Interactional Feedback in Text-based and Voice-based Synchronous Computer-Mediated Communication

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Abstract

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In the ever-changing digital era, the surge of online informal language learning platforms has revolutionized the way we learn new languages. This dissertation delves into the critical role of interactional feedback (IF) in synchronous computer-mediated communication (SCMC), a cornerstone for optimizing these digital learning spaces. Anchored in the interactionist perspective and usage-based linguistics, this research seeks to illuminate the pathways through which IF can enhance language acquisition in virtual settings.

The proliferation of online language learning tools has not been matched by a comprehensive understanding of feedback dynamics. This study, therefore, sets out to bridge this knowledge gap by examining the impact of IF on language learners' proficiency, particularly in article usage - a notorious challenge for language learners. Over a span of ten weeks, ten pairs of native speakers (NS) and non-native speakers (NNS) engaged in SCMC sessions, generating a rich dataset of 49 hours and 197 transcripts. This corpus served as the foundation for a mixed-method analysis, scrutinizing the types of NS feedback, the NNS errors that prompted such feedback, and the subsequent NNS responses, with a focus on article usage across varying proficiency levels and discussion topics. The investigation uncovered a spectrum of eleven distinct feedback types, with embedded corrections and interrogative recasts emerging as the

most potent in eliciting learner uptake. The comparative analysis of text-based and voice-based feedback revealed a notable disparity in effectiveness, with text-based feedback succeeding in 33% of instances, while voice-based feedback achieved a higher success rate of 43%. The study also highlighted article errors as the predominant trigger for NS corrective feedback, with a remarkable 69% of NNSs adjusting their article usage in response to such feedback.

A qualitative dive into the data exposed personal subjects as the most frequent topics of conversation, underscoring the significance of contextually relevant interactions in language learning. Employing a dynamic coding approach, complemented by rigorous statistical analyses such as the Friedman test and subsequent post hoc comparisons, the study meticulously charted the evolution of article usage over the course of the ten-week period. The post hoc comparisons, in particular, shed light on the intricate relationship between learners' proficiency levels and their mastery of article usage. These analyses confirmed a positive correlation between proficiency and article accuracy, with higher proficiency learners consistently demonstrating more precise article usage in both text and voice-based SCMC.

The implications of these findings are far-reaching for the field of language education. They underscore the necessity for educators to cultivate a nuanced understanding of the diverse feedback mechanisms at play in different communicative contexts. The study advocates for the strategic use of varied feedback techniques, such as integrated corrections and clarification requests, and the design of activities that foster target-like language production. In crafting SCMC tasks, educators are encouraged to prioritize feedback that bridges communicative gaps, ensuring that such activities are in harmony with pedagogical objectives and learner preferences. In conclusion, this research contributes to the body of knowledge on digital language learning by providing empirical evidence on the efficacy of IF in SCMC. It offers actionable insights for

language educators seeking to refine online instructional practices and curriculum development, with the ultimate goal of enhancing learners' linguistic competence in an increasingly digitalized world.

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Dedication

بسمه تعالی

“Read in the Name of your Lord Who created. Created man, out of a clot. Read, and your Lord is the Most Generous, Who taught by the Pen, Taught man that which he knew not.” (Quran, 96).

I begin by thanking Allah Almighty for His infinite mercy and for creating the Fourteen Infallibles (عَلَيْهِمُ ٱلسَّلَامُ) for Guidance.

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In loving memory of my late grandfather, Haji Muhammad Ibrahim, affectionately known as Baba-e-Kalan, who first inspired my dream of pursuing a doctorate. I love him and miss him dearly. This dissertation is dedicated to his memory.

I end with the prayer, "Rabbi zidnee ilma" (Al-Quran, 20:114): "O my Lord, increase me in knowledge." May Allah Almighty guide me to continue increasing my knowledge and grant me the wisdom to put that knowledge into meaningful action. Ameen.

Chapter 1: Introduction

Increasingly, experts are urging people to learn a second language (L2) in order to be competitive in an interconnected world. Countries that actively nurture different languages reap a range of rewards, from more innovative workforce to more successful exports (*Economist*, Sept. 2018). Learning a language is thought to not only provide the learner with new language skills, but also to broaden their understanding of the world via the cultural education that often goes hand-in-hand with learning another language. In the past few decades, opportunities for language learning have evolved beyond the limits of time and place that are inherent to face-to-face interaction (Blake, 2000). Electronic wide-area networks, spread across the World Wide Web, connect speakers from a wide range of backgrounds and enable expanded opportunities for language learning and social interaction. Indeed, the online language learning environment has greatly impacted the cognitive and social aspects of language learning. Over their computers and the Internet, early-morning risers from Japan may chat with Brazilian night owls; English teachers in the city of New York can teach a multicultural group of students across the globe.

