study with 24 intermediate-level ESL students. In addition, Loewen and Erlam (2006) found only 9 percent of uptake in their study with 31 elementary-level L2 learners, and Kim (2014b) found only 7 percent of uptake in her study with 28 intermediate-level ESL learners. Upon taking all these studies into account, the findings suggest that uptake of negotiated forms seems to be reduced in written online interactions.

These findings however, do contradict those from Pellettieri (2000) and Tudini (2007), which reported a higher level of uptake, resulting in 75% and 59%, respectively. This higher

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[27] Further clarification for this shall be provided in Section 6.3.2.1.3.

uptake rate, however, may stem from the differences in task and dyad type as illustrated previously in Section 2.3.4.1.

6.3.2.1.2 Introspective measure

Learners' comments in the SR interviews were examined to ascertain whether they have engaged in the process of noticing after receiving negative feedback from an interlocutor. The descriptive findings initially suggested that the voice chat facilitated a higher percentage of noticing incidents than the text chat (52% and 37% respectively). The results of the inferential statistics, however, did not yield any significant difference between the oral and written modalities in promoting learners' noticing of deficiencies in their L2 productions. Nevertheless, with such a small sample size, caution must be applied, as this statistical analysis was carried out on the data of only 22 participants (out of 40).[28]

An argument that has been put forth is that text-SCMC creates an ideal atmosphere facilitative for learners' noticing and cognitive comparisons. This is because of the availability and permanence of feedback, as well as the time learners have to focus their attention on language forms whilst not impacting the flow of their communicative interaction (Kern, 1995; Pellettieri, 2000; Warschauer; 1996). Interestingly enough, these affordances do not lead to greater incidents of noticing in text chat when compared to voice chat in the present study. Additionally, these arguments have not been borne out in other empirical investigations of the potential of text-SCMC in increasing learners' noticing of interactional feedback, either in text-SCMC alone (e.g. Kim, 2014b) or in comparison to FTF interactions (e.g. Gurzunski-Weiss & Baralt, 2014; Lai & Zhao, 2006). In Kim's (2014b) study, the rate of the learners' recall of feedback provided in text chat in the SR interviews was low, resulting only in 8%, far fewer than this present study's participants' recall of feedback in the SR sessions (37%).

Furthermore, Gurzunski-Weiss and Baralt's (2014) investigation of Spanish L2 learners' noticing of feedback in FTF vs. text-SCMC revealed no statistical difference in the learners' ability to notice feedback based on the mode. In addition, Lai and Zhao's (2006)

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[28] This was the number of participants with valid values for comparison between the oral and written SCMC. In cases where the participant did not receive feedback in the two modalities, or received feedback in one but not the other, then their noticing data were counted as missing.

examination of ESL learners' noticing of feedback, particularly negotiation of meaning and recasts in text-SCMC as compared to FTF interactions, revealed no statistical difference. Despite this statistical finding, it is important to note that Lai and Zhao (2006) concluded that text-based online chat promotes more noticing than FTF interaction, seemingly based on their descriptive results and the large effect size (*M*= .45 and *M*= .24, respectively; *Cohen's d=* .83). After analysing these studies in light of each other, one may assert that these findings do not support the claims associated with text-SCMC potential to increase learners' noticing of feedback, suggesting that oral and written modes/modalities could contribute equally to the increase of the saliency of language forms and learners' subsequent noticing of them.

However, these findings do contrast those by Yuksel and Inan (2014), who found that text-SCMC was significantly more facilitative for noticing than FTF interactions. In their examination of the effects of communication modes (FTF vs. Text-SCMC) on negotiation of meaning and its noticing, even though FTF interactions generated a higher number of incidents for negotiation of meaning, the text-SCMC context led to more instances of noticing. This difference was significant, leading the researchers to conclude that text-SCMC is more facilitative for learners' noticing than oral FTF interaction. However, limitations identified with this study could restrain this conclusion: 1- the time-gap (i.e. four days) between task-based interaction and SR interviews, and 2- the unclear conceptualization and operationalization of noticing (see Section 3.5.2).

In summary, the quantitative analysis of the noticing incidents revealed by the learners' introspective comments in the SR interviews showed that there was no difference between the oral and written SCMC to help learners' notice gaps and deficiencies addressed by their partners' corrective moves. The results of the follow-up questionnaire provided further evidence to support this conclusion. The majority of learners' responses (62.5%) to the effect of modality on their noticing of corrective feedback provided by their interlocutors indicated that there was no difference between the oral and written modalities. Moreover, twenty percent favored text chat, while the rest (17.5%) believed that feedback provided in voice chat was more useful to notice their linguistic errors. These attitudes, with no apparent bias to one modality over the other, suggest how opportunities of noticing corrective feedback could be similarly attainable in oral and written online discourse.

6.3.2.1.3 Notes on measures of noticing

As highlighted, the noticing of incidents revealed by introspective SR data was compared to the learners' provision of uptake in the interaction data. This comparison revealed two important issues: 1) noticing does not necessarily lead to uptake, and 2) uptake may occur, but noticing may not. In other words, lack of immediate uptake does not indicate that nothing is noticed, and the presence of uptake does not indicate that the form has been noticed. Elaborations on these issues shall follow.

First, the results revealed that the rate of noticing was only 56% when it was measured by uptake in the text chat, and even a smaller rate (i.e. 53%) was found in the context of voice chat. This suggests that only approximately half the proportion of noticing was represented by uptake in the online synchronous modalities of interaction. Therefore, these results indicate the limitations of the measure 'uptake' in revealing about learners' noticing of feedback in SCMC contexts; this subsequently challenges studies that have relied solely on this measure in their examination of learners' noticing of feedback within text chat (e.g. Iwasaki & Oliver, 2003; Loewen & Erlam, 2006). In relation to this finding, some researchers have questioned the reliability of uptake as a measure of learners' noticing and learning in text-SCMC, suggesting that this communication medium, probably due to its unique features, might not promote the provision of uptake. Smith (2003, 2005) envisaged that learners might be less inclined to uptake a previous utterance while text chatting because of the pressure to respond quickly to incoming messages in this context. Indeed, some participants expressed the feeling of pressure to respond immediately and quickly to their partners' messages. Furthermore, Kim (2014b) argues that retyping the correct utterance may feel "unnatural and redundant" in written interactions compared to situations with oral feedback (p.65).

Not only is this the case in SCMC contexts, but a small proportion of noticing that was represented by uptake was also found in a classroom context. In their comparison of introspective and performance data, Bao et al. (2011) found that the rate of noticing was only 14.3% when it was measured by uptake in oral FTF classroom interactions. Indeed, these results could support indications that uptake occurrence depends mostly on conversational contexts (Kim, 2014b; Oliver & Mackey, 2003; Sheen, 2004).

Second, the comparison revealed another important issue, which is that uptake may occur, but not noticing. For thirteen incidents of uptake in voice chat, the participants failed to report noticing during their SR interviews. To elaborate, the learners modified their erroneous productions in response to interactional feedback during their oral interactions; however, when it came to their introspective feedback, they did not report why they did this. As explained previously in the Results Chapter, this lack of self-reporting could have two main interpretations. First, learners might repeat a recast, implying that they have allocated some attention to them, whilst in fact, this repetition could be a mimic repetition or a means of participating in the conversation, with no noticing and recognition of the negative evidence. Mackey and Philp (1998) proposed that repetitions of recasts "may be red herrings" (p. 338). Indeed, it has been argued that in some cases, uptake might serve social rather than cognitive functions (Ellis & Sheen, 2006; Kim, 2014b). Therefore, it would be difficult to equate this uptake with noticing and/or learning. As many SLA researchers argued, for the negative evidence to be useful, learners need to recognize the corrective intent of the feedback and identify the problematic aspects in their interlanguage (Egi, 2007a; Roberts, 1995; Russell & Spada, 2006). In other words, learners need to be aware of the fact that they are being corrected and to perceive the intent behind the corrective move (i.e. the mismatch between their non-target-like utterances and the corresponding target forms). Second, learners might have noticed and corrected errors in their productions, but failed to reveal that in their SR comments. As argued by some researchers, the lack of self-reporting should not be interpreted as a lack of awareness, as some thought processes are difficult to verbalize (e.g. Jourdenais, 2001; Schmidt, 2001; Uggen, 2012). Additionally, the oft-used recall prompts such as, "*what were you thinking?*" might not elicit learners' thoughts about a particular interactional move (e.g. the interactional feedback), as elicited reports are often found to be summative comments about their interactions (Egi, 2010). Therefore, the lack of reported noticing in the introspective protocols does not necessarily imply the non-occurrence of noticing (Egi, 2010; Mackey, 2006b), as this measure does have its limitations (Uggen, 2012).

Comparisons of performance and retrospective measures shed light on the limitations of the earlier studies, which examined noticing in SCMC contexts by mere relying on the uptake measure, and highlighting important methodological considerations. There is a ground

theoretical basis for the role that uptake can play in SLA. These findings therefore do not underestimate this positive role of uptake, but they suggest that their absence and/or occurrence should be reported with caution. Smith's (2005) study provides support to this suggestion, as his examination of lexical acquisition in text-SCMC found that the presence and absence of uptake did not appear to be an important variable in the short and middle-term acquisition of target lexical items. As his results revealed no relationship between uptake and lexical acquisition, Smith (2005) argued that, there is "a possible diminished role for uptake in SLA" (p.33), particularly in the context of text-SCMC.

Considering the above-discussed limitations associated with the provision of uptake, learner's uptake cannot provide a full picture of the effects of SCMC on noticing. Rather than relying on this traditional crude measure of noticing provided by interaction data, the present findings advocate that, utilizing introspective measures can triangulate and attest data on learners' noticing of interactional feedback, and further, provides a richer qualitative insight into learners' internal processes.

6.3.2.2 Features of noticing of interactional feedback
6.3.2.2.1 Noticing in terms of trigger types
When inspecting the noticing incidents in terms of the linguistic category addressed by the interactional feedback, the findings showed that the lexical items accounted for the majority of learners' noticing, followed by noticing of phonological/spelling errors, and finally by the noticing of morphosyntacic errors. Interestingly, the pattern of frequency of the noticed linguistic features was similar across the two synchronous modalities, suggesting that the modality of interaction does not play any role in enhancing certain linguistic features over others.

As shown, the lexical items accounted for most of the learners' noticing (79% in voice chat; 80% in text chat), but a much smaller frequency for the noticing of morphosyntactic features was reported in both modalities (15% in voice chat; 7% in text chat). In their comparisons of FTF vs. text-SCMC, Lai and Zhao (2006) found that lexical items were noticed more in FTF interaction, but text-SCMC facilitated more noticing of grammatical

items. As for Yuksel and Inan (2014), they found that there was not much difference between learners' recall of lexical and grammatical negotiations in both mediums.

A limited number of descriptive, exploratory studies have suggested that text-SCMC could enhance the development of grammatical competence through noticing of morphological and syntactical features (e.g. Pellettieri, 2000; Salaberry, 2000). However, the results of these qualitative studies are rather controversial, and there is no clear evidence tapping carefully into learners' cognitive processing. That is, these studies used negotiations as evidence of learners' noticing of linguistic features, but they did not employ direct measures that could ascertain learners' noticing in a legitimate manner. Arguably, negotiations of certain linguistic features do not necessarily result in learners' being cognitively engaged with them. In comparing FTF and text-SCMC on the development of past-tense forms in Spanish, Salaberry (2000) found that the first signs of change in the past-tense morphological marking were more clearly identified in the text-SCMC tasks than in FTF tasks. This finding led Salaberry (2000) to argue that morphosyntactic means are more salient in written discourse than in oral interactions, revealing that text-SCMC may represent a pedagogically sound environment for morphosyntactic development in the L2. While Salaberry's (2000) work was a pioneering pilot study in the field, his argument could be vigorously challenged due to two main reasons: (a) participants performed the FTF task before the text-SCMC task,[29] and (b) there was a time delay of at least one week between the two tasks. These limitations could have significantly affected the learners' performance in the text-SCMC, and thus, resulted in more morphosyntactic accuracy. A further comparative study with more appropriate measures of noticing and grammatical development is therefore suggested.

It is evident that learners' infrequent noticing of morphosyntacitc features is not surprising, and it has been an alarming result found within many studies investigating the noticing of corrective feedback in task-based interactions carried out in laboratory settings - whether this is in an FTF context (e.g. Egi, 2007b; Mackey et al., 2000) or SCMC contexts (e.g. Gurzynski-Weiss & Baralt, 2014; Morris, 2002; Ware & O'Dowed, 2008). In an oft-cited study, Mackey et al. (2000) suggested that learners' noticing of feedback addressing

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[29] From the study procedure, the researcher did not mention any counterbalancing of the order of mode of interaction.

morphosyntactic errors is not 'isomorphic' to their noticing of feedback addressing lexical and phonological errors. Similar to the findings reported in the oral medium in this present study, Mackey et al. (2000) found that there was a greater likelihood of feedback to be perceived in instances of lexicon and pronunciation, and less likely in cases of morphosyntax. The researchers speculated that the learners' noticing of feedback that targeted lexical and phonological errors may be due to the fact that, when compared to morphosyntactic errors, irrelevant lexical choices and inaccurate pronunciations have "more potential to seriously interfere with understanding" (Mackey et al., 2000, p.493).

In line with this speculation, some other researchers have argued that, due to their low salience, morphosyntactic features contain less communicative value and they do not impede on mutual understanding, and subsequently, they may 'go by the wayside' (Lee, 2007; Ware & O'Dowed, 2008). This argument could also be explained in light of VanPatten's (1996) model of L2 input processing, as well as Skehan's (1998) views on limited attentional capacity on task performance. According to their views, learners are not capable of attending to all the information in input available to them, and only some of it becomes the object of their selective attention. Due to their limited processing capacities, learners are likely to first attend to lexical items, and if resources are not depleted at this point, they may attend to grammatical forms with high communicative value. When applying this argument to the type of task utilized in this study, it is possible to accept that the 'spot-the-difference' task may have required more attention to the message content (i.e. naming and describing different objects in the picture) than the message form. Hence, learners allocated more of their attentional resources to lexical items but not to morphosyntactic issues. Another reason put forward as to why noticing of morphosyntactic features is not common, is because recasts are the most common feedback type used to address errors in morphosyntax. For example, Mackey et al. (2000) and Gurzunski-Wiess and Baralt (2014) conducted a post-hoc analysis to examine what type of feedback was used to address different error types. Overwhelmingly, recasts were found to be the most common type of feedback used to address morphosyntactic errors. This type of feedback is argued as not to be facilitative in noticing target-non-target mismatches, and also that learners tend to interpret this feedback type as relating to content rather than linguistic forms (Morris, 2002).

Pronunciation is a central component of the L2 acquisition. Sicola (2010) states that the cognitive processes of attention and noticing are as potentially influential in acquisition of L2 phonology as for other areas of language development. In a very recent systematic study, Gurzynski-Weiss, Long, & Solon (2017) reviewed five empirical studies that have measured pronunciation, alongside lexical and grammatical targets. The researchers concluded that task-based interaction is, "a worthwhile avenue for promoting attention to and the development of pronunciation" (p.221). Additionally, FTF interaction research has revealed the efficacy of corrective feedback provided during task-based interactions, in drawing learners' attention to phonological errors (Gurzynski-Weiss & Baralt, 2014; Mackey et al., 2000). Findings of the present study support these conclusions and provide evidence of their relevance to voice-SCMC context.

Phonological features were the second highest linguistic features attended to in voice chat. Not only were learners able to notice their partners' more accurate pronunciations most of the time (15 out of 23), but they also showed higher levels of processing of the phonological features. For instance, in most cases (13 out of 15), learners were able to verbally detect the differences between the target and non-target forms. These findings, while preliminary, suggest the potential of task-based voice-SCMC in promoting learners' attention, and in the development of L2 pronunciation.