Owing to the rise in the demand for learning second language(s), one may observe a phenomenal increase in the number of both formal and informal online language programs, especially during and post COVID-pandemic since the beginning of 2019. A simple internet search for online language tutors will yield about 88 million results that include institutions, companies, and individuals offering to teach a second language around the globe. Of these, upwards of 10 million tutors identify as English language tutors or programs. The number almost doubles to more than 20 million when an internet search is conducted for the number of language chat rooms hosted on various websites, a quarter of which are chatrooms specific to English language learning. These online language exchange services include websites and chatrooms that

are free (e.g., among many others, Conversation Exchange, The Mixxer, Speaky) or subscription-based (e.g., among many others, Babble, ELS, Duolingo). Obviously, these chatrooms, websites, and courses are fulfilling a real and increasing need of learning a language by capitalizing on prospects of better education and employment opportunities, in addition to a more sobering 21st Century reality of the need to learn an L2 "to escape wars, despotic regimes, disease, drought, famine, religious persecution, ethnic cleansing, abject poverty, and climate change" (Long, 2015, p. 4). The rapid transition to online learning during the COVID-19 pandemic, which caused lockdowns and sudden school closures including language learning schools, significantly impacted the proliferation of "naturalistic" online language learning.

Expertise in multiple languages is a significant asset to any enterprise irrespective of the sector it operates in. Inclusion of technology helps organizations to enhance their existing learning programs and provide flexible learning space to employees at a minimal additional expenditure. As corporations are increasingly emphasizing e-learning, traditional language learning providers are focusing on digitization of their learning environment to match their capabilities with the learning and development strategies of enterprises.

Such immense interest in online language learning has given birth to its own market and some of the very popular applications and websites are listed on stock exchanges around the globe. According to the latest market research report published by Technavio (2022), analysts forecast the global digital English language learning market for 2022-2026 to grow at a compound annual growth rate (CAGR) of over 18%. Put into perspective, this is larger than the combined CAGR for multinational technology companies including Apple Inc. Google, and MapQuest. The primary reasons listed for such a huge growth from a cost/benefit perspective are that online language learning enables individuals to learn at their own pace, schedule classes as

per their flexibility, and choose learning materials as per their interest or needs (BusinessWire, Sept. 2018). In addition, the growth of this segment is further supported by the advent of mobile learning solutions that allow human-human interaction mediated by computers outside the sedentary environment.

It is, however, essential to question the efficacy of online language learning and the interaction that takes place between native speakers (NS) and L2 learners, or nonnative-speakers (NNS), of a language. Is online NS-NNS interaction, although well-meaning, facilitating L2 learning at all? What aspects of this interaction are especially helpful? Which facets of these interactions merit additional investment? How can this multi-billion-dollar language learning market thrive further? To answer these questions and to ensure sustainability and accountability of such online programs, there is a need to examine online interaction through the specialized lens of second language acquisition (SLA). A more meaningful and effective online language learning may occur if the interaction therein is informed by L2 learning theories, the processes underlying L2 learning, and the major factors influencing it.

Background of the Study

The availability of technology affords educators, practitioners, and L2 learners with unique opportunities to not only incorporate and integrate cutting-edge technology into the L2 classroom, but to pursue language learning and teaching avenues that were unheard of in the past century. L2 researchers, on the other hand, are provided with an ideal playing ground to pursue research agendas that are continuously pushing boundaries of computer-assisted language teaching and learning in parallel with adding to SLA theories.

Theoretical claims that conversational interaction can facilitate language learning were made by various researchers beginning in the 1970s (e.g., Mackey, 2007; Long, 1996; Pica and

Doughty, 1985; Hatch, 1978b). One of the most notable and seminal claims was made by Long in 1981 when he proposed the Interaction Hypothesis in which he stated that while comprehensible input is necessary for language acquisition, negotiation of meaning is also an essential component. In 1996, Long expanded on his original postulation of the Hypothesis, which, in its most recent iteration, suggests that interaction connects input, internal learner capacities, and output in productive ways. It further states that as a result of feedback obtained through interaction, learners may attend to form, or 'notice the gap' between their own production and/or comprehension and the target language.