6.3.2.2.2 Noticing in terms of feedback types

The examination of the noticing incidents, in terms of the type of feedback, showed that negotiation moves led to more incidents of noticing than recasts.[30] This finding was congruent in the voice and text chat, resulting in 64% and 52% noticing of negotiation moves in comparison to the 24% and 17% noticing of recasts respectively. Therefore, it suggests that, regardless of the interaction modality, negotiation moves may encourage learners to be more careful and that they should attend to form. This substantiates the findings of several interaction studies, conducted in different L2 contexts, which suggest that learner's noticing may be affected by interactional feedback type. For example, Mackey's (2006b) investigation

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[30] As previously alluded to, only one case of explicit feedback was found in the oral SCMC, and thus no generalization could be made in relation to explicit feedback and its effect in terms of drawing learners' noticing.

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of learners' noticing and learning in instructed L2 classrooms found that grammatical forms (questions), that were more often negotiated, were noticed and learned better than those (plurals and past tense) which were more often recast. Similarly, Mackey et al.'s (2000) investigation of learners' perceptions of interactional feedback provided during their dyadic FTF task-based interactions with NSs, revealed that learners noticed and perceived errors targeted by negotiation moves more than recasts. In addition to these descriptive studies, a number of experimental studies were designed to examine the effects of incidental prompts (i.e. negotiation moves) and recasts on facilitating learners' grammatical development (e.g. Ammar, 2008; Rahimi & Zhang, 2016). The findings of this research have suggested that prompts were more facilitative in enabling acquisition than recasts. Furthermore, Samani and Noordin (2013) extended this line of research by examining the effects of prompts and recasts in text-based SCMC on students' achievements in grammar. Overall, their findings revealed that both recasts and prompts through written SCMC were effective for grammar learning, as there was a significant improvement on the Iranian male postgraduate learners' scores from pretests to immediate posttests. However, when comparing the two corrective feedback techniques, prompts were found to be more useful, as students who received feedback in the form of prompts outperformed their counterparts in the recast and control groups. These findings corroborate Lyster and Ranta's (1997) and Lyster's (1998) earlier suggestions that report negotiation moves to be more beneficial than recasts in drawing learners' attention to linguistic forms, since they may push for modified output and/or enhance the salience of forms.

One of the controversial issues surrounding the effectiveness of recasts as a corrective feedback strategy is the extent to which they are made salient to learners (Ellis, 2013). Their saliency is assumed to affect, whether learners can recognize them and consequently are able to notice the gap between their initial erroneous utterances and the recasts. Text chat is argued to enhance recasts' saliency and correspondingly orient learners' attention to them and stimulate their cognitive comparisons. This argument, however, was not borne out in the present investigation. Given these results, one could argue that recasts may be difficult to be noticed and perceived correctly by L2 learners, particularly in task-based interactions and even in text-SCMC, despite the slower nature of written chat interactions and the enduring nature of written messages.

Theoretically, recasts have been claimed to create an optimal condition for the cognitive comparisons needed for L2 learning to take place (Long, 1996). Long (1996) asserts that recasts are effective in promoting L2 development, as they offer learners both negative evidence (i.e. reformulations of their earlier erroneous productions) and positive evidence (i.e. target-like models). Notwithstanding, as previously mentioned, empirical research has provided little support with regards to the extent by which recasts are found to be facilitative for L2 development and learning. There are some proposed reasons for this limited usefulness. First, several researchers argue that recasts are ambiguous to L2 learners, and thus, learners do not always perceive the correction intent behind them; rather, learners interpret recasts as alternative expressions (serving either as repetitions or affirmations) of what they have just said or comments on the present content (Lyster & Ranta, 1997). Second, Mackey et al. (2000) suggested that recasts might not be noticed because they do not require participation by learners, while in contrast, negotiation moves do require participatory involvement from learners, and thus, they heighten the learners' noticing of gaps in their interlanguage. Another important reason why learners could not benefit from the recasts is because of the setting of their communication. Learners might not have attended to recasts as they were performing a task-based activity, where their focal attention was on meaning and not on form. In support of this, Oliver and Mackey (2003) found that differences of contexts that occur within the classroom setting affected recasts effectiveness. Learners were found to notice the corrective intent of the recasts to a greater extent in lessons where language was emphasized more than in meaning-oriented classrooms. This finding was further supported by other empirical research, which revealed that recasts were more perceived in form-oriented classrooms, whereby the emphasis on accuracy primed learners to notice the corrective function of recasts (e.g. Ellis & Sheen, 2006; Lyster & Mori, 2006). In addition to these reasons, literature of recasts suggests a variety of learner-internal factors (e.g. learners' proficiency level, developmental level, limitations in working memory) or learner-external factors (e.g. length, number of changes, type of changes, and many others) that might constrain learners' noticing of recasts. Considering the main focus of this study, which is to ascertain any modality effects on learners noticing of feedback, and whether the feedback type could modulate this relationship, the study did not probe into these aspects, and it would only refer to relevant studies for those interested (e.g. Egi, 2007a; Philp, 2003).

One last important reason that has been argued to mitigate the efficacy of recasts in text-SCMC is the location of recast in relation to the erroneous trigger (Lai & Zhao, 2006; Loewen & Erlam, 2006; Sauro, 2007). In online written interactions, there is a possible lack of adjacency between the trigger and recast; that is, due to overlaps between interlocutors' turns, the feedback often followed several intervening turns unrelated to the targeted forms. This lack of adjacency indeed appeared to have limited opportunities for the learners to notice recasts and made comparisons between their erroneous productions and that of their partners' more accurate reformulations. In the present study, among the 18 incidents of recasts that were provided in the text chat, six were provided in a non-contingent fashion, and among those, only one incident was noticed. Lai et al.'s (2008) study provides further support to this finding, reporting that learners noticed contingent recasts more significantly than non-contingent recasts. A point that is worth mentioning here is that in some written synchronous networked programs, messages could appear on the recipient's screen while they are being typed (e.g. *Ytalk* used in Pellettieri's (2000) study), whereas in the chat programme used in the present study (i.e. *Skype*), messages only appear when they are completely typed and sent by the interlocutor after pressing the 'Enter' key. In the first case, learners see messages letter by letter, whereas in the other, they view only the final version of their partners' composed messages. These differences could in fact influence the learners' attention to deficiencies in their productions, targeted by recasts (i.e. delayed appearance of recasts may go unnoticed). This also represents an interesting issue for future research, which is to ascertain any different possible affordances in text-SCMC that could bring the learners' attention to recasts in text-SCMC.

Taken together, the study findings suggest that noticing and mental processing that prompts (i.e. negotiation moves) bring about are key factors for L2 learning and development. This discussion, however, does not mean that recasts are of no value to L2 learners. Positive effects of recasts on L2 development have been revealed by a number of experimental classroom (e.g. Doughty & Varela, 1998) and laboratory studies in FTF (e.g. Iwashita, 2003; Mackey & Philp, 1998) as well as text-SCMC contexts (e.g. Sauro, 2009), and are invoked in reviews of corrective feedback (e.g. Lyster et al., 2013) and meta-analyses of research on interaction (Mackey & Goo, 2007) and on classroom oral feedback (Lyster &

Saito, 2010). In an experimental classroom study which examined the effects of recasts on learning English past tense (simple and conditional), Doughty and Varela (1998) found that recasts had a significant effect on learners' accuracy of the target form, as measured by oral and written tests. Similarly, Mackey and Philp's (1998) experimental laboratory study indicated that recasts can facilitate L2 development. In their examination of the effects of recasts on learners' development of question formation, the researchers found that interaction with intensive recasts was more beneficial than interaction without recasts, particularly for more advanced learners.

6.3.2.2.3 Quality of learners' cognitive engagement

The quality of noticing of language forms is an important issue. Based on the theoretical framework of Schmidt's (1995) noticing hypothesis and the several theoretical accounts of cognitive processing (e.g. Craik & Lockhart, 1972; Leow, 1997; Storch, 2008; Tomlin & Villa, 1994), learners process L2 input/feedback in varying degrees. That is, learners could simply attend and refer to a particular language form, while in other instances, they can go beyond the mere reference, and demonstrate a higher level of engagement by explicitly identifying the mismatch between their deviant forms and the target-like forms. A number of L2 studies have revealed that learning is more likely to take place when there is extensive attention paid to language forms than simple/perfunctory attention. Higher levels of processing of linguistic information, including information provided via feedback, were found to be more strongly associated with greater retention than processing them less elaborately (Baraly, 2008; Qi & Lapkin, 2001; Sachs & Suh, 2007). These findings motivated the present pedagogically oriented investigation to shed light on the quality of learners' noticing in synchronous interaction, in order to help understand the dynamic cognitive processes of learners while engaged in online oral and written interactional platforms. Given the increase in examining and considering online language learning, this attempt would contribute to help ascertain any potential impact of the different online interaction modalities. As no study, to the best of my knowledge[31], has considered the level of learners' noticing

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[31] Although a number of studies have touched upon this issue when comparing incidents of noticing in FTF vs. text-SCMC, the unit of their analysis was episode of negotiation for meaning or LREs (e.g. Rouhshad & Storch, 2016; Zeng, 2017). In fact, these units do not take into consideration the learners' subjective experience or verbalization. As Schmidt (2001) stated, the most definitive evidence of noticing is a verbal report, which is revealing about the state of mind in which an individual has undergone.

with regards to the modality of interaction, the present findings could offer useful implications for theory and pedagogy.

As alluded to previously, text-SCMC is argued to make input more salient, and therefore promote higher cognitive processing in comparison to oral interactions (Payne & Whitney, 2002; Sauro, 2007; Warschauer, 1997; Williams, 2005). The findings of the present study provided support to the potential of text chat in motivating higher levels of noticing; however, a comparison between the percentages of elaborate noticing incidents in the voice chats (67%) and text chats (56%) did not indicate any superiority of the written modality over the oral modality.

A point in relation to this discussion is Svalberg's (2012) argument of the limitation of mere consideration of cognitive engagement, without taking into accounts the social and affective perspectives. Svalberg (2012) argues that language awareness occurs as a result of '*Engagement With the Language*', a construct which involves cognitive, social and affective engagement. Therefore, she proposed a threefold model for analyzing learners' attention (or not) to forms, during task-based peer interactions. In a recent study, Baralt, Gurzynski-Weiss, and Kim (2016) utilized this model in their qualitative investigation of learners' attention to form in dyadic task-based peer interactions in FTF and text-based SCMC contexts, offering some interesting findings. The data from the learners' interactions and post-task questionnaires showed more cognitive (e.g. attention to language forms and reflection), social (e.g. supportive interaction) and affective (i.e. positive feelings) engagement in FTF, whereas these levels of engagement were rare or absent in text-SCMC. This finding led the researchers to suggest, that learners' cognitive engagement is mediated by the interaction medium, and is influenced by learners' social and affective engagement. They concluded, "learners' social and affective engagement influenced their cognitive engagement: the more affective and social engagement, the more cognitive engagement learners demonstrated" (Baralt et al., 2016, p.235).

Qualitative findings from the debriefing questionnaires and interviews in the present study seem to support Baralt et al.'s (2016) conclusion. Interestingly, the participants indicated higher levels of engagement and cooperation with their partners while completing

the task in the oral modality than in the written modality. Additionally, they expressed being more relaxed while voice chatting than text chatting, mainly due to problems associated with split turns, lack of backchanneling and prosodic cues, as well as their inadequate typing skills, particularly on a computer keyboard. This enhanced social and affective engagement within voice chat may explain why the frequency of noticing incidents were higher in this context in comparison to text chat (*Mdn*= 50.0; *Mdn*, 33.3, respectively), although the difference was not statistically significant.

6.3.2.2.4 Insights into learners' noticing of feedback in SCMC
The SR data captured qualitative aspects of learners' noticing and provided useful information on learners' mental processes when receiving interactional feedback, yielding four major themes. These themes characterized the ways in which learners processed feedback in SCMC, and were as follows: (a) noticing of gaps in their L2 knowledge, (b) reflecting on linguistic choices, (c) testing hypothesis and (d) priority of some linguistic forms.

Interestingly, learners' noticing did not only result in examining disparities between their productions and their partners' variations, but rather, this noticing further triggered a series of cognitive processes whereby learners identified gaps in their L2 knowledge, made comparisons, reflected on available linguistic choices and tested hypotheses. Elaborations on the identified themes follow.

Regarding the first theme, "noticing gaps in their L2 knowledge", several SR comments illustrated that when learners noticed restrictions in their L2 knowledge, they searched for forms in their partners' feedback. In other words, learners were aware of limitations in their L2, which triggered their attention to appropriate and accurate language forms in subsequent input/feedback.

This phenomenon reflects precisely what Swain (1995) proposes in her output hypothesis, which suggests that output promotes learners to attend to their linguistic limitations, which consequently influences their noticing of linguistic evidence in the available input. This argument has been proven by many researchers who found that

encountering a problem in L2 knowledge while producing L2 output seems to stimulate noticing when the learner is provided with the respective forms in following input (e.g. Qi & Lapkin, 2001; Uggen, 2012).

The second theme, "reflecting on linguistic choices" showed how the interactional feedback led learners to reflect on their linguistic choices to reach linguistically correct and more appropriate decisions. One may assert therefore, that interactional feedback serves as "a cognitive focusing device" (Storch, 2008, p.111), which leads learners to focus their attention on linguistic choices. Surprisingly, these active mental processes appeared predominantly in the learners' comments on their interactions in voice chat, while they were rarely observed in their comments of written synchronous interactions. Thereupon, this finding supports the earlier quantitative descriptive findings, which demonstrate that voice chat provided more abundant opportunities for, not only noticing of corrective feedback, but also for higher levels of noticing in comparison to text chat.

The SR data further demonstrated how the interactional feedback prompted learners to test hypotheses, usually commenting on how the feedback led them to either make changes and modifications, or to provide alternative forms, thereby testing their successfulness and confirming their appropriateness. In fact, Williams (2012) argues, "the cognitive window is open somewhat wider and learners have a richer opportunity to test their hypotheses when they write than when they speak" (p.328). In line with this argument, Gilabert et al. (2016) note that the features of written discourse (i.e. the visibility of text and availability of time) facilitate hypothesis testing during written tasks, since they allow learners more time and freer cognitive resources. Interestingly, this mental process appeared in the learners' comments on their negotiations of both modalities, suggesting that both contexts are facilitative for hypothesis testing, which are argued to be associated with higher levels of engagement and awareness (Leow, 1997).

Finally, the fourth theme, "priority of some linguistic forms", showed that when learners received recasts targeting lexical or phonological/spelling errors, together with morphosyntactic errors, their SR reports commented exclusively on the lexical or phonological/spelling issues, but not on their errors in morphosyntax. This is in line with

what many other studies into noticing of linguistic features in the output have previously reported (e.g. Mackey et al., 2000; Qi & Lapkin, 2001; Williams, 1999). Thus, the findings of these studies showed that learners mostly focus on lexical and other surface levels of linguistic processing, with little focus on morphosyntax. As previously alluded to, learners are more concerned with communicating their ideas as opposed to being accurate, and therefore, their attentional resources may be concerned with semantic (i.e. content) rather than syntactic (i.e. form) processes.

6.4 Learners' Perceptions and Experiences in Voice and Text-based SCMC

In addition to the investigation pertaining to the theoretical strengths of oral and written SCMC, and how these online platforms affect learners' interactional and attentional processes, it was deemed necessary to also shed light on the practical issues of how L2 learners perceive their interactions during these online modalities. Moreover, input from the L2 learners was extracted on what they thought of the potential of oral and written SCMC as resources in their study and in their practice of the target language.

Within SCMC research, there have been very few attempts to understand the potential of SCMC from the learners' perspectives and these attempts have addressed their perceptions of text-SCMC in comparison to FTF interactions (e.g. Kaneko, 2009; Kern, 1995). This study sought out to increase our understanding of how learners benefit from text-SCMC and compare and contrast the learning opportunities potentially afforded by this modality to those available in voice-SCMC. Bærentsen and Trettvik (2002) argue that the objective features of the environment only become affordances when they are related to the users' needs and activity. That is, affordances of a particular medium are relevant only to the extent by which they could be perceived and enacted upon by the users of that mode. To capitalize on the valuable affordances of oral and written SCMC, learners' perceptions were inspected, along with the examination of their interactions and cognitive processing. This was deemed useful to trace and ascertain the realization of affordances, as well as to help enrich our understanding for the potential of SCMC to L2 learning (Blin et al., 2016).

The last research question was therefore concerned with the learners' perceptions of the oral and written modalities, with regards to the following aspects that were investigated: (a) interaction and completion of task-based activity, (b) monitoring and processing of the language and (c) perceived L2 benefits. Responses to the debriefing questionnaire and interview were analyzed for participates' perceptions towards SCMC, and the reasons that the learners provided to explain their positive and negative perceptions towards the two conditions will be further discussed; this data shall be subsequently compared with those reported in earlier relevant studies.

6.4.1 Completing the task

Participants held positive attitudes towards completing the task-based interaction in both modalities; however, the findings indicated that learners expressed a higher preference in performing the task using voice chat. Anecdotal comments made by the learners in the debriefing interviews suggested that interactions within the oral and written synchronous modalities differ in distinct ways, either facilitating or hindering their performance and interaction in each respective modality. The benefits and limitations of each synchronous modality are elaborated upon in the following discussion, based on the main themes identified across the two modalities.

Authenticity: Learners' perceptions indicated that voice chat encouraged more authentic conversation, which is similar to that occurring in FTF situations. Though voice and text chat are both synchronous, learners appreciated the synchronicity of their interactions in voice-SCMC, which allowed them to feel more engaged with their partners and involved in preforming the task-based activity. This perception that voice chat is more synchronous than text chat is supported by Kenning's (2010) statement, in that, "face-to-face offers greater simultaneity than audio networks, audio than text chat, and text chat than a shared word processor" (p.8). This also concurs with the social presence theory, which considers "the degree of salience of the other person in the interaction" as a key factor in determining the effect of the interaction context (Williams & Christie, 1976, p. 65). When relating this theory to SLA, it is argued that the higher the social presence during L2 communication, the more efficient the interaction will be. As Ko (2012) illustrated, when learners perceive a higher degree of social presence, they are more likely to be more satisfied with their interlocutor and their learning experience. Additionally, Yamada (2009) examined learners' perceptions of productive performance and social presence in four types of SCMC: video-conferencing, audio-conferencing, text chat with images and plain text chat. Interestingly, his findings revealed that learners appreciated video and voice-based interactions more than those that were text-based. In line with the attitudes expressed by the present study's participants, Yamada's participants indicated that oral interactions promoted consciousness of natural communication and relief, and thus, enabled them to speak naturally as they would do in FTF interactions. These findings further suggest that social presence enhances the interaction between learners, which, subsequently, impacts their involvement and performance of the

task; this must be taken into consideration when examining the unique benefits of each synchronous modality.

It should be noted though, that in Yamada's (2009) study and this present study, learner-learner (i.e. NNS-NNS) interactions were included, and the effect of increased social presence in this dyadic interaction might not be the same in NNS-NS interactions. For example, Van der Zwaard and Bannink (2014) examined learners' interactions with NSs in text-SCMC and video-SCMC. The researchers noted that the transmission of image and voice in video-based interactions posed a threating communication environment, whereby issues such as NNS' potential loss of face and NS' politeness and solidarity hindered successful task completion. This was not the case in text chatting, where, due to the lack of audio-visual registration, the relative anonymity of this interaction medium motivated the learners to communicate more freely and not to be concerned with loss of face – hence, they were able to negotiate for meaning more often and more successfully.

Feedback and turn-taking patterns: The findings showed that the nature of oral interactions allowed for a smoother flow of information and higher mutual intelligibility than the text chat. In voice, learners gained simultaneous feedback and reciprocated to each turn, resulting in organized discussion and adjacent discourse patterns that facilitated referential coherence. The most consistent comment the participants made during the debriefing interview, was that it was easier to complete the task, as well as cooperate and understand their partners in voice chat. The oral modality gave them a feeling of harmony and connection by being able to simultaneously follow each other and comment extensively on each turn with ease. In contrast, text chat afforded time lapses between turns and resulted in some overlaps that impeded learners from having a coherent discourse.

It should be noted that the turn-taking rules identified by Sacks et al. (1974) do not apply to synchronous written interactions, since in text chat, the conversation floor is available to everyone, and participants can post messages at the same time in the chat window, resulting in different threads intertwined (Herring, 1999). What can also be added to the disturbed turn adjacency, is the fact that some of the turns in this context could continue beyond one message, as participants were able to expand and add to their own contributions

(Berglund, 2009). As a result, participants experienced difficulty in tracking corresponding turns. Similarly, in Kern's (1995) and Smith et al. (2003) studies, the difficulty of regulating turn-taking and accumulation of messages on the screen was perceived as the most serious drawback of the written modality. In fact, it is worth mentioning some issues that could have exerted a minimal influence on learners' interactional patterns in the written modality: First, the participants were not experienced users of text chatting in English, though they used it regularly to chat with family and friends in their L1, and second, the participants may not have used text chatting before for formal task-related interaction.

Availability of facilitative features: Learners referred to features and elements integrated in their oral or written discourse that helped aid their communication process. One widely-expressed advantage associated with voice chat, which also contributes to enhanced coherence and understanding within this context, is the availability of prosodic features and backchannels (e.g. tone, pitch of the voice, and discourse markers such as 'oh, yeah, well' and many others). For many learners, there was more uncertainty in text chat because the tone and intent in written interaction can be harder to interpret. As argued by Smith et al. (2003), text-SCMC is a 'lean' medium in comparison to FTF interaction, as it relies on "fewer channels for the transmission of messages" (p. 706). Moreover, Satar (2015) reported similar findings in her qualitative investigation of learners' perceptions of multimodal SCMC (i.e. video-based). She found that reciprocation and backchannels emerged to be necessary elements in order to keep involvement and understanding in online synchronous interactions, as they led to a smooth conversation flow and satisfaction from conversations.

As identified within this study, the learners were able to better organize and manage their discussion via voice chat than text chat. This was evident in the transcripts of their interactions, and in their reported perceptions and reflections during the debriefing interviews. This however, was not congruent with Kaneko's (2009) qualitative analysis of the transcripts of learners' task-based interactions in FTF and text-SCMC, who suggested some positive aspects of text-SCMC, among which was the better task-organization skills. Transcripts of novices-skilled peer interactions in the two mediums highlighted the learners' systematic way of asking and answering questions in text-SCMC. That is, in the written SCMC, the information exchange between learners was found to be orderly, clear and

without any confusion, but this was not the case in the oral FTF interaction. However, Kaneko (2009) explained that, in their written interactions, the skilled learners initiated the task in most instances, by providing a framework for how to exchange information and proceed through the task. As this pattern was established, learners were able to take control of the task and their learning experience in this modality was enriched accordingly. This systematic exchange of information was not attained among participants in the present study, and their interactions were more influenced by the nature of text chat, wherein turn-taking included overlaps (Berglund, 2009; Herring, 1999; Smith & Gorsch, 2004; Smith & Sauro, 2009). This is consistent with Herring (1999) and Jenks (2009), who suggest that learners might require a set of communicative strategies that could help them maintain coherence and develop their engagement in text-SCMC.

Interestingly, to manage their interactions in text chat, learners reported using some of the keyboard facilities (i.e. Arabic numerals, brackets, question/exclamation marks, symbols and emoticons). These features greatly assisted the learners to ensure a faster communication and better understanding. For example, some learners opted for Arabic numerals in lieu of writing the numbers in full, and question marks in lieu of reformulating clarification requests; these helped save time and generated a faster response time. In addition, one learner was found to supply her partner with additional information between brackets, which was a means of helping her understand. It should be noted however, that while the written modality allowed this learner to be more attentive/deliberate about the clarity of information, her practice of "excessive use of aids" does have the potential to reduce opportunities for negotiations and learning (Kaneko, 2009, p.143). Furthermore, to compensate for the lack of audio cues in text-SCMC, learners reported using emoticons or expressive punctuation. Emoticons are visual representation of facial expression, which are commonly used in CMC contexts to indicate the feeling and/or emotion of the person (Garrison, Remley, Thomas, & Wierszewski, 2011).

Detailed versus shallow exchange of information: Due to the smooth flow of communication and organized turn-taking in oral interactions, voice chat fostered more exchanges of information. Conversely, the exchange of information in text chat took much longer time and required more efforts (i.e. typing). Consequently, learners focused on merely

exchanging superficial information and did not engage in more extended talk or discussion. In fact, there was no discussion made on where to start; rather, a random discussion was initiated of the objects available in their pictures, and even some confusion about the details and locations of what they had found as a difference. In addition, some learners admitted that the written modality did not encourage them to negotiate unclear messages. They would negotiate unclear utterances in voice chat, but in text, they ignored them and moved on with the discussion.

Arguably, text chat may not support this level of interactivity due to a lack of cohesiveness, social presence, and prosodic/paralinguistic cues (Darhower, 2002). Based on their post hoc analysis of turn-taking in oral (FTF and SCMC) and written SCMC, Loewen and Wolff (2016) further speculate that the little opportunity for negotiated interaction within text-SCMC might be because of the permanency of input in text chat, as well as the learners' using the shortest means of information exchange. Hence, learners might not negotiate very frequently because the information they receive remains on the screen.

Reduced anxiety: The nature of voice chat in the present study provided a less stressful environment for the participants. Interestingly, previous research has revealed that oral production, for many language learners, is one of the main sources of their foreign language anxiety (e.g. Arnold, 2007; Hauck & Hurd, 2005; Horwitz, Horwitz, & Cope, 1986). As text-SCMC does not require learners to speak, it is argued to create a less pressured environment, and thus, may encourage production (Beauvois, 1992; Kern, 1995). In addition to the fact that learners do not need to speak in text chat, they are afforded additional planning and processing time, which provides them with opportunities to reflect on what has been said, and to also help them plan what they want to say, thereby placing lower social demands on themselves and reducing their levels of anxiety (Baralt & Gurzynski-Weiss, 2011). Despite these findings and arguments, the current study's findings showed that the voice chat medium contributed to more reduced anxiety than text chat. Half of the participants (n=20) felt more comfortable and less anxious in performing the task in voice chat than in text chat, and thirteen participants indicated that both online environments were similarly relaxing. Only very few participants (n=7) felt more relaxed in text chat.

Empirical research that compared anxiety levels of participants in different modes/modalities of interaction offered mixed findings. While anxiety was identified as a more prominent feature of voice-SCMC than text-SCMC in Satar and Özdener's (2008) study, the same contexts were found to be equally comparable in their impact on learners' anxiety in Arnold (2007) and Baralt and Gurzynski-Weiss (2011). It should be noted however, that the researchers' qualitative examinations of the participants' responses or their interactions did not concur their statistical findings. For example, in Satar and Özdener (2008), 53% of the learners in the voice chat group indicated that their dyadic interactions within this context decreased their anxiety, while only 20% of the learners in the text chat group shared this perception. Furthermore, although Arnold's (2007) quantitative data from pretest and posttest questionnaires did not reveal any significant difference in learners' anxiety reduction, his qualitative data reported that text-SCMC was a useful context in diminishing learners' anxiety, fear of embarrassment and fear of negative feedback from the teachers or peers. Although it is beyond the scope of the current study to provide empirical evidence regarding learners' anxiety levels, the exit questionnaires and interviews showed the learners' indication of reduced anxiety in the voice chat medium. One could argue that voice-SCMC may have a better position in comparison to the conventional FTF context, because it keeps learners' anonymity and, hence, reduces face threats that are more present within FTF interactions. In relation to this, Paralk and Ziegler (2017) reflect such sentiments. In their examination of learners' attitudes towards video-SCMC in comparison to FTF interactions, they found that learners experienced less anxiety in video-SCMC than in FTF encounters. Despite the difference of the type of interlocutor (i.e. NS vs. NNS) within their study, this finding, along with the present research findings, suggests that oral SCMC (either voice or video-based) may allow learners to speak with more reduced anxiety. Future empirical examinations utilizing subjective, as well as objective measures of anxiety could help gain a better understanding of the role context may play in affecting learners' anxiety.

Qualitative data generated by the debriefing interviews have explained why participants felt more relaxed in voice chat, but not in text chat. Learners experienced less anxiety in the oral modality because they were able to better understand their partners, respond more effectively to their information and questions, as well as discern whether their messages were successfully conveyed or not. In contrast, many learners indicated that they felt anxious in the

written modality because of the lack of coherence and intelligibility. Learners further revealed that their inadequate typing skills in English made them more stressed while communicating in this context. Some detailed that they were more used to mobile virtual keyboards as opposed to actual physical ones. In fact, unfamiliarity with the computer's keyboard appeared to have adverse effects in relation to learners' anxiety specifically, and in their general interactions. First, learners took a longer time to formulate their messages, which in turn caused them to be more concerned and anxious of being late in responding to their partners and attending to the language. Second, few learners were unable to produce some orthographical features using physical keyboards (e.g. capitalizations and punctuations), and this made them feeling tense and busy experimenting with the keyboard buttons, rather than attending to their own or partners' messages. Third, due to their slow typing, learners shared only minimum details to avoid being late and to reduce the amount of time completing the task in the written modality. Finally, some learners felt stressed while waiting for their partner's responses, as there was no indication of their partner's behavior during text chat. Frustrated with long waits for incoming messages, some learners were observed to make phone calls, reply to their phone messages, or even doodle on the task paper. Assuming that cognitive processing requires involvement and careful attention, this apparent loss of motivation and attention could be significant.

In line with these findings, even though participants reported their familiarity with computers and chatting online, Baralt and Gurzynski-Weiss (2011) assumed that this familiarity is with regards to their L1, but not with their L2. Thus, the novelty of practicing the L2 via text chat might have led to an increased anxiety in text-SCMC. In addition, Hamano-Bunce (2010) found that a greater level of learners' stress in text-SCMC was largely due to typing. She reported that learners found typing difficult and time consuming, which was the main reason of the relative paucity of LREs in their interactions within this modality. In addition, her observations led her to argue that much of the time in text chat was spent articulating the messages on the keyboard rather than engaging in LREs or monitoring their language. Similarly, many other researchers concluded that the technology and typing may possibly have posed an additional cognitive burden for some learners (i.e. attentional resources may be directed toward keyboarding and not their language) (Loewen & Erlam, 2006; Loewen & Reissner, 2009; Sauro, 2012). This might explain why the permanence of

interactional feedback in text chat did not result in greater occurrences and levels of noticing. Thus, inadequate typing skills and the ensuing increased anxiety might actually hinder language production, negotiation and noticing in written SCMC on a considerable level.

Nonetheless, Hung and Higgins' (2016) examination of tandem exchanges in text-versus video-SCMC revealed opposite attitudes to those found in the present study. While they admitted that their inadequate keyboard skills restricted their production in text-SCMC, two-thirds of the participants believed they performed better and felt more relaxed and confident in text chat than in video chat. It should also be noted that learners in the Hung and Higgins' (2016) study were able to use online resources, such as dictionaries and Google Images while text chatting, but they were not able to benefit from these resources during video chatting due to the faster pace and intensive interaction within this context. Having such affordances within text chat could have affected the learners' confidence and relief whilst using this method. Additionally, although the researchers did not offer adequate information pertaining to learners' familiarity with online chatting, their participants appeared familiar with managing discussions in the text chat - a reason that could have also facilitated their online written interactions. As explained by Hung and Higgins (2016), many participants declared that they tended to wait patiently for their interlocutors to send responses, in an attempt to avoid overlapped turns and minimize the risk of incoherent chatting. Only a very small number of participants in the present study showed awareness that simultaneous typing might disturb the adjacency of their turns and make their interactions difficult, and thus, they needed to employ certain strategies to create coherence in this context. For example, P12 deleted all of his constructions whenever he received a message form his interlocutor, commenting,

> *While I was formulating my questions in the text chat, my partner sent something. This interrupted me and I felt obliged to delete my question. Sometimes, I would rewrite and send them again afterwards.*

However, as previously alluded to, waiting for a message from the interlocutor does not solve this issue, as one does not know whether the turn is completed or not. That is, a turn might extend over several messages (Berglund, 2009). Indeed, interactions in text-SCMC remain loosely coherent in comparison with interactional norms in oral discussions (Herring, 1999).