Championed by Long (1996) in his revised articulation of the Hypothesis and later supported by other researchers (Gass, 1997, 2003; Gass & Mackey, 2006; Long, 2007; Mackey, Abbuhl, & Gass, 2012; Pica, 1996), it was purported that the aspect of interaction that provides favorable grounds for L2 learning can be ascribed to 'negotiation of meaning'. This is because negotiation of meaning potentially offers L2 learners opportunities to receive comprehensible input (Krashen, 1982, 1985), to produce output through which they can test their hypotheses about L2 forms, and process the L2 syntactically (Swain, 1985, 1995, 2005). Aided by the provision of negative evidence, which can be defined as input that provides direct or indirect evidence of linguistic forms, L2 learners become aware of the gap(s) between their interlanguage and the target language (Robinson, Mackey, Gass, & Schmidt, 2012; Schmidt, 2001, 1995, 1993, 1990; Schmidt & Frota, 1986). In other words, negative evidence, which facilitates L2 development by indicating to learners that there was an issue with their language production, potentially drawing their attention to gaps between their L1 and TL, is provided through interlocutor's feedback on learners' L2 utterances (Ziegler & Mackey, 2017).

Thus, the Hypothesis claims that interaction is influential in promoting and facilitating the development of second (L2) or foreign language, and that negotiated interaction assists SLA (Long, 2007). However, as interaction researchers generally agree, the association between interaction involving negotiation for meaning and SLA is not a simple causal one but is complex and multifaceted. This relationship is likely impacted by various factors such as developmental readiness, type of IF, type of target structure, learner internal capacities and differences (e.g., working memory, aptitude), social factors, task characteristics, and context (Ammar & Spada, 2006; Ellis, Loewen, & Erlam, 2006; Goo & Mackey, 2013; Han & Kim, 2008; Long, 2007; Lyster & Ranta, 2013; Mackey et al., 2012; Nassaji, 2015). Given the complex nature of the relationship between interaction and L2 learning, researchers have become particularly interested in the specific features of interaction that may influence the extent to which negotiation of meaning during interaction benefits L2 learners (for a review of interaction research, see Loewen & Sato, 2018; Spada & Lightbown, 2009; Long, 2007). In particular, considerable attention has been paid to feedback during interaction, leading to discussions of types of feedback and their efficacy for L2 learning.

A number of studies have been conducted to investigate the role of interactional feedback (IF) in SLA (Han, 2008, 2002, 2001; Long, Inagaki, & McDonough, 1998; Mackey & Philp, 1998; Oliver, 1995). Several researchers have identified the importance of such feedback types as recasts, confirmation checks, and clarification requests, and their effectiveness for the development of L2 (Lyster, 1998; Lyster & Ranta, 1997; Panova & Lyster, 2003). Recent meta-analyses also clearly evidence the beneficial effects of IF provided during interaction on the acquisition of L2 lexical and grammatical features (e.g., Brown, 2016; Kang & Han, 2015; Li, 2010; Lyster & Saito, 2010; Russell & Spada, 2006).

Over the same period in which the revised version of IH appeared, a body of literature addressing computer-assisted language learning (CALL) emerged. In an early position paper, Chapelle (1998) identified features of interaction that could be directly applied to instruction in computer-mediated environment. CALL features such as making linguistic structures salient, supporting modified interaction between learner and interlocutor, providing opportunities for learners not only to notice their errors but also to modify their output, and to receive comprehensible input are highlighted. These critical features are mirrored in ideal SLA conditions – for instance, the importance of interaction, exposure to comprehensible input, and opportunities for output and feedback (Zeng, 2017; Lin, Huang, & Liou, 2013; Sotillo, 2010). Following suit, studies in CALL started investigating the language produced by L2 learners in computer-mediated communication (CMC) and the interaction taking place in asynchronous and synchronous environments (Smith, 2008). A portion of this research described the language produced in asynchronous (ACMC) and synchronous (SCMC) modes/channels (e.g., Hung & Higgins, 2016; Vandergriff, 2013; Kenning, 2010; Smith, 2005; Kelm, 1992; Chun, 1994). Other studies analyzed the complexity of the language produced (Chun, 1994; Kern, 1995; Warschauer, 1996, 1998), and finally others compared the language produced in face-to-face interaction versus ACMC and SCMC interactions (Sotillo, 2000; Warschauer, 1996).