The minority who indicated that they experienced a more relaxed atmosphere in text chat did appreciate the extra time that text chat afforded them, so as to not feel rushed when structuring their messages, and they felt at ease when reviewing their output before contributing to the chat. These participants seemed to be afraid of committing mistakes and were conscious of accuracy in communication. Hence, they felt more relaxed and comfortable in communicating via text chat as compared to voice chat.

Interestingly, learners in the present study who revealed no difference between the two modes of interaction with regards to feeling relaxed attributed this to two main issues. First, both modalities offered anonymous communications, where their identities are totally concealed. Second, they were interacting with peers in similar or closer level of proficiency, resulting in what Learner P14 referred to as, '*an informal, comfortable atmosphere*'. This is where they can feel free to make mistakes and experiment with the target language. Both issues are significant in light of the theory of foreign language anxiety (Horwitz et al., 1986) and the model of willingness to communicate (MacIntyre, Dornyei, Cle ́ment, & Noels, 1998), which both consider affective factors as key to the L2 learning process. Minimising learner anxiety would result in an increased willingness to communicate; that is, learners are more willing to communicate in L2 when they are not apprehensive about communication, and when they perceive themselves capable of communicating effectively. However, as Zhao's (1998) examination on the effects of anonymity on learners' computer-mediated collaborative learning revealed, anonymity can be a 'double-edged sword'. That is, while anonymity promoted learners to be more critical in providing peer reviews, it also led them to work less. In addition, anonymity encouraged learners to focus more on their peers' journals during the editing sessions; however, it resulted in less helpful and lower quality reviews in comparison to those provided in the identifiable condition. These findings suggest that, although anonymity can free learners from social pressure and constraints, it could also negatively affect their level and quality of participation. Future research that examines the effects of anonymity, with regards to the quantity and quality of interactional feedback in learner-learner dyadic interaction, is warranted as a means of identifying the benefits and/or pitfalls that could be associated with anonymity in SCMC context.

6.4.2 Monitoring and processing of the language

The qualitative findings showed the participants' positive attitudes towards the potential of the two modalities in enhancing their monitoring and processing of the language, though their attitudes pertaining to this were slightly more favorable for the written modality. The affordances and constraints of each synchronous modality that appeared to influence learners' monitoring of output and noticing of input are presented in the following discussion.

Overall, text-SCMC appeared to be more facilitative in promoting internal noticing of the participants' own errors and in the careful composing of L2 constructions. Most of the participants revealed that text chat allowed them to be more deliberate in their message constructions, as they have more planning and processing time in this context than in voice chat. They explained that the reduced speed of communication in text chat, coupled with the recorded utterances on the screen, allowed them to pay closer attention to language accuracy and modify their errors without feeling rushed. In relation to this, few learners stated that the auto correct feature available in text chat helped them to pay closer attention to their spelling. These positive attitudes towards the usefulness of text chat in promoting greater reflection and monitoring of the learners' own language output were also reported in other studies (e.g. Lai & Zhao, 2006; Hung & Higgins, 2016; Yamada, 2009). These findings fit quite well with previous arguments of text-SCMC, which propose that text-SCMC allows for offline composing and editing of messages, since it obviates the need to respond immediately to the interlocutors. As a result, text-SCMC offers learners an increased time to reflect on the accuracy of their language (Smith, 2004). A caveat to this however, is that some of the participants who acknowledged these benefits, also stated they could not take full advantage of these features, as they felt the pressure to respond quickly to their partners and catch up with the discussion.

Similar concerns were expressed by ESL learners in Kim's (2014b) study, where 85% of the participants noted that they felt they did not have enough time to think about their utterances via text chat because of the overall pressure in communicating via this medium. Following these observed perceptions, one could argue that the demands of maintaining the speed of communication in the text chat might restrict the careful attention learners give to language forms.

Learners who expressed a preference towards voice chat as a means of enhancing their monitoring of their language attributed this to their partners' apparent reactions to their language. That is, their partners' voice tones and reactions would help them judge if their productions were problematic, and hence, they would reflect on their linguistic choices and attempt to produce more accurate ones if necessary.

Nonetheless, the findings indicated that text-SCMC did not gain as much preference with regards to enhancing learners' noticing of partners' productions and corrective feedback. Indeed, the close percentages of learners' responses in the debriefing questionnaires and their following comments in the interviews suggest that both modalities are equally facilitative with regards to enhancing noticing of partners' input and feedback, confirming earlier quantitative findings. While the permanence and self-paced nature of text chat helped some learners to process their partners' input/feedback, their insufficient typing skills and the incoherent turns seemed to have mitigated those benefits of text chat. Learners expressed that their inadequate typing skills kept them busy experimenting with the keyboard buttons, while others admitted that the split turns caused them to waste time and attention to figure out the corresponding turns. Such limitations might have potentially exerted unfavorable effects on L2 interaction and noticing. These limitations led Kim (2014b) to conclude that, text-SCMC "appears to increase learners' cognitive load rather than lower it" (p. 69).

6.4.3 L2 Benefits

Despite learners' preferences for completing the task in voice chat and monitoring their language in text chat, learners did not perceive a difference in how much they learned and did not favour one modality of interaction over the other, specifically in terms of their potential to contribute to their L2 learning. Overall, the debriefing questionnaires and interviews revealed that learners reacted positively to the potential of both modalities to L2 knowledge and development, and they showed considerable interest in performing tasks online via voice and text chat and maintain this practice.

When learners were asked, in which environment they felt they experienced more gains in their L2, equal percentages of the learners' responses (27.5%) revealed that they did learn something from either voice or text chat. The remaining 45% declared that there was no difference between the two modalities. As for the learners' responses in the debriefing interviews, they revealed that almost all the learners perceived gains in vocabulary, as well as increased confidence in using the target language in both modalities. The comments also suggested that learners benefitted from their interlocutors' pronunciation and spelling, as well as some oral and textual expressions and complete sentences. Additionally, they indicated that learners tailored their interlocutors' feedback to address gaps in their L2 productions in both modalities. One leaner commented, "*I learned how to correctly spell some words after looking at how my partner wrote them*" (P30). Another learner made a remark on his partner's more appropriate lexical choices, "*I used the word 'vase' at the beginning, but when my partner said he had some statues in his picture, I realized this is a more appropriate word*"(P32).

Considering the potential of each synchronous modality to L2 learning, the majority (60%) reacted positively to both interaction modalities, agreeing that each has a potential for their L2 learning. The remaining learners expressed a preference for voice over text chat (23.5% vs. 7.5%). Voice chatting was more valued by participants, mainly due to its practicality, capability to create a virtual environment of FTF interaction, and its easiness in comparison to text-SCMC. Other learners showed more appreciation of voice-SCMC, as their interactions in this modality led to increased participation and understanding, developed their self-confidence and resulted in greater gains in vocabulary and pronunciation. However, despite this slight appreciation for voice chatting, the learners' comments demonstrated their enthusiasm for continuing to use both online chatting and regularly utilize this approach to develop their L2 competency, boost their speaking and writing skills, maximize gains in the different language aspects, and consequently, enhance their self-confidence in using the L2. Learners commented that both contexts provide useful and convenient platforms in which to practice their L2, particularly in their L1 contexts where there is lack or limited L2 interactional opportunities. Warschauer (1996) noted that CMC is particularly significant for L2 learners who have few chances to find authentic settings for communicating in the target language. Generally speaking, the observed positive reactions and motivations towards using

SCMC support previous observations (e.g. Blake, 2000; Toyoda & Harrison, 2002; Warschauer, 1996).

It was interesting to see the awareness among some learners with regard to the potential transfer from writing practice in text chat to their speaking skills. Some learners reported that they felt confident and willing to participate in voice chat because they felt prepared to speak after being engaged in text chatting, indicating that both modalities are considered beneficial for the reinforcement of learners' oral skills. Indeed, SCMC research has suggested that learners' participation in synchronous written interactions can be their preliminary step towards their FTF interactions, showing that learners' oral/speaking performance benefits from being involved in written synchronous interactions (Abrams, 2003; Payne & Ross, 2005; Satar & Özdener, 2008). These few pioneering studies addressed the issue of 'transferability' of the learners' linguistic features observed in their text-SCMC sessions, to their oral performance. The findings of these studies generally advocate the possible transfer of language forms from text-SCMC to oral performance.

6.5 Conclusion

This chapter has summarized the present study's quantitative and qualitative findings, and discussed them in light of the previous relevant literature on learner-learner interactions in FTF and SCMC contexts. It has systematically addressed the main research themes, and presented and discussed the findings accordingly. These findings subsequently open up the discussion on the synchronous modality impact on engaging learners in task-based interactions and promoting learners' noticing of linguistic forms, considering learners' perceptions and the inherent attributes of each synchronous interaction modality.

Overall, the findings have reasonably demonstrated that voice-SCMC could extend more opportunities for negotiation and noticing of errors following feedback, in a way that seems challenging to implement in text-SCMC, particularly for intermediate-level EFL learners. Voice chat generated more incidents of negotiations, though the difference was not statistically significant. Also, it encouraged learners to modify their output in more instances, and to produce successful uptake. It further triggered more incidents of noticing than text

chat, although the difference was not significant too. These increased benefits in the oral modality are particularly relevant in light of the text-based language learning approach, whose underlying principle is that L2 achievement has greater potential if the learning environment can create 'conditions' (Ellis, 2003). Despite that, the current study does not suggest the superiority of voice-SCMC over text-SCMC. Text chat seemed particularly useful for the occurrence of self-repairs, and it was greatly appreciated by many learners as a self-monitoring tool that facilitates the accuracy and quality of their productions. What also emerges as particularly interesting in terms of learners' perceptions and experiences of the two synchronous modalities, are findings that show their positive attitudes towards the potential of both to their language learning and their contribution to improve confidence in oral and written communicative skills. The current study, however, echoes Kenning's (2010) statement that some benefits of text-SCMC might have been "overstated" (p.16). The text-SCMC features that are argued to be facilitative for learners' interactional and attentional processes appeared rather illegitimate, and not as practically feasible as they are often taken to be. As Kenning (2010) challenged, they are "potential benefits that require optimal conditions on a number of dimensions to fully materialize" (p.16). In parallel with this argument, this study's findings suggest that if text-SCMC is to play a positive role in L2 learning, learners will need to develop typing skills and need to be supported with strategies and structured activities/tasks that could ensure the kinds of interaction that offers L2 benefits. The following chapter seeks to draw upon these findings/implications, and expand on the areas constituting avenues for future research.

Chapter 7: Conclusion

7.1 Introduction

This chapter presents a summary of the key findings for this research study, followed by a presentation of their implications in relation to L2 pedagogy and research methodology. Additionally, the limitations of the study and recommendations for future research are also addressed. The chapter then concludes with commentary on this study's contribution to CALL-SCMC literature.

7.2 Summary of Key Findings

The purpose of this study was to investigate how the oral and written modalities of SCMC would facilitate L2 learners' interactional and attentional processes whilst they were engaged in learner-learner task-based interaction. More specifically, the primary overarching aim was to identify the strengths and limitations imposed by each modality in how it could influence: (a) negotiated interaction, (b) the cognitive process of noticing, and (c) the learners' perceptions of their learning experiences.

The study adopted a one-shot repeated-measures experimental design. It also utilized a mixed methods research strategy, in order to constitute a more holistic approach that allowed detailed observation of any potential impact of synchronous modality on the frequency of negotiation episodes and incidents of noticing, as well as providing the qualitative aspects of learners' negotiations and cognitive engagement. Forty EFL adult Arabic learners attending general English language courses participated in this study. Initially, the participants were paired to form 20 mixed proficiency dyads of low-high intermediate English level, which was based upon their performance during a matching task (i.e. EIT). Then, the dyads were randomly assigned to one of four treatment conditions, in order to counterbalance the order of the modalities of interaction and the two treatment tasks. Following their task-based interactions in both contexts, SR interviews were conducted to elicit data on the participants' noticing of interactional feedback. Debriefing questionnaires and interviews were also administered, in order to elicit participants' perceptions of their learning experience within the two synchronous modalities.

Five main findings can be extracted from this study. First, this study has revealed that, regardless of the SCMC modality, both contexts could be equally facilitative for fostering incidents of negotiated interaction. That is, even though voice chat generated a higher frequency of negotiation episodes per 100 words descriptively, this frequency was not statistically significant between the two conditions. However, qualitative findings from the analysis of the interview data suggested that, whether or not learners will indicate problems and engage in negotiation for meaning, it does depend on the perceived constraints and affordances of the modality of interaction. Learners seem less willing to indicate their non-understating during text chat, and hence, they negotiate for meaning less frequently in this context than in voice chat. These findings challenge claims made by some researchers, which suggest increased opportunities for negotiated interaction in text-SCMC in comparison to oral communication (e.g. Blake, 2000; Kitade, 2000; O'Rourke, 2005; Pellettieri, 2000; Warschauer, 1997).

Second, as with frequency of negotiations, the findings of the present study have revealed no cross-modality differences with regard to the features of negotiations. Both modalities facilitated more meaning negotiations than form negotiations, promoted the use of the same type of feedback (i.e. although clarification requests and confirmation checks were used abundantly to negotiate meaning, recasts were the only feedback type used to negotiate form), and also encouraged a similar distribution of the different types of linguistic foci of negotiations (i.e. meaning negotiations were mainly triggered by lexical items, whereas form negotiations were mostly triggered by errors in morphosyntax and phonology/spelling). Similarly, these findings ran contrary to the earlier alleged arguments in existing literature, which advocate that the self-paced setting in text chat and the permanent nature of written exchanges are facilitative features that would focus learners' attention to form (e.g. Blake, 2000; Pellettieri, 2000; Warschauer & Kern, 2000). This was not the case, as the text-SCMC did not prompt increased negotiations of form than those of meaning.

Third, the findings of the present study have demonstrated only partial support to the assumptions within literature, which asserts text-SCMC presents extended advantages for noticing and cognitive comparisons over oral interactions (Blake, 2000; Kern, 1995; Lai &

Zhao, 2006; Lee, 2008; O'Rourke, 2005; Pellettieri, 2000; Salaberry, 2000; Smith & Sauro, 2009; Warschauer, 1997; Williams, 2005). While text-SCMC generated significantly more instances of self-repairs than voice chat (i.e. internally driven noticing), it did not manifest any superiority to the oral communication in enhancing noticing of interactional feedback (i.e. externally driven noticing). That is, there was no statistical difference in the two modalities of interaction for the occurrence of noticing of feedback. There may, however, be quantitative differences between the two modalities in the production of uptake after negative feedback. More specifically, voice chat may be more facilitative for language learners to modify output and successfully repair their erroneous productions following feedback.

Nonetheless, a note of caution must be taken with regards to the aforementioned quantitative findings on the differential effects of modality on learners' noticing. First, it could be argued that the significant increase of self-repairs in text-SCMC might be due to learners' typing difficulties and confusion when using a computer keyboard. To explain, the findings showed that learners engaged predominantly in spelling/orthography self-repairs while text chatting. While these self-repairs are indicative of learners' monitoring their productions and attempting to increase their accuracy, the learners' responses during the debriefing interviews indicated that many of these correction moves were due to their unfamiliarity with typing in English, particularly on a computer keyboard (e.g. some learners were trying to identify how to write capitals, while others were experimenting with different keyboard buttons to find the suitable punctuation mark). Second, the increased incidents of uptake in the oral modality might not be associated with increased attention to feedback. To elaborate, the comparison between the performance and introspective data on noticing showed that, for a number of incidents of uptake in voice chat, the participants' responses failed to reflect that they have cognitively attended to the feedback move. Therefore, the provision of uptake might not be predictive of learners' noticing of feedback, but rather, it is used as a mimic repetition or a means of participating in the conversation (Ellis & Sheen, 2006; Mackey & Philp, 1998).

Fourth, the findings suggested that voice- and text-SCMC could be equally facilitative in promoting high levels of learners' engagement with the feedback, with the lexical issues mostly prompting higher levels of noticing across both contexts. Findings of introspective

data further yielded qualitative insights into the learners' mental processes that they experienced when engaged in online oral and written negotiations. Interestingly, these findings demonstrated that learners' noticing does not only result in examining discrepancies between their productions and their partners' more-target-like output, but rather, this noticing further triggers a series of cognitive processes whereby learners identify gaps in their L2 knowledge, reflect on available linguistic choices and test hypotheses.

Finally, the findings revealed information about the perceived benefits and limitations of each interaction modality, which helped explicate the previous quantitative findings. Interestingly, the findings showed that one learner's benefit was another learner's limitation, and a possible explanation for the lack of differences between the modalities was learners' differing interpretations and utilization of the affordances available within the two contexts. For example, the slower pace of written exchanges was perceived as beneficial by some learners, as this feature allowed them extra time to compose their messages and to feel more relaxed and confident about participating. In contrast, other learners perceived it as disadvantageous because it either caused them 'pressure' or 'boredom'. Learners felt the urge to reply to their partners, and thus, they did not feel relaxed and could not focus on their language. In the other case, learners felt bored because of the long waits for their partners' responses, subsequently affecting their interest in completing the task.

Table 7.1 summarizes the perceived benefits of each modality that fostered engagement during the learning processes, based on direct quotations from participants. Due to the advantages perceived in voice chat, learners believed that this mode allowed for greater understanding, smoother exchange of information and a more relaxing and pleasant interaction venue. Conversely, text chat exhibits a number of affordances that helped learners to feel relaxed during interactions, as well as focusing and monitoring their output. Despite these benefits, learners' perceptions highlighted a number of negative aspects that could hinder text-SCMC utility, such as lengthy messages, overlapped exchanges, lack of voice tones and backchannels, as well as learners' typing difficulties and unfamiliarity with computer keyboards.

Table 7.1

Summary of the benefits of oral and written SCMC

	Voice chat	Text chat
Completing the task-based activity	• **More authentic and similar to FTF interactions (i.e. a greater feeling of social presence)** "*…more real and closer to FTF interaction*" (P6)	• **Permanence of text** "*Information was available, so I could check them. I didn't need to remember them all the time, I would go back and check everything*" (P5)
	• **Organised turn-taking exchange of information** "*I felt as though we did better in voice chat. He asked and I answered, and vice-versa. We were more organized*" (P11)	• **Slower pace of interaction** "*Because I was writing at my own pace, I felt more relaxed in text chat*" (P34)
	• **Motivated to exchange more information** "*I felt I was able to give more details in voice…Describing things in details was not easy in text chatting*" (P39)	• **Availability of keyboard facilities** "*I like using emoticons. They better express your feelings*" (P5)
	• **Availability of prosodic information and backchannels** "*From the tone of voice, I could say if she is confused or something else. But in writing, I was not able to feel this*" (P3)	• **It does not require proficient oral skills.** "*Maybe because I am not really good in speaking… I stammer in speech, so I liked text chat more*" (P31)
	• **It does not require proper spelling and adequate typing skills.** "*I have problems with spelling and writing in English, and that is why I favoured voice more than text*" (P13)	
Monitoring and processing of the language	• **Immediate responses and apparent reactions (e.g. voice tone, backchannels)** "*When my partner does not get me during voice chat, I start to think of my language and try to correct any errors*" (P13)	• **Permanence of text** "*I can see and I can take time, read and reread at my own pace*" (P24)
		• **Slower pace of interaction** "*I had enough time to write my sentences, I didn't need to rush*" (P31)
		• **Requires accurate messages** "*I felt more obliged to write carefully and correctly in text chat*" (P6)
		• **Auto correction** "*I benefitted from the auto correction. It helped me notice my errors*" (P9)

In conclusion, this study has provided empirical support for the potential of online text chatting in promoting L2 learning opportunities. Nevertheless, even though this study supports this potential, it does challenge the arguments against those who state that text-SCMC has increased advantages over oral communication in facilitating negotiated

interaction and promoting incidents of noticing. Online oral chatting also has similar potentials, and thus, the neglect of this medium of interaction, and the absence of parallel research on its potential for L2 interaction-driven learning - as compared to that of text chat - is biased. Both modalities appear as promising tools for L2 learning, and this conclusion was further supported by the learners' acknowledgment that both synchronous modalities have the potential to enhance their L2 development and increase their confidence of speaking and writing in L2.

7.3 Pedagogical Implications

With the advent and expanded use of technology inside and outside the language classroom, the present investigation offers insights into the pedagogic use of SCMC in L2 learning and teaching. That is, it provides a glimpse of how the use of online interaction modalities may facilitate L2 learners' provision of interactional feedback and engagement in negotiated interaction, encouraging them to pool each other's resources whenever uncertainties arise concerning language choices. The findings showed that both environments (oral and written) held their unique characteristics and strengths. Voice chatting promoted increased L2 production and higher incidents of negotiated interaction and noticing, as well as encouraging learners to modify their output and produce successful uptake. As for text chatting, it appeared particularly useful for the occurrence of self-repairs, and was highly appreciated by many learners as a self-monitoring tool that promotes accuracy and quality of their L2 output. Learners also expressed their support for this particular mode, as it provided a useful bridge for oral interactions (i.e. organizing their ideas in print and developing the grammatical structures and vocabulary required for oral production). It would, therefore, seem logical that both written and oral SCMC could be incorporated in L2 teaching and learning, so as to maximize their potential and use within the classroom, and subsequently yield the most benefit to language learners.

The findings also revealed learners' appreciation for both contexts, citing them as convenient and meaningful platforms in which to practice their L2, particularly in their L1 environments, where there is lack or limited L2 interactional opportunities. Language teachers and educators working in language institutions may therefore reconsider the

importance of offering and incorporating online chatting for L2 learners to engage in out-of-class language and negotiation work. However, it should be noted that online chatting is not "a panacea for language acquisition, nor is it a substitute for normal classroom discussion" (Kern, 1995, p.470), but rather, it can support SLA as an additional context for language use and practice. Furthermore, language learners may want to consider the potential learning opportunities available in online voice and text-based exchanges, and benefit from this type of language practice, particularly if they do not live in L2-speaking areas (Blake, 2000; Jepson, 2005).

While SCMC lends itself well for L2 learning, the findings substantiate Lin, Warschauer and Blake's (2016) suggestion, that if online interaction is to play a role in L2 learning, "learners will need support, guidance, and well-structured activities to ensure the kinds of participation and linguistic interaction that can lead to success" (p.124). Pedagogical efforts are needed to heighten the benefits of interactions in SCMC. First, L2 teachers may need to provide and design appropriate tasks that encourage language usage and provide learners with opportunities for negotiations. As most of the negotiations were focusing on meaning in both modalities of the present study (i.e. initiated to resolve problems in comprehension), it is important for language teachers to also consider appropriate awareness-raising activities, through which focus-on-form is promoted during meaning-oriented interaction via SCMC.

Second, in an attempt to increase learners' focus on form and counteract their avoidance to correct each other's mistakes, L2 teachers may need to provide metacognitive training and instruction to learners, in order to maximize the learning opportunities in their dyadic interactions of SCMC. Sato (2017) declares that in peer interaction, it may be difficult for many L2 learners to correct their partners' mistakes, and therefore recommends offering pedagogical training and explicit instruction of interactional feedback, which in turn, may encourage learners' provision of corrective feedback and engagement in negotiations. This recommendation is further supported by a number of studies on peer interaction (e.g. Fujii et al., 2016; Sato & Ballinger, 2012). For example, Fujii et al. (2016) conducted an experiment, entitled "How to be an active learner: Feedback, negotiation and noticing", in which metacognitive instruction was implemented. The aim of this experiment was to examine the

effects of metacognitive instruction on the provision and also on the use of interactional feedback in learner-learner interactions within the task-based EFL classroom. Findings showed that learners in the experimental group, who were shown models of corrective feedback, and practiced how to provide feedback with the teacher, detected significantly more linguistic errors and provided proportionally more corrective feedback than those in the control group.

Third, pedagogical efforts should also focus on highlighting technological affordances to bring about additional learning outcomes. Although the findings showed that text-SCMC encouraged learners' negotiations, limited L2 production could be identified as a risk (i.e. in comparison to those generated in the oral modality). Part of the challenges identified in text chat was that it took time to form and reply messages, and it may have lacked coherence due to the disturbed flow of messages. To improve their communication in text-SCMC, learners need to develop their typing skills and need to be supported with strategies that could facilitate the coherence of their text-based online interactions, as well as help them take advantage of the modality affordances. The ways in which learners could maintain coherence have been suggested in a number of studies on text-SCMC (see Berglund, 2009; Herring, 1999; Kaneko, 2009). Explicitly orienting L2 learners to the need of demonstrating responsiveness, employing means to signal connection among turns, and using cues that could reveal if the interlocutor is typing, may all offset the tracking problems caused by disturbed turns and enhance the learners' online written discussions.

In addition, as a number of participants revealed that they would have appreciated text-SCMC more if they were allowed to use and consult online dictionaries (in order to ensure comprehension and accuracy of their productions), tasks that are designed to incorporate this feature may be a direction to pursue. Hung and Higgins' (2016) findings support having such affordances within text chat, as they were likely to affect their participants' confidence and relief whilst interacting in this medium.

7.4 Methodological Implications

In addition to the aforementioned pedagogical implications, the current study provides further methodological insights for L2 research, particularly in relation to the study of the cognitive process of noticing. First, although self-repairs can reveal a great deal about learners' noticing and reflections on errors in their L2, they do not constantly mirror all the incidents in which learners noticed errors in their L2 productions. That is, the absence of self-repairs does not necessarily mean that learners have not attended to errors in their productions. Both the oral and written interactions influence the occurrence of self-repairs, and hence, depending on this measure to provide inferences on the learners' internally driven noticing, it may pose a limitation to the research findings. In this sense, L2 researchers need not to rely solely on this measure, but consider employing additional measures (e.g. verbal reports) that could capture incidents of self-repairs.

Second, the comparisons of performance and retrospective measures of noticing of interactional feedback used in this study revealed two important issues: 1) noticing does not necessarily lead to uptake, and 2) uptake may occur, but noticing may not. These findings highlight the limitations of relying upon uptake as a sole measure of noticing, and also advocate that a triangulation of uptake and introspective measures will be useful in obtaining and attesting data for learner noticing (Bao et al., 2011; Gass & Mackey, 2007).

7.5 Limitations and Directions for Future Research

Several limitations of the current study need to be noted. While acknowledging these limitations, a few suggestions are also made for future research. First, the small sample size was inevitable given the nature and duration of the study, yet this was a limitation that restricted generalizing the findings beyond the context of the study. Thus, in addition to having a larger sample size, one may also suggest including a wide array of culturally different participants for research that seeks to examine and compare negotiated interaction in different mediums, since the use and provision of corrective feedback might be affected by cultural motivations, such as saving face (Fujii & Mackey, 2009; Nassaji, 2015).

Second, the research findings pertaining to learners' self-repairs and noticing of

interactional feedback could be limited by the inherent limitations of the measures used. Learners' comments in the debriefing interviews showed that they did notice some errors in their L2 independently, but because of the oral or written nature of their interaction, they did not feel it was necessary to correct them. Thus, the mere reliance on 'self-repairs' as a measure of noticing of self-errors may pose a limitation to this study's findings. In addition, as with all studies involving self-reports, SR may not fully capture and assess all noticing incidents (Mackey, 2006a). Coupled with this, participants may have provided erroneous information on what they actually became aware of during the exposure (Bowles & Leow, 2005). These limitations were mitigated in this study by following Gass and Mackey's (2000, 2017) suggestions for the conduct of SR, namely: collecting the data immediately after the completion of task-based interactions, acquainting participants with the process, using oral recordings and chat transcripts as stimulus to activate participants' memory, and asking them to report their thoughts in their L1.

Third, the type of the experimental task used in the current study (i.e. spot-the-difference task) could have influenced the findings. Different types of tasks have been documented to have different effects on L2 opportunities and result in different findings (see Kaneko, 2009, Zeng, 2017). For example, Kaneko (2009) compared learners' performances in three types of tasks (role-play, spot the difference and constructive tasks) across text-based SCMC and FTF interactions. While the 'constructive task' created the most opportunities for the negotiation of meaning and corrective feedback in both modes of interaction, this task was more profitable for the provision of corrective feedback in text chat than in FTF interaction, as there were twice as many incidents of corrective feedback found in text-SCMC. Furthermore, the advantage of the constructive task was particularly evident in text-SCMC in comparison to the other two tasks. First, the distribution of lexical and morphosyntactic negotiations were more balanced in this task using text chat, while it became biased towards lexical negotiations in the other tasks. Second, negotiations were more successful in terms of indicating mutual understanding at the end of negotiation in this task. Third, this task promoted the provision of implicit, as well as explicit corrective feedback, while the other tasks only promoted implicit feedback. Lastly, more than 50% of corrective feedback was incorporated in this task while in the other two tasks, no feedback was incorporated. Following these findings, Kaneko (2009) suggested that there are some

advantages for accuracy-focused tasks to be conducted in text chat rather than in FTF context, indicating that the meaning-focused nature of the other tasks may outweigh the benefits available in text-SCMC. It would therefore be interesting, to examine learners' performance across a range of more form- (e.g. dictogloss) to more meaning-focused tasks (e.g. jigsaw), in order to ascertain if the task type has a great impact on the potential for negotiation of meaning and form in voice- and text-SCMC.

In addition, factors related to individual differences, such as working memory (i.e. the individual's ability to simultaneously process and store information relevant to the processing task at hand), phonological memory (i.e. the individual's capacity to retain spoken sequences temporarily in short term memory) and language learning aptitude (i.e. grammatical sensitivity and inductive ability) (Skehan, 1998), are issues that have not been addressed in the present study. These cognitive individual factors are argued to influence the noticing of L2 input/feedback (e.g. Mackey & Philp, 1998; Sachs & Suh, 2007). While the repeated measures design of the study (i.e. within-subject) could eliminate the possible effects of participants' individual differences, future research that reflects on these factors is warranted in order to provide a richer understanding of factors mediating the potential of SCMC modalities.

In addition to the aforementioned limitations and suggestions, it should be noted that, given the focus and design of the current study, the participants engaged in a one-time, task-based interaction, for each synchronous modality. Although participants indicated their familiarity with both online chatting contexts, the majority pointed out that they had never used them to complete task-based interactions. It is possible therefore, that the allure and novelty of completing task-based interactions in both modalities could have affected learners' performance, and subsequently, the study's findings. To resolve this, the study design could include a number of online task-based sessions (as opposed to only a single session), where the first one or two sessions could serve as practice; this would be more appropriate to judge the differential impact of modality on learners' interactional and cognitive processes. In addition, extending this research to include long-term data would generate even richer data, and increase the potential for insights into the differential effects of oral and written SCMC, not only on promoting L2 interaction-driven learning opportunities, but also in developing L2

production and L2 gains/acquisition.

A further limitation of the current study is that it was carried out within an experimental setting, and therefore, the results may not be fully applicable to practical environments. Thus, it may be worthwhile to conduct a similar examination between the two contexts in L2 online classroom contexts. It would also be of interest if future research considers multimodality. This research, and many other studies examining noticing in SCMC, required learners to use either text or voice to interact in L2, forgetting that SCMC is inherently multimodal (Jenks, 2014). For instance, learners could send voice memos while text chatting, whereas they could send and receive texts while voice chatting. How hybrid interaction between voice and text occurs within a single interface, and whether this creates facilitative conditions for L2 negotiations and noticing, remains to be elucidated.