The majority of empirical studies in the two sub-branches of SLA research, SCMC and interaction, have taken place in instructional settings. Classroom-based studies investigating the effects of face-to-face interaction on L2 learning and SCMC studies investigating interaction between learners and instructors/tutors populate the field. Although interaction in face-to-face (FTF) contexts is largely accepted as beneficial to L2 development (Goo et al, 2013; Ellis & Sheen, 2006; Keck et al, 2006), the relationship between interaction and learner outcomes within

instructional SCMC environments is less clear. The gap in research is even more pronounced when it comes to investigating naturalistic environments, which can be defined as the learner/learner or learner/native speaker interaction that occurs outside the auspices of a classroom or experimental conditions. In fact, it would not be amiss to state that SCMC-IF research conducted in naturalistic SCMC conditions is almost nonexistent.

To summarize, the interaction approach to SLA suggests that conversational adjustments occurring during interaction benefit L2 development by providing learners with opportunities to receive modified comprehensible input and interactional feedback; notice gaps between their interlanguage and the target language features; and produce output. SCMC provides an ideal ground for L2 learners to notice gaps between their output and the input they receive, especially owing to interactional feedback. Empirical findings generally indicate a positive role of SCMC environments in L2 learning and positive effects of feedback delivered via SCMC. However, a substantial portion of interaction and SCMC studies are conducted in instructional settings investigating L2 learners' interaction with their instructors/tutors. The effects of native speaker interactional feedback on L2 learners' language development in naturalistic settings have not yet been clarified, thus pointing towards a significant gap in interaction and SCMC research.

Focus of the Study

The current study sought to engage a highly under-researched sub-field of SLA, namely L2 acquisition in naturalistic NS-NNS interaction in synchronous CMC environments. More specifically, the study sought to address the question relevant to all language learners in general, whether in instructional settings or not, but particularly the NS and NNS users of online language learning chatrooms: to what extent is NS feedback effective in synchronous online environments when conducted in text-based versus voice-based modes? To this end, the study sought to

investigate the effects of NS interactional feedback in two SCMC modes, text-based and voice-based, on adult ESL learners' acquisition of language, defined as *uptake* and discussed in subsequent sections. While research investigating feedback in CMC has been conducted in the past, significant gaps remain to be filled.

While there is a moderate amount of empirical evidence for the benefits of IF in CMC, particularly in synchronous modes, most of this body of literature is experimental, cross-sectional, and classroom-based and investigates researcher-imposed feedback types – for example, recasts – that the researcher deems relevant to the study. Moreover, because most previous research has been conducted in instructional settings, mostly the L2 learners and instructors served as research participants (Ziegler, 2015; Lin et al, 2013). While findings from such studies may inform the use of SCMC tools in language instruction, the question that arises is to what extent these findings are generalizable to L2 learning in naturalistic environments or, in other words, the digital 'wild'. Questions pertaining to the type of errors that prompt NS feedback, types of feedback that NS use, and the effect of such feedback on the development of NNS use of language remain largely unexplored. Finally, another notable gap in research is that the kind of data that support empirical findings in the sub-field of CALL in SLA is overwhelmingly instructional, cross-sectional, and quantitative in nature. Many researchers in the field (e.g., Levy, 2015; Gabryś-Barker & Wojtaszek, 2014) have called for empirical studies from a more qualitative perspective to complement the existing quantitatively dense findings.

Overall, the gaps identified above suggest a higher need for research that investigates the effects of NS feedback in NS-NNS online interaction in naturalistic environments. To address the above-mentioned gaps, the three guiding research questions, as stated in Chapter three, asked what types of NS interactional feedback exist in NS-NNS interaction in two conditions vis-à-vis

text-based SCMC and voice-based SCMC; what types of linguistic errors trigger NS interactional feedback, and whether these linguistics errors display any patterns of use throughout the course of online naturalistic interactions. The study employed a mixed methods design where participants were divided into different proficiency levels from intermediate to advanced proficiency. L2 English proficiency was determined based on the participants' placement in a community language program at a language school in New York City. L1 was determined by asking participants what language they grew up with from birth (Hulstijin, 2018). This same criterion was applied to determine English NS, which served as a comparison group in answering research question three, which asked if any patterns can be detected in the NNS use of the most common linguistic error in the interactions. It was assumed that NS are likely to exhibit highly stable patterns of the kinds of linguistic features most likely to be common in NNS production; in other words, NSs have ample opportunity to model their own proficiency. In this sense, native speaker patterns of language use were incorporated in this study in efforts to identify TLU of the most common NS error in online interactions (see Definitions subsection below).