One last area that is obviously worth investigating from this study, is to examine how different text-SCMC software features mediate opportunities for noticing and negotiation. As noted previously (see Section 6.3.2.2.2), Pellettieri (2000) utilized text chat software (i.e. *Ytalk),* which consists of a split screen - in the top half, users type their messages, and in the bottom half, they view the replies of their interlocutors as they are typed word by word. This feature distinguishes this software from other commonly used text chatting software, which only display the final product of the interlocutor's composed messages. Such a feature might mitigate the problems associated with incoherent discourse and split turns, and it might possibly increase learners' noticing and immediate comparisons between their partners' responses and their earlier output. Future research that would examine learners' noticing during text-SCMC, using software that allows this feature (in comparison to commonly used software), would be highly insightful in determining whether this feature would facilitate the chatting benefits.

7.6 Contribution of the Study

Within the practice of L2 teaching and learning, the traditional communication structures are continuously evolving. As a result, it is necessary to explore the integration of certain digital interactional aspects, where it is envisaged that these aspects will help shed light on the perceived benefits, assurances and challenges that relate to CALL technologies found in L2

teaching environments (Mackey, 2012). This thesis reports on one of the first studies that set out to investigate the differential effects of the oral and written SCMC, in facilitating learners' negotiated interaction and cognitive engagement during task-based interactions. It has helped exploit many of the argued affordances offered by the text-SCMC, and compared them to those available in voice-SCMC under the key tenets of the interactionist perspective. It presents novel findings in relation to the relative merits of the two different modalities of communications, providing empirical evidence that support their potential in facilitating L2 interaction-driven learning opportunities.

This thesis has also provided in-depth qualitative data on learners' perceptions towards the potential of SCMC. While a number of studies have informed about learners' perceptions regarding either voice or text chat, this study, given its repeated-measures design, provided a more comprehensive evaluation of the two modalities, identifying the perceived benefits and limitations imposed by each context to learners' interactions, and offering some useful implications for L2 pedagogy.

Another potential contribution of this study stems from the mixed methods strategy it utilized for data collection and analysis. Both quantitative (i.e. interaction tasks and debriefing questionnaires) and qualitative (i.e. stimulated recall and debriefing interviews) methods were employed in this examination, offering a rich account of the modality effect, not only in generating incidents of negotiated episodes and noticing, but also in influencing the features of learners' negotiations and in the quality of their cognitive engagement with the feedback. In addition, this study offers interesting qualitative information that was used to provide further insight into the participants' mental processes that they experienced when engaged in negotiations during oral and written SCMC.

Finally, this study presents an attempt to examine consistency and/or discrepancy between the learners' introspective reports in comparison to their provision of uptake. This comparison offers insights into appropriate methodology for investigating noticing.

Appendices

Appendix A: Learner's Background and Online Chatting Questionnaire

Dear learner,

This questionnaire aims to gather some information about your experience of the English language and your experience with online chatting. The answers you provide here will be used for my research.

Section 1: Biographical information

Please fill in the blank or circle the most appropriate response.

- Name: ……………………
- Age: ………………………..
- Gender: Male   Female
- Home country:………………………..
- How old were you when you started learning English?.............................
- How long have you been studying English? For ………….years ………….. months
- How long have you been studying in English-speaking countries (include previous education, if applicable)? For ………….years ………….. months
- What is your last English proficiency test score (if you remember)?
    - Test type: ……………………………(e.g. IELTS, TOFEL)
    - Test date: ……………………………
    - Score: ……………
- What is your current proficiency level of English?...

Section 2: Online Chatting

- Have you ever used online chatting in **<u>Arabic</u>**?   Yes☐   No☐

    If **Yes**, please answer the following:

    1. Who were your chat partners?

        Family ☐   Friends ☐   Others☐…………………………

    2. Put a tick (✓) in the appropriate column to indicate which type(s) of online methods you have used before to chat in Arabic, and how frequently you use them.

	Never	1-2 times per month	Once a week	2-3 times a week	Daily
Text chat					
Voice chat					
Video chat					

- Have you ever used online chatting in **<u>English</u>**?   Yes☐   No☐

  If **Yes**, please answer the following:

  1. Who were your chat partners?

     Family ☐   Friends ☐   Native English speakers☐

        Learners of English☐   Others☐……………………

  2. Put a tick (✔) in the appropriate column to indicate which type(s) of online methods you have used before to chat in English, and how frequently you use them.

	Never	1-2 times per month	Once a week	2-3 times a week	Daily
Text chat					
Voice chat					
Video chat					

- Which of the following best describes your typing ability in English?
    - ☐ Hunt and peck (one/two-fingered typing)
    - ☐ Peck (two-to-five fingered typing)
    - ☐ Touch-typing (typing without looking at the keyboard)

Please return the completed questionnaire to the researcher.

Thank you for your participation!

Appendix B: Elicited Imitation Task

Instructions:

Now, you are going to hear a number of sentences in English. After each sentence, there will be a short pause, followed by a tone sound {TONE}. Your task is to try to repeat exactly what you hear in English. You will be given sufficient time after the tone to repeat the sentence. Repeat as much as you can. Remember, DON'T START REPEATING THE SENTENCE UNTIL YOU HEAR THE TONE SOUND {TONE}.

Now let's begin.

1. I have to get a haircut (7)
2. The red book is on the table (8)
3. The streets in this city are wide (8)
4. He takes a shower every morning (9)
5. What did you say you were doing today? (10)
6. I doubt that he knows how to drive that well (10)
7. After dinner I had a long, peaceful nap (11)
8. It is possible that it will rain tomorrow (12)
9. I enjoy movies which have a happy ending (12)
10. The houses are very nice but too expensive (12)
11. The little boy whose kitten died yesterday is sad (13)
12. That restaurant is supposed to have very good food (13)
13. I want a nice, big house in which my animals can live (14)
14. You really enjoy listening to country music, don't you (14)
15. She just finished painting the inside of her apartment (14)
16. Cross the street at the light and then just continue straight ahead (15)
17. The person I'm dating has a wonderful sense of humor (15)
18. She only orders meat dishes and never eats vegetables (15/16)
19. I wish the price of town houses would become affordable (15)
20. I hope it will get warmer sooner this year than it did last year (16)
21. A good friend of mine always takes care of my neighbor's three children (16)

22. The black cat that you fed yesterday was the one chased by the dog(16)

23. Before he can go outside, he has to finish cleaning his room (16)

24. The most fun I've ever had was when we went to the opera (16)

25. The terrible thief whom the police caught was very tall and thin (17)

26. Would you be so kind as to hand me the book which is on the table? (17)

27. The number of people who smoke cigars is increasing every year (17/18)

28. I don't know if the 11:30 train has left the station yet (18)

29. The exam wasn't nearly as difficult as you told me it would be (18)

30. There are a lot of people who don't eat anything at all in the morning (19)

This is the end of the elicited imitation task.

Thank you

Appendix C: Warm-up Activity

Session 2

Dear participant,

Thank you very much for your participation and help to complete the conduct of this research study. Now, you will meet a friend online on Skype, and you are required to do the following:

1- Introduce yourself to your partner.

2- Talk about your day's activities or plans for the rest of the day.

3- Complete the spot-the-difference tasks on the following pages, one via voice and the other via text.

شكرا جزيلا على مشاركتك ومساعدتك في اكمال سير هذه الدراسة البحثية. الآن، سوف تتحاور مع شخص على الانترنت عبر برنامج سكايب لإكمال نشاطين، نشاط عن طريق التواصل الصوتي، والآخر عن طريق التواصل النصي.

يتطلب منك القيام بما يلي:

1- قدم نفسك إلى محاورك.

2- تحدث باختصار عن ماذا فعلت اليوم أو خططك لبقية اليوم.

3- أكمل النشاطين الموجودين بالخلف.

Appendix D: Treatment Tasks

Spot-the-difference Task 1 (Sheet A)

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication

Instructions:

In this task, you and your partner will be given two pictures (labeled A & B) of a room in a house. Almost all of the details in these two pictures are similar. However, there is a number of differences between picture A and picture B. Your task is to describe your pictures to each other and ask each other questions to find out at least **FIVE differences**. Complete the task only in **English**.

An example is provided to help you complete the activity successfully.

Example: In picture A, there is a clock in the middle of the far wall, whereas in picture B, there is a natural scene image.

Picture A:

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication

Instructions:

In this task, you and your partner will be given two pictures (labeled A & B) of a room in a house. Almost all of the details in these two pictures are similar. However, there is a number of differences between picture A and picture B. Your task is to describe your pictures to each other and ask each other questions to find out at least **FIVE differences**. Complete the task only in **English**.

An example is provided to help you complete the activity successfully.

Example: In picture B, there is a natural scene image in the middle of the far wall, whereas in picture A, there is a clock.

Picture B:

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication

Instructions:

In this task, you and your partner will be given two pictures (labeled A & B) of a room in a house. Almost all of the details in these two pictures are similar. However, there is a number of differences between picture A and picture B. Your task is to describe your pictures to each other and ask each other questions to find out at least **FIVE differences**. Complete the task only in **English**.

An example is provided to help you complete the activity successfully.

Example: You will notice that in picture A, there's a cot on the left, whereas in picture B, there's a chair.

Picture A:

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication

Instructions:

In this task, you and your partner will be given two pictures (labeled A & B) of a room in a house. Almost all of the details in these two pictures are similar. However, there is a number of differences between picture A and picture B. Your task is to describe your pictures to each other and ask each other questions to find out at least **FIVE differences**. Complete the task only in **English**.

An example is provided to help you complete the activity successfully.

Example: You will notice that in picture B, there's a chair on the left, whereas in picture A, there's a cot.

Picture B:

Appendix E: SR Protocol

SR Instructions and Questions

(Arabic version is also available)

SR Instructions: (to be read to the participant at the beginning of the session)

Now, you are going to review parts from your interaction sessions. I am interested in knowing what you were thinking <u>at the time during the task.</u> I can hear/see what you were saying/writing, but I don't know what you were thinking. So every time I pause the recording, please tell me <u>in English or Arabic</u>, <u>whatever you were thinking at the time when you were talking with your partner</u>, but <u>NOT</u> what you are thinking <u>now</u>. If there is anything you would like to add or comment on, just let me know.

Please remember,

- There is no right or wrong answer. Your response can be about anything you were thinking about, for example the picture, what you said, what your partner said, or something else.
- Your response can be as long or as short as you want it to be.
- If you do not remember what you were thinking at that time, just say 'I don't remember.'
- You don't have to feel an obligation to say something meaningful every time the recording is paused. If you were not thinking anything, just say, 'I wasn't thinking anything.'
- You need to speak clearly and loudly enough for the microphone to pick up your voice.

Do you have any questions?
Ready to begin?

SR Questions: (for negotiation episodes)

- What do you remember thinking at this point during the task?

- What did you think your partner was saying at this point?

- Do you remember thinking anything when your partner said this?

- Why did you say this? or What did you intend to say?

- What were you thinking when you said/typed this?

- Is there anything else you would like to comment on about this moment?

Appendix F: Debriefing Questionnaire

SCMC task-based interaction Questionnaire

(Arabic version is also available)

Student ID#_____
(To be filled out by the researcher)

Please complete the following questionnaire and let the researcher know when you are finished.

Thank you!

Please tick only 1 response for each question.

	more in voice chat	more in text chat	same in voice and text chat
1. I liked doing the task			
2. It was easy to complete the task			
3. I cooperated well with my partner			
4. I felt relaxed doing the task			
5. I learned from the task			
6. I had enough time to construct sentences			
7. I had enough time to understand what my partner said			
8. I paid attention to how I was saying things in English			
9. I paid attention to how my partner was saying things in English			
10. I corrected my own language			
11. I noticed the corrective feedback provided by my partner			
12. I had a positive online chatting experience			

Appendix G: Debriefing Interview

Debriefing Semi-structured Interview

(Arabic version is also available)

1. Briefly describe your experience with completing tasks via online chat?
2. What were the main differences between completing the task in voice and text chat?
3. What were the **best and worst aspects** of completing the task via voice chat? Please explain in detail.
4. What were the **best and worst aspects** of completing the task via text chat? Please explain in detail.
5. Why did you think you felt more relaxed during the voice/text chat?
6. Why did you think you paid more attention to how were you saying things more during voice/text chat?
7. Why did you think you paid more attention to how your interlocutor was saying things in English during voice/text chat?
8. Do you think your online chat exchanges have helped you improve your English? How? Did you learn anything today? Did you notice anything interesting about English (for example, verbs, vocabulary, grammatical structures)? From which task?
9. Tell me how the chat sessions today have changed your perspectives on using online chat to practice English?
10. Is there anything else you would like to add about completing tasks via text or voice-based SCMC?

Appendix H: Participant Information Sheet

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication (SCMC)

(Arabic version is also available)

Dear learner,

My name is Waad Alzahrani and I am a PhD student in the Department of Education at the University of York, in the UK. I am currently doing my PhD research, under the supervision of Dr. Zoe Handley, exploring second language learning in computer-mediated task-based interaction. I am writing to ask if you are able to take part in this study.

In this particular study, I am interested in investigating the interaction patterns of EFL adult Arabic learners who are engaging in voice-based and text-based computer-mediated tasks. If you participate in this study, you will attend two sessions. In the first session, you will be asked to complete a short background questionnaire to determine some basic demographic information, such as age, gender, years of learning English, and your proficiency level of English and some information relevant to your use of online chatting. Also, you will be asked to perform a short language proficiency assessment. In the second session, you will be asked to engage with another learner to perform two task-based activities, one in voice chat and the other in text chat. The voice chat will be audio recorded, and the computer screen will be video recorded during your text chat. Scripts of text chat will also be saved and stored. Each task will take approximately 10-15 minutes to complete. After the completion of the two tasks, you will be interviewed by me to reflect on your thoughts while engaged in the tasks. Following this, you will be asked to complete a debriefing questionnaire. At the end of the session, you will be interviewed again to reflect on your answers in the debriefing questionnaire.

Confidentiality
The data that you provide will be confidential and will only be used for research and teaching purposes. One week after data collection, the data will be anonymised, and no one besides the researcher will know your name, as it will be replaced by a pseudonym. However, your voice will not be changed and will be kept as it is.

Storing and using your data
All the data will be stored securely on a personal password-protected computer. The anonymised data will be archived for future use in research and teaching. It will be made

available for researchers affiliated with this research project (e.g. researchers involved in coding the data and supervising the project). It may also be included in academic presentations and publications. This research has been reviewed by, and received ethics clearance from the University of York Research Ethics Committee, and there are no risks associated with taking part in this research.

Your rights as a participant

Your participation in this study is entirely voluntary. You are free to withdraw from the study at any point during data collection and up to one week after the data is collected. In such a case, please contact the researcher and the data you have provided will be deleted and destroyed.

I hope that you will agree to take part in this study. If, at any time, you have any questions about the study that you would like to ask before giving consent or after the data collection, please feel free to contact me:

Name: Waad Alzahrani
Email: wama501@york.ac.uk

If you have any concerns or complaints, you can contact:

Name: Dr. Zoe Handley   (Supervisor)
Email: zoe.handley@york.ac.uk

Name: Dr. Paul Wakeling (Chair of the Ethics Committee)
Email: education-research-administrator@york.ac.uk

If you are happy to participate, kindly complete the enclosed consent form and hand in it to the researcher.

Please keep this information sheet for your own records.

Thank you for taking the time to read this information.

Yours sincerely,
Waad Alzahrani

Appendix I: Consent Form

Investigating EFL Arabic learners interaction in synchronous computer-mediated communication (SCMC)

(Arabic version is also available)

Please initial each box if you are happy to take part in this research.

I confirm that I have read and understood the information given to me about the above named research project and I understand that this will involve me taking part as described above.

I understand that the purpose of the research is to investigate the interaction patterns of EFL Arabic learners who are engaging in voice-based and text-based SCMC

I understand that data will be stored securely on a password-protected computer and only the researcher (Waad Alzahrani) will have access to any identifiable data.