The analysis explored the types of interactional feedback provided by NS participants and the NNS uptake of such feedback in naturalistic discourse. In this study, the categorization of NS feedback was determined by tallying the occurrences of specific interactional feedback types utilized by NS, as outlined in the works of Lyster and Ranta (1997) and Nassaji (2017). The combined quantitative and qualitative analysis of NS feedback illuminated the most common errors for which NS participants preferred to provide feedback. Based on NS feedback, a list of the errors giving rise to NS feedback was suggested. Changes in the most common error types in NNS use were explored across proficiency levels. Descriptive statistics were computed and

analyzed for research question one and two of the study, followed by a TLU analysis of the interaction data in response to research question three. English articles were identified as the most common linguistic errors in both the text-based and voice-based interactions and thus constituted the primary linguistic target of the study. With the TLU analysis, the study's focus shifted to a more granular target analysis of the most common linguistic error pertaining to the participants' use of English articles in different linguistic environments (e.g., generic NPs, common NPs) and their use of articles by noun type (e.g., count/noncount nouns). Discussion of the findings is guided by Long's (1996, 2007) Interaction Hypothesis and the Complex Dynamic Systems Theory (CDST) (Verspoor & Lowie, 2011), which served as a meta-theory guiding the findings of the study.

Through an investigation of NS interactional feedback on NNS language use, both within and across text-based and voice-based environments in longitudinal naturalistic SCMC, the overall aim of the study was to contribute to an understanding of NS interactional feedback in online environments; and, in doing so, glean insights for L2 interaction theory and elucidate the effectiveness of a multi-billion-dollar industry (Technavio, 2022), namely, online language learning.

Definitions of Terms

Second Language Acquisition is a multidisciplinary field with ties to theoretical and applied linguistics, language education, educational psychology, cognitive psychology, and neuroscience, to name a few. Given the preponderance of theories imported from disciplines outside the field and the competing strands of research within, "Terminological confusion is rampant in both the theoretical and empirical spheres [of SLA]" (Han, 2012, p. 1912). As a result, defining key terms presents a challenge in any area of SLA research, and the study of

naturalistic online interactions is no exception. That said, in the following, the terms and constructs most relevant to the current study are briefly defined. Several of these and related terms will be more extensively defined, explored, and operationalized in the following chapters.

1. **Native speaker (NS):** Someone who has acquired basic language cognition through a two-way communication on a regular basis in one or more languages from birth or early childhood (Hulstijin, 2018).
2. **Non-native Speaker (NNS):** A non-native speaker is someone who has acquired a second or additional language other than their first language. This individual may have varying levels of proficiency and fluency in the non-native language (Ellis, 2008; Ortega, 2009).
3. **Second language learner (L2 learner):** An individual who learns a language different from their L1, where the learning is taking place significantly after birth (Hulstijin, 2018). In the present study, participants began learning English and the L2 in adulthood.
4. **Computer-mediated communication (CMC):** Engaging digitally, either individually or with multiple participants, to simulate face-to-face communication through the use of computers, thereby enhancing human interaction.
5. **Synchronous computer-mediated communication (SCMC):** interpersonal communication that occurs in real time and without delay e.g., electronic chat.
6. **Text-based SCMC:** refers to real-time interaction such as a live chat, synchronous written chat to the exclusion of voice and video chats.
7. **Voice-based SCMC:** refers to real-time interaction such as a live chat, synchronous voice chat with the exclusion of written and video chats.

8. **Error:** Broadly speaking, an error is a deviation from the norms or rules of the target language that is produced by a learner of that language (Ellis, R., 1994).
9. **Negative evidence:** Negative evidence is a type of language input that informs the learner that a certain form, structure, lexical choice, or phrasing is not linguistically acceptable in the target language. Negative evidence can be direct or indirect, explicit or implicit, and can come from various sources, such as teachers, peers, or NS (Mackey & Goo, 2018).
10. **Target-like use (TLU):** is a type of analysis among 12 different methods for investigating L2 learner language cited by Ellis and Barkhuizen (2005). The other methods are error analysis, obligatory occasion analysis, frequency analysis, functional analysis, interactional analysis, and conversational analysis.
11. **Interlanguage:** An evolving, and dynamic language system created by an L2 learner, which is generated by interactions among linguistic and conceptual subsystems that the learner experiences through an L1, and the language being learned (L2) (Selinker, 1972; Tarone, 2006).
12. **Interactional Feedback:** A response containing negative evidence provided by a native speaker to a nonnative speaker error during interaction.
13. **Uptake:** Broadly speaking, uptake is divided into two categories in the study:
    a. **Immediate uptake:** following the definition of to Lyster and Ranta (1997), immediate uptake is defined as the NNS participants' utterance that immediately follows the NS interactional feedback in the same mode of communication that the feedback was provided, for instance, text-based SCMC; whereas,

b. **Delayed uptake:** refers to the evidence in terms of learner output not immediately after the NS feedback move (Smith 2005) and not necessarily in the same mode of communication in which the feedback was provided by the NS.

14. **Input**: All the meaningful language, be it written or spoken, to which the learner is exposed during the online interactions in the study.

Outline of the Dissertation

The remainder of the study is organized in the following manner. In Chapter Two, a review of the literature illuminates the theoretical frameworks used in this study, namely the Interaction Hypothesis (Long, 1997, 2006), the Complex Dynamic Systems view on language learning (e.g., Larsen-Freeman, 2003, 2006; Verspoor, Lowie, van Dijk, 2008; de Bot, Lowie, Thorne, & Verspoor, 2013), and Usage-Based Language Learning (e.g., Ellis, 2010, 2015). The chapter also reviews the literature as it relates to the central constructs of interest, including types of interactional feedback (Nassaji, 2017), negotiated interaction (Gass, 1997; Long 1996; Scmidt, 1995), and uptake (Lyster & Ranta, 1997). Then ensues a discussion on SCMC specifically text-based and voice-based SCMC (Warschauer, 1996; Smith, 2005). Then, based on both conceptual and empirical studies, characteristics of SCMC that may facilitate SLA processes and language learning in the digital 'wild' are presented, as well as relevant empirical research on L2 learning of the English article system. Finally, the motivation for the study and the research questions are stated.

Chapter Three focuses on the methodology, starting with a discussion of naturalistic discourse that needs to be considered in a study of this nature. This is followed by a description of a pilot study that helped inform the methodology used in the current study. Then, the present study and its methodological features are described.

Chapter Four presents the results. The descriptive statistics of NS interactional feedback and comparisons of feedback effects in text-based SCMC versus voice-based SCMC are presented first. Then, the results of TLU analysis of the interaction data are presented together with an intra-learner analysis of the participants' use of the English articles.

Finally, Chapter Five offers a discussion of the findings. It first addresses each of the research questions. Then, the importance of online naturalistic interaction in the learning of the English articles, the need for a more nuanced understanding of interactional feedback and uptake, are underscored. Finally, some limitations of the study and avenues for future research are outlined.

Chapter 2: Review of the Literature

This chapter begins with a review of several constructs central to the present study, which include *interactional feedback, negotiated interaction, synchronous CMC, uptake in SCMC, and language learning in the wild*. Each of these constructs is defined at length. Next, drawing from both conceptual and empirical studies, the rationale for utilizing the interaction approach, as well as the rationale for the choice of research setting for the present study, are put forth. Finally, the motivation for the study and the research questions are presented.

Interactional Feedback

Interactional feedback (IF) refers to feedback that is generated in response to both linguistically erroneous and communicatively inappropriate utterances that learners produce during conversational interactions (Nassaji, 2015). Such feedback can take place through various forms of negotiation and conversational strategies such as repetition, clarification requests, and confirmation checks. Researchers (e.g., Ellis, 2010; Fu & Nassaji, 2016; Mackey, 2007) have argued that interactional feedback assists L2 development by helping learners identify the gap between their interlanguage forms and the correct forms of the target language. In the updated version of the Interaction Hypothesis, Long (1996) proposes that interactional feedback provided through negotiation of form (focus on form) will draw learners' attention to problematic linguistic structures, thus providing opportunities for learners to 'notice the gap' (Schmidt, 2001) between the target language and their own language. In doing so, the learners tend to make modifications accordingly. In other words, interactional feedback provides learners information about the unacceptability or inappropriateness of their utterances and raises their awareness of 'holes' in their own language. Thus, interactional feedback seems to create suitable conditions for restructuring of the interlanguage to take place.