I understand that data will be confidential and only the anonymised data will be shared with the researchers involved in coding the data and supervising the project.

I understand that the anonymised data will be used for research purposes, and it may be used publically by the researcher in academic conferences and publications.

I understand that the data will be archived, and it may be used for future analysis and other research and teaching purposes.

I understand that I can withdraw from the study at any point during data collection and up to one week after data is collected.

I understand that this research has been reviewed by, and received ethics clearance from the University of York Research Ethics Committee.

Thank you very much!

I, the participant, agree to these conditions:

Name: _____   Email: _____

Signature:_____   Date: _____

I, the principal researcher, agree to these conditions:

Name: **Waad Alzahrani ,**

        PhD student, University of York, UK

Signature: _____ Date: _____

Appendix J: EIT Scoring Rubric

Ortega et al.'s (1999) scoring guidelines for EIT

SCORE 0

Criteria	Examples
• Nothing (Silence)	
• Garbled (unintelligible, usually transcribed as XXX)	

• Minimal repetition, then item abandoned:
  - Only 1 word repeated
 	
  - Only 1 content word plus function word(s)
 	
  - Only 1 content word plus function word(s)
  plus extraneous words that weren't in the
  original stimulus
 	
  - Only function word(s) repeated
 	
NOTE: with only, just, yet (meaningful adverbs),
    score 1
	- The- the street in... in... street... hmm (16/#2)
	
	- I wish... comfta-portable (19/#1)
	
	- I watch a movie (9/#22)
	
	- You don't... don't you? (14/#1)
	
	- He just finished (15/#23)
	(Closed word + Adv + lexical word) (score 1)

SCORE 1

Criteria	Examples
• When only about half of idea units are represented in the string but a lot of important information in the original stimulus is left out	- Cross the cross--cross the street ahead and. (16/#4) - I don't have nap (7/#1) - I ...the last year (20/#4) - I have to hair-haircu (1/#24) - Would you... the book on the table (26/#7)
• When barely half of lexical words get repeated and meaningful content results that is unrelated (or opposed) to stimulus, frequently with hesitation markers	- I wonder... why he... drive... well (6/#9) - He just finished painting... inside the park (15/#11)
• Or when string doesn't in itself constitute a self-standing sentence with some (targetlike or nontargetlike) meaning (This may happen more often with shorter items, where if only 2 of 3 content words are repeated and no grammatical relation between them is attempted, then score 1)	- I enjoy movie what shew have a... have a (9/#3) - She only eats vegetables and have xx- never eat vegetables (18/#4) - I want to big nice house.(13/#25) - A good frien of my take a good my chilren

	(21/#25)
	- I wannata .... animalslive (13/#26)
• Also when half of a long stimulus is left out, and the sentence produced is incomplete	- Zu book .... table (2/#26)
	- I doubt he how to drive (6/#25)
	-The little boy the kitten... no.. is sad... I can't remember (11/#8)
	- Before... before he can go outside for (23/#11)

SCORE 2

Criteria	Examples
• When content of string preserves at least more than half of the idea units in the original stimulus; string in meaningful, and the meaning is close or related to original, but it departs from it in some slight changes in content, which makes content inexact, incomplete, or ambiguous	- The gooda friend take care o- chi- children (left out that it was the neighbor's children, and that they were three) (21/#1)
	- After dinner I have a long piece [peace?] of a nap (<a long, peaceful nap) (7/#4)
	- She just finished painting the seaside her apartment (<inside of) (15/#4)
	- The restaurant was supposed to have ve- good food (<is supposed; meaning changed to past) (12/#4)
	- I want to big house which... in which... animal can live (left out 'nice' 'my' and made animal into singular) (13/#4)
	- Would you hand me... the books which are on the table (<book; meaning changed to plural) (26/#4)
	- It is possible to day tomorrow (from pronunciation problem, it is ambiguous whether 'rain' has been understood, but it is possible) (8/#1)

SCORE 3

Criteria	Examples
• Original, complete meaning is preserved as in the stimulus. Strings which are quite ungrammatical can get a 3 score, as long as exact meaning is preserved. Some synonymous substitutions are acceptable.	- It is possible... the rain tomorrow (8/#11)
	- That restaurant ah.... supposed to... ah... very good food (12/#14)

• Examples of acceptable substitutions (SCORE 3): hand/give/pass are acceptable synonyms for item 26. Substitutions of and & but are acceptable. A lot of = many, etc. • Anything with or without 'very' can be considered synonymous.	- Would you pass me the book on the table (26/#21)(Score 3) - Would you be so kind...to bring... the book...on the table (26/#13)(Score 3) - The rest-restaurant is supposed to have **good food** (12/#11)(Score 3)
• Examples of unacceptable substitutions or omissions (SCORE 2): - cigar smoking> smoking - apartment >house/room - he<>she - sense of humor> humor - finished cleaning>cleaned - order> eat - nice,big > big - AUX cannot be omitted (can go> go) - a lot of Noun> 0 Noun -too Adj > 0 Adj	- The number of people who **smoke** ...um is increasing every year (27/#10)(Score 2) - **He** just finished painting... inside of a **his** house (15/#5)(Score 2) - She finished **a** painting... inside her apartment (15/#7)(Score 2) - The person I'm dading is ...**wonderful... humour** (17/#11)(Score 2) - Before he get outside...he must **clean** his room (23/#9)(Score 2) - She always **eat**...meat...nev-never eat vegetable (18/#5)(Score 2)
• Changes in grammar that don't affect meaning should be scored as 3. For instance, failure to supply past tense (had>have) and missing articles should be considered grammar change only (score 3).	- After dinner I **have** a long peaceful nap. (7/#17)(Score 3)
• By contrast, cases of extra marking or more marked morphology should be considered as meaning change. For example, a present tense repeated as past or as future should be scored as meaning change (score 2).	- The restaurant **was** supposed to have ve- good food.(12/#24)(Score 2) - After the dinner I **will have** a long... sp- peaceful nap. (7/#8)(Score 2)
• Similarly, singular/plural differences between stimulus and repeated string change the meaning, not only the grammar (score 2).	- The **street** in the city is wide (3/#8)(Score 2)
• Changes of person (he for she or she for he) change the meaning; but problems of agreement (she...her versus she...his) should be considered	- **She** just finished painting ...**his** room inside (15/#14) (Score 2)(apartment is missing)

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grammatical change, not meaning change.	
• Ambiguous changes in grammar that COULD be interpreted as meaning changes from a NS perspective should be scored as 2. That is, as a general principle in case of doubt about whether meaning has changed or not, score 2.	- The street**s** on the city **is** wide (3/#23)(Score 2) (We can't know whether the number agreement is just a grammar problem or an interpretation problem, but string is ambiguous in meaning: (a) a generic plural statement or (b) a statement about one street (score 2).

SCORE 4

Criteria	Examples
• Exact repetition: String matches stimulus exactly. Both form and meaning are correct without exception or doubt.	

Appendix K: GAT Transcription System

A: General Structure of the Transcript

- The most common font use is Courier 10pt, as it is equidistant.
- The line spacing should normally be 1.5.
- The entire transcript is written in small letters.
- There is no hyphenation at all in GAT.
- The sequence of items is an iconic reflection of the temporal sequence of events in real time.
- Each line containing words represent an aborted speech which is marked if it ends in a glottal stop. Also, lines may include in-breaths or out-breaths, and measurements of pauses in parentheses.
- Micro pauses, up to approximately 0.2 sec duration, are indicated by (.). Long pauses are indicated in seconds (notation to the tenth of a second). Pauses within the intonation phrase are notated within the segment, but when the pause cannot be easily attributed to one of the speakers, it is notated on a separate line.
- The number of the segment is followed by the speaker ID. However, the speaker IDs are not repeated in the following segment.
- Numbers are transcribed using words.
- Hesitation markers such as er, uhm, erm etc are transcribed.
- Laughter such as hahaha, hehe or hihi are also transcribed according to the vowel quality and number of pulses or syllables.

B: Transcription conventions (Jenks, 2011, p.115)

This is a comparison table of the most common transcription conventions. Only the GAT conventions were used in this study.

Feature	CA	GAT	SBS
Simultaneous utterances	[[and]]	[and]	[[and]]
Overlapping utterances	[and]	[and]	[1,2,3 and]
Contiguous utterances	=	=	=
Timed pause	(0.0)	(0.0)	(0.0)
Micro pause	(.)	(.)	.. or ...
Falling intonation	.	.	.
Slight rising intonation	,	,	,
Rising intonation	?	?	?.
Marked upstep in intonation	↑	↑	⌐
Marked downstep in intonation	↓	↓	⌐
Elongation	:	:	:
Abrupt stop	-	-	-
Emphasis	underline	CAPITAL	^
Loud/forte speech	CAPITAL	<<f>word>	<F>word</F>
Soft/piano speech	° °	<<p>word>	<P>word</P>
Exhalations	hhh	hhh°	(Hx)
Laugh particle	he or ha	he or ha	@
Laughter within a word	wo(hh)rd	<<laugh>word>	wo@rd
Inhalations	.hhh	°hhh	(H)
Faster/allegro talk	>word<	<<all>word>	
Slower/lento talk	<word>	<<len>word>	
Smile voice	$word$	<<:-)>word>	<☺>word</☺>
Analyst notes	((notes))	((notes))	((notes))
Unintelligible syllable	*per syllable	x per syllable	# per syllable
Hearing approximations	(word)	(word)	#word

Appendix L: Text-SCMC Coding Scheme

The coding scheme can be found in Smith's (2008, p.100) study.

Coding symbol	Meaning	Explanation
~~strikethrough~~	Indicates text that has been typed and subsequently deleted before message is sent.	Strikethrough shows messages or parts of messages that a learner has typed but deleted before sending the final message. None of the strikethrough text appears on the screen of the interlocutor nor on the hard copy of the chat log.
Black bar + underline ▌	Indicates text with embedded deletion has been deleted. Black vertical bar indicates where deletion begins. Deleted text is underlined to the left of the bar.	Black bar + underline is used when a message or part of a message which already has some deleted sections is subsequently deleted in its entirety. This coding allows the acknowledgment of deletions of text with embedded deletions.
[post-hoc inserted text]	Indicates that the text within the brackets has been inserted at a later point in the message.	Note: A second, third, etc. occurrence of post-hoc inserted text is signified with double/triple brackets respectively [[text]], [[[text]]].
[~~post-hoc deleted text~~]	Indicates that the deleted text within the brackets was deleted at a later point in the message.	Note: A second, third, etc. occurrence of post-hoc deleted text is signified with double/triple brackets respectively [[~~text~~]], [[[~~text~~]]].
[+]	Indicates the point in the message at which the [post-hoc inserted text] was inserted.	Note: The point in the message at which a second, third, etc. post-hoc insertion is made is signified with double/triple brackets respectively [[+]], [[[+]]].
[-]	Indicates the point in the message at which the [post-hoc deleted text] was deleted.	Note: The point in the message at which a second, third, etc. post-hoc deletion is made is signified with double/triple brackets respectively [[-]], [[[-]]].
[+/-]	Indicates the point in the message at which a correction was made.	This code is used for short one or two character corrections such as for capitalization, spelling, typos, etc. This code eliminates the need for using the more lengthy [-][+] in sequence.
[line number] Example: [3]	Indicates the point in text currently being typed but not yet sent where a new line from the interlocutor appears on the screen of the target participant.	Often a line from the interlocutor will appear on the screen mid-way through a message which is in the process of being typed. This code indicates both the point at which this new message appears and its line number on the chat log/chatscript. For example in the chat text below Jordan's line 3 appears while Katarina is typing line 6. Specifically, it occurs immediately after Katarina types the word "nimmt".

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Appendix M: Example of Video-enhanced Chat Log

This is the video-enhanced chat log for dyad one (P1 & P2).

Turn	Line	Final chat log	Video-enhanced chat log	Explanation
1	1	[17:17:01] P1: hi		Unremarkable
2	2	[17:17:05] P2: hi		Unremarkable
3	3	[17:17:36] P1: how are you		Unremarkable
4	4	[17:17:57] P2: what do you have in the right sied of the pic	what do you have in [3] the right sied of the pic	After the word "in" line 3 appears on screen.
5	5	[17:18:43] P1: drawers	draw~~rs and bed~~rs	Types then immediately deletes "rs and bed" then retypes "rs" to complete the word "drawers".
6	6	[17:19:14] P2: i can see bord and big hart	i~~can~~ can see bord <u>wth~~ee~~</u> [5]■ and big hart	Types then immediately deletes "can". Types then immediately deletes "e", retypes "e". After retyping "e" line 5 appears on screen. Then "wthe" is deleted.
7	7	[17:19:24] P1: towel is hanging on the wall	~~towel was hang~~ towel is hanging on the wall	Types then immediately deletes "towel was hang".
8	8	[17:19:47] P2: yas i have it	yas i have it	Unremarkable
9	9	[17:20:15] P1: I do not have red heart	~~on~~ I do [8] ~~n,~~ not have red ha~~ert~~eart	Types then immediately deletes "on". After typing "do" line 8 appears on screen. Types then immediately deletes "n,". Misspells and immediately corrects spelling of "heart".
	10	[17:20:33] P1: i have pink bed	i have pink bed	Unremarkable
10	11	[17:20:51] P2: in the lift of the towel i can see books	~~t~~in the lift o~~g~~[9]f the t~~p~~owel i can s[10]ee ~~rufe~~ books	Types then immediately deletes "t". Types then immediately deletes "g". After deleting "g" line 9 appears on screen. Types then immediately deletes "p". After typing "s" line 10 appears on screen. Types then immediately deletes "rufe".
11	12	[17:21:24] P1: i do not h see it	~~white sundels on the floo~~[11]~~r~~ i do~~no~~ not h see it	After typing "floo" line 11 appears on screen. Continues typing then immediately deletes "white sundels on the floor". Types then immediately deletes "no".

	13	[17:21:38] P1: i have pink bed	i have pink bed	Unremarkable
	14	[17:22:17] P1: and white sundels on the flour	and wh~~I~~ite sundels ~~n~~on the flou~~r~~ur	Autocorrect changes "I" in "white to "i". Types then immediately deletes "n". Types then immediately deletes "ur" then immediately retypes "ur" resulting in a non-target-like spelling of the word.
12	15	[17:22:28] P2: ok what about lift hand ?	ok what ab[12]~~uta~~[13]~~ut~~aot■ [14][bout] lift hand ? [*] [+]	After typing "ab" line 12 appears on screen. Types then immediately deletes "ut". After typing "a" line 13 appears on screen, then continues typing "ut", then immediately deletes "aut" and replaces with "aot". [*] After typing this message in its entirety, cursor moves to and highlights "abaot". After highlighting "abaot" line 14 appears on screen. Then deletes "baot" and replaces with "bout" to spell correctly.
13	16	[17:23:09] P1: flower seat	flou~~re~~wer seat	Types then immediately deletes "ur". Types "e" then immediately deletes.
14	17	[17:23:14] P2: i dont have sundels	i dont have su~~un~~[16]dels	Types then immediately deletes "u". After typing "n" line 16 appears on screen.
15	18	[17:23:32] P1: stand light next to the seat	stan[17]d light next to the seat	After typing "stan" line 17 appears on screen.
16	19	[17:23:50] P2: ihave babe bad in the lift	ihave babe bad [18] in the lif~~ett~~	After the word "bad" line 18 appears on screen. Types then immediately deletes "et".
17	20	[17:24:12] P1: i do not have it	i do not have i~~y~~t	Misspells and immediately corrects spelling of "it".
	21	[17:24:46] P1: i have ben under the desk	i have ben under the desk	Unremarkable
18	22	[17:25:44] P2: in the rofs i can see books and under the books there is bicecal	[*][20] in the rofs i can se[21]e books ~~in~~and under ~~i~~the~~-~~ books there i~~ds~~ bi~~ce~~cecal	[*] Cursor moves and selects 'Edit message' box for previous line 19 message, but selects 'Cancel' leaving message intact. Before typing commences line 20 appears on screen. After typing "se" line 21 appears on screen. Types then immediately deletes "in". Types then immediately deletes "i".