Interactional feedback operates predominantly through spoken language in diverse environments, encompassing both natural settings and classroom environments. Nassaji (2015) suggests that this feedback method prompts learners to attend to linguistic structure, employing implicit and explicit approaches. It subtly directs attention to errors in form by utilizing strategies designed for handling communication difficulties. Moreover, irrespective of communication breakdowns, interactional feedback has the potential to overtly highlight specific linguistic forms through deliberate and direct error correction strategies.

A difficulty in offering corrective feedback to language learners is that they may not invariably perceive a recast as an attempt at correction; instead, it may be interpreted as a validation of what the learner has just uttered. This means that learners may not notice or pay attention to the linguistic features that indicate that the teacher's utterance is different from their own, such as changes in form, length, or content. Instead, they may focus on the meaning or content of the utterance and accept it as correct or acceptable. This can lead to confusion, misunderstanding, or lack of motivation for further learning.

Some researchers have suggested that recasts are effective in showing learners how their current interlanguage differs from the target language. They argue that recasts can provide both positive evidence (by providing the target-like utterance) and negative evidence (by indicating that the utterance is non-target-like) at the same time (Yin, 2021). However, other researchers have argued that recasts are ambiguous and may be perceived by learners as confirmation of meaning rather than feedback on form (Nicholas et al, 2001). They claim that recasts can also serve a conversational function and signal agreement or approval from the teacher (Egi, 2007). Therefore, learners may not always interpret recasts as corrective feedback and may rely on other cues or strategies to monitor their own performance.

The learners' comprehension and response to recasts are contingent on a variety of factors, encompassing their proficiency level, familiarity with linguistic norms, communication objectives, and the specific dynamics of their interactional setting. Proficiency plays a pivotal role, with more advanced learners in English exhibiting a heightened ability to discern and incorporate linguistic cues embedded in recasts, unlike their less proficient counterparts.

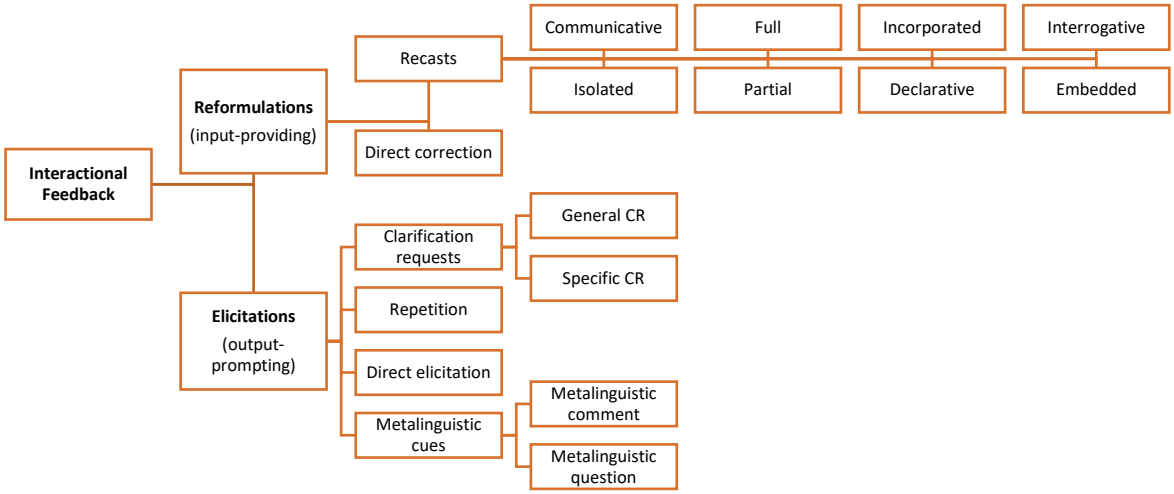
Awareness of linguistic norms also comes into play, as learners who possess a greater understanding of these norms are more predisposed to identifying and embracing recasts as corrective interventions, as noted by Egi (2007). Moreover, the clarity of learners' communication expectations and goals further shapes their utilization of recasts. Those with well-defined objectives are more likely to employ recasts strategically as tools to attain their communicative aims compared to learners without explicit goals.

The contextual aspect of interaction is crucial as well. Learners who anticipate feedback within their interactional context are more inclined to actively attend to recasts, while those in contexts devoid of anticipated feedback may not accord as much attention to these corrective measures, as observed by Carpenter et al. (2006). This intricate interplay of factors underscores the nuanced nature of how learners perceive and respond to recasts in their language acquisition journey. In short, determining whether learners perceive a recast as a corrective effort, or a confirmation of their prior statement lacks a straightforward answer barring a stimulated recall activity which, however, poses its own methodological problems. Instead, this interpretation is contingent on diverse factors that shape how learners utilize and understand recasts across different scenarios. Given the complexity of interpreting recasts, it is important to understand the different types of feedback used in interaction with learners. In fact, various research studies

have identified two main types of feedback used by teachers or interlocutors in interaction with learners: reformulations and elicitations.

Over the years, a number of research studies have examined interactional feedback and identified a number of feedback types used by the teacher or interlocutors in interaction with learners (e.g., Ellis et al., 2001; Lyster & Ranta, 1997; Panova & Lyster, 2002). These feedback types can be generally grouped into two main types: reformulations and elicitations (Lyster & Saito, 2010; Nassaji, 2009). Generally, reformulations are feedback strategies that rephrase the learner's erroneous utterance into a correct form. These types of feedback have also been called *input-providing* because they provide the learner with targetlike input (Ellis, 2009). Elicitations are strategies that do not provide the learner with the correct form but rather attempt to prompt the learner to correct his or her original erroneous output. Thus, they are called *output-prompting* or prompts (Lyster, 2004). Both reformulation and elicitation can take many different forms. Figure 1 presents the different types and sub-types of interactional feedback. The two main types of interactional feedback are further defined and discussed in the following sections.

Figure 1: Types and subtypes of interactional feedback.[i] (Adapted from Nassaji, 2015: 46)



Input-providing feedback: Reformulations

As stated above, feedback that provides some kind of linguistic input to the learner following the learner's erroneous output are termed as input-providing or reformulations. Sub-types of reformulations include *recasts* and *direct correction.* The former has received much attention in the field of language acquisition, both L1 and L2. In the field of L2 acquisition, a number of definitions can be found but as noted by Nassaji (2015), they all define recasts as feedback that reformulated the learner's erroneous utterance into a correct form while "preserving the core of the meaning" (p. 47). *Direct correction* refers to utterances that both rephrase the learner's erroneous utterance and also clearly indicate to the learner that his or her utterance is erroneous in some way by using very explicit terms and phrases.

Recasts: Defined as a reformulation of all or part of learner's utterance that retain the learner's intended meaning have been the focus of most research on interactional feedback. The large number of studies on recasts, including recasts delivered in SCMC, is due in great part to the documented frequency of recasts in a range of classroom contexts. Recasts resemble explicit error correction in that they also include the full target-like reformulation of the initial error; however, recasts are also distinctive in that they are not introduced by phrases signaling their corrective intent (e.g., *You mean, You should say*). Thus, without these overt indicators of corrective intent, recasts tend to fall on the implicit end of the feedback spectrum.

Once again, *recasts* are said to be contingent and occur immediately following a nontarget form. They also provide the learner with the correct reformulation of an erroneous utterance. Lastly, the context in which they occur is primarily meaning-focused and they attempt to preserve the meaning. Mackey (1999: 561) provides the following example of recast:

Example 1:

NNS: Your picture how many how many cat your picture?
NS: How many cats are there in my picture? ← **Recast**
NNS: Yeah how many cats?

Recasts are usually considered as one type of feedback; however, it is not a unified feedback type and can take many different forms. Based on the formal and functional characteristics of recasts in interaction research, recasts in the present study will be coded according to the following eight subtypes according to Nassaji (2015)[ii]:

> "In terms of degree to which they single out the error or combine the correction with other information within its linguistic context" (p. 50).

***Isolated, Embedded,* and *Incorporated* recasts:** In his study on corrective feedback, Lyster (1998b) categorized recasts based on linguistic mode and inclusion of additional information. He identified four types: isolated declarative, isolated interrogative, incorporated declarative, and incorporated interrogative recasts. Isolated declarative recasts offer a corrected version with a falling intonation and no extra