				After the word "the" a space is entered then immediately deleted, the space is then re-entered. Misspells and immediately corrects spelling of "is". Types then immediately deletes "ce", then re-enters "ce" resulting in a non-target-like spelling of the word.
19	23	[17:25:50] P1: do you have another bed above the pink bed in the right side	do you have another bed above the pink bed in the right [22] side	After the word "right" line 22 appears on screen.
20	24	[17:26:16] P2: on	on	Unremarkable
	25	[17:26:31] P2: there is 3 boxs	there is 3 boxs	Unremarkable
21	26	[17:26:48] P1: i don't have bicecle	~~i~~ i don~~2~~'t h[25]ave bicecle	Types then immediately deletes "i". Types then immediately deletes "2". After typing "h" line 25 appears on screen.
22	27	[17:27:05] P2: ok thank you	Ok [26] thank you	After the word "ok" line 26 appears on screen.
23	28	[17:27:16] P1: thank you	thank you	Unremarkable

Appendix N: Coding Manual

A) Coding of interaction data

The transcripts of learners' online interactions (both oral and written) are coded for the following:

1) Negotiation episodes		
	Definition	**Example**

	Negotiation episodes refer to the conversational exchanges that arise when interlocutors seek to prevent a communicative impasse occurring or to remedy an actual impasse that has risen.	**(1)** P1: but there is trophy
		P2: what
		P1: trophy
		P2: trophy
		P1: yeah
		P2: what do you mean by trophy
		P1: like in play station
		 When you win you get trophy
		P2: aha yes yes hehe
		
		(2) P12: ok so (4.0)
		    do you have two bads
		P11: two beds
		P12: in the yeah one of them
		    is in the grounds
		    one in the up
		P11: yeah

2) Features of negotiations	Each negotiation episode is then coded for the following features:			
	Features	**Category**	**Definition**	**Example**

	Type of negotiation	**(1) Meaning negotiation**	Meaning negotiations are motivated by communication breakdowns and have clarification request, confirmation or comprehension checks as their indicators.	P14: ok what about that hurt in the
				    we have some hurts
				    two hurt
				P13: where is it
				P14: aah behind that behind the bed
				P13: you mean hearts?
				P14: yeah heart
				P13: in the cupboard
				P14: yeah hehehe

		(2) Form	Form negotiations	P12: ok so (4.0)

		negotiation	are motivated by the interlocutor's intention of alerting the speaker of his/her language problems. In form negotiations, there is no apparent communication breakdown and they have recasts and explicit correction as their indicators.	``` do you have two bads P11: two beds P12: in the yeah one of them is in the grounds one in the up P11: yeah ```
Type of interactional feedback (i.e. indicator)	**(1) Recast**	A reformulation of a speaker's erroneous output into a more target-like form, without interrupting the flow of the interaction.	``` P4: ok earmm and also there is like maybe small big bag P3: a small bag – P4: do you have a small bag P3: no i don't have ```
	(2) Explicit correction	A correction of a previous utterance, indicating the source of error and sometimes with a metalinguistic explanation.	``` P30: we call troof P29: ok no it is called shelf P30: ok ```
	(3) Negotiation move (a) Clarification request	Utterances that indicate a problem in comprehension and encourage the speaker to rephrase the previous output. Clarification requests are mostly	``` P5: do you have high heel P6: what ? P5: next to the bed high heels shoes P6: no ```

		formed by wh- or tag questions; however, statements such as '*I don't understand*' or '*try again*' can also function as CR.	
	(b) Confirmation check	Utterances in which the interlocutor checks if s/he correctly understood what his/her conversational partner is saying. These are in the form of questions, with or without a tag, and they involve full or part repetition of the interlocutor's preceding utterance.	```P14: ok what about that hurt in the we have some hurts two hurt P13: where is it P14: aah behind that behind the bed P13: you mean hearts? P14: yeah heart```
	(c) Comprehension check	Utterances in which the speaker checks if the interlocutor has understood what s/he said. The speaker here might have some idea that their partners did not understand some part of their utterances, and they check whether this is the case or not.	[17:07:18] P16: yes [17:07:19] P15: what? [17:07:37] P15: do u understand what wall is mean ? [17:08:18] P16: I think this defferent
Type of Trigger	**(1) Global**	Cases where the problematic	```P3: I got one boat in the middle shelf I mean that one```

				above the bed P4: sorry i don't understand what you mean? P3: see there are 2 shelves above the bed yeah P4: yes P3: the second one has a boat P4: no i do not have
		(2) Linguistic (a) Lexical	Cases where the problematic utterance can be clearly linked to a specific lexical item, e.g. use of unfamiliar words, inaccurate or inappropriate choices of lexical items and non-target derivations of nouns, verbs, adverbs and adjectives.	P10: do you have a painter on the right side ? P9: do you have a big window on the left? P10: yes i have P9: you mean painting right? P10: yeah
		(b) Morpho-syntactic	Cases where the problematic utterance can be clearly attributed to aspects of English morphology or syntax, e.g. incorrect word order, lack of gender or number agreement, or incorrect verb tense or mood.	P16: yeah i have red blanket and i have man christmas do you have P15:no i don't have man christmas hehe christmas man you mean P16:yeah christmas man

		(c) Phonological	Cases where the problematic utterance can be attributed to non-target phonetic production.	`P38: do you have bi low`
				`P37: what`
				`P38: bi low`
				`P37: where`
				`P38: in the bed`
				`P37: bi PILLOW you`
				`     mean?`
				`P38: yes pillow`

		(d) Spelling/ Orthographical	Cases where the problematic utterance can be attributed to errors in spelling/ the written form of a word.	[16:47:14] P32: raut or left [16:47:32] P31: u mean right ? [16:47:40] P32: yes
	Type of response	**(1) No modified output** (a) Acknowledge-ment	Incidents where the participant only responded with 'yes' to the feedback.	[16:47:14] P32: raut or left [16:47:32] P31: u mean right ? [16:47:40] <u>P32: yes</u>

		(b) Repetition	Incidents where the participant simply repeated the same non-target-like utterance, in whole or in part.	`P32: do you have in your`
				`    in right of your`
				`    picture three dolphin`
				`P31: three what`
				<u>`P32: three dolphin`</u>
				`P31: no i don't have`

		(c) Topic continuation	Incidents where the participants ignored the feedback and continued the topic.	`P26: doesn't have wat`
				`    wash`
				`P25: no no i didn't have`
				`    a clock`
				<u>`<R> P26: ok number three`</u>

		(2) Modified output
		(a) Non-successful modification
			Incidents where the participant changed his/her response following the feedback, but his/her modification was still in a non-	`P32: yeah and two`
				`    two things`
				`P31: two pillows`
				<u>`P32: two polls yeah`</u>
				`    behind the two polls`
				`    in the right you have`

		target like form that needed repair.	

	(b) Successful modification (i.e. repair)	Incidents where the participant successfully modified his/her output in response to feedback, incorporating at least one of the corrections in case there were many.	`P38:  do you have bi low`
			`P37: what`
			`P38: bi low`
			`P37: where`
			`P38: in the bed`
			`P37: bi PILLOW you mean?`
			`P38: yes pillow`

3) Self-initiated noticing (i.e. self-repairs)

Learners' online interactions are also coded for instances of self-initiated noticing (i.e. self-repairs). **Self-repairs** are operationalized as episodes in which the participants independently corrected their own productions, without being prompted to do so by their interlocutors.

Each self-repair is also coded for its linguistic category:

Linguistic category of self-repairs	Definition	Example

(a) Lexis	Situations where the learner has changed the wrong word and substituted the correct one for it.	`P27:  you have a watch(.)`
		`     a clock`
		`P28:  no i can't see`

(b) Morphosyntax	Situations where the learner corrected any morphological or syntactic errors.	`P13:  what about the rubbish`
		`P14:  a::::: no`
		`     rubbish under table`
		`     under the table`

(c) Phonology	Situations where the participant mispronounced a word and then	`P28:  earrr you can see`
		`baby bad`
		`baby bed`

	changed it to the correct pronunciation.			
	(d) Spelling/ Orthography	Situations where the participant corrected errors in spelling or orthography (i.e. capitalization and punctuation).	**Final chat log**	**Video-enhanced chat log**
			[14:01:26] P27: the mattress is the one under the blanket	the mattress is the one under [15] the [p̶][b]lanket [*][-][+]

B) Coding of SR data

Learners' transcribed comments in the SR sessions are examined and coded for incidents and levels of noticing.

1) Incidents of noticing

Learners' comments are first coded as either they attended to the feedback [+N] or they did not attend to the feedback [-N].

Code	Operationalization	Example	
		Negotiation episode	**SR report**
[+N]	Situations where learners indicated that: (a) they were aware of the fact that they received a target-like model of the linguistic form, and/or whether their production of the form was problematic. (b) the form was new to them (c) the feedback led to revisions of their hypotheses about the target form.	P14: ok what about that hurt in the we have some hurts two hurt P13: where is it P14: aah behind that behind the bed P13: you mean hearts? P14: yeah heart P13: in the cupboard P14: yeah hehehe	thinking at this time? P14: *aah two hearts I meant hehehe. I wanted to ask about the hearts, but I pronounced it wrong. She got me. She corrected me.*
[-N]	Situations where learners indicated that: (a) they could not remember what happened during the chat (b) they just noticed a difference between their output and their interlocutor's feedback (i.e. during the SR, upon prompting).	P8: ok do you have flower up the bend up the bed P7: what P8: flower P7: flowers no just outside P8: ok	R: Do you remember thinking anything at this point during the task? P8: *I meant the flowers and the vase (saying them in Arabic, and pointing to them in the picture).* R: do you remember any

			other thing at that time? P8: *no*
	Or cases where learners' recall of the episode was mainly about the content of the picture.		

2) Levels of noticing

All the incidents of reported noticing [+N] are then coded as either: a) simple noticing or b) elaborate noticing.

Code	Operationalization	Example	
		Negotiation episode	**SR report**
Simple noticing	Noticing incidents where learners simply reported or referred to the target-like linguistic form in the feedback or the problematic form in his/her utterance without further deliberation.	```P32: how many you have four P31: how many what P32: how many this one you said P31: statues P32: yeah P31: i have two```	R: What do remember thinking at this point during the task? P32: *I wanted to describe these here* (referring to the objects on the middle, lower shelf in his picture), *and he gave me the proper word.* R: Were you thinking anything else? P32: *nothing*
Elaborate noticing	Incidents where learners deliberated over the language forms and provided explanations of the differences, as well as reasons for accepting the corrected forms or discussion of alternative forms.	```P31: no i have white (3.8) do you have a vase (pronounced as vaise) in the left of your bed P32: what P31: vase (pronounced as vaise) P32: vase (pronounced as vaise) P31: vase vase (pronounced as vaise) P32: earrrmm don't know```	R: What do remember thinking at this point during the task? P31: *this is called 'vase', right? In American English, it is called 'vase'* (pronounced as 'vaise')*, but I am not sure how it is said in British English. . I suspected it might be pronounced differently. I remember one of my teachers pronounced it in this way. The spelling is v a s e* (spelled correctly).

Appendix O: Braun and Clarke's (2008) Phases of Thematic Analysis

The following table is adapted from Braun and Clarke (2006, p.87).

Phase	Process
1. Familiarising yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	On-going analysis to refine the specifics of each theme, and the overall story the analysis tells; generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Appendix P: Raw Data of Learners' Interactions

The following table presents the interaction data, i.e. the time on task, number of words and turns, frequency of negotiations (total, meaning and form) and frequency of self-repairs in voice and text chat.

Group	Dyad	P#	Voice chat							Text chat						
			Time (min)	Words	Turns	n/total	n/m	n/f	Self-repairs/ total	Time (min)	Words	Turns	n/total	n/m	n/f	Self-repairs/ total
1	1	P1	9:13	276	50	5	5	0	1	9:50	72	12	1	0	1	1
		P2		503	52				2		71	11				1
2	2	P3	8:20	315	54	6	5	1	1	42:00	347	28	5	4	1	7
		P4		249	52				3		191	27				3
3	3	P5	16:18	833	144	13	10	3	3	30:00	243	25	3	1	2	10
		P6		511	142				3		145	24				1
4	4	P7	6:15	155	51	6	6	0	0	16:50	148	22	0	0	0	6
		P8		295	51				2		106	21				4
1	5	P9	5:50	249	51	6	5	1	0	14:33	160	22	6	5	1	3
		P10		217	50				3		142	23				2
2	6	P11	3:00	149	24	1	0	1	0	19:00	221	20	2	2	0	4
		P12		172	25				1		87	19				1
3	7	P13	4:47	300	50	3	1	2	0	12:50	152	21	0	0	0	0
		P14		250	50				4		110	21				2
4	8	P15	5:00	211	36	3	3	0	1	24:30	169	21	2	2	0	2
		P16		168	38				2		110	20				1
1	9	P17	11:30	394	70	5	4	1	1	18:00	102	19	1	1	0	1
		P18		542	71				8		167	19				3

2	10	P19	4:50	200	48	3	2	1	1	24:00	135	21	3	1	2	8
		P20		218	48				1		131	20				5
3	11	P21	4:10	285	39	5	2	3	0	12:00	94	18	2	1	1	2
		P22		105	38				1		51	18				0
4	12	P23	4:50	207	37	3	1	2	0	10:00	84	10	0	0	0	2
		P24		232	37				1		78	11				1
1	13	P25	9:00	567	67	8	4	4	3	20:10	124	24	2	1	1	0
		P26		166	66				0		77	24				0
2	14	P27	8:20	337	55	7	5	2	4	38:40	256	26	4	0	4	9
		P28		157	54				2		173	25				5
3	15	P29	10:28	838	80	7	5	2	4	23:40	320	23	5	2	3	8
		P30		337	79				2		149	22				1
4	16	P31	10:40	394	90	11	10	1	0	25:00	182	25	6	4	2	5
		P32		388	90				2		93	25				0
1	17	P33	4:40	155	30	3	2	1	0	11:00	115	11	1	1	0	0
		P34		97	30				0		45	10				0
2	18	P35	5:30	240	48	5	4	1	0	18:50	78	14	0	0	0	3
		P36		140	47				1		54	14				0
3	19	P37	12:37	312	87	10	10	0	2	23:10	143	23	3	3	0	3
		P38		439	87				5		145	23				1
4	20	P39	5:14	344	38	5	0	5	2	12:00	109	11	1	0	1	1
		P40		148	39				2		45	11				1
	Total		**02:30:32**	**12,095**	**2295**	**115**	**84**	**31**	**68**	**06:46:03**	**5,424**	**784**	**47**	**28**	**19**	**107**

Appendix Q: Noticing Incidents in Accordance to Trigger and Feedback Types

The following table presents the frequency of noticing incidents in terms of feedback and trigger types.

Type of feedback	Type of trigger					
	Voice chat			Text chat		
	Grammar	Lexis	Phonology	Grammar	Lexis	Spelling
Incidents of Recast	**17**	**5**	**11**	**8**	**1**	**9**
[+N]	2	2	4	-	1	2
Incidents of negotiation move	**23**	**38**	**12**	**6**	**9**	**10**
[+N]	4	32	11	1	7	5
Total of negotiation episodes	**106**			**43**		
Total of [+N]	55 (52%)			16 (37%)		

Abbreviations

ACMC	Asynchronous Computer-Mediated Communication
CALL	Computer-Assisted Language Learning
CMC	Computer-Mediated Communication
EFL	English as a Foreign Language
ESL	English as a Second Language
FTF	Face-to-Face
IELTS	International English Language Testing System
L2	Second/Foreign Language
LREs	Language-Related Episodes
MS Word	Microsoft Word
NNS	Non-Native Speaker
NS	Native Speaker
P	Participant
SCMC	Synchronous Computer-Mediated Communication
SLA	Second Language Acquisition
SPSS	Statistical Package for Social Sciences
TBLT	Task-Based Language Teaching
SR	Stimulated Recall

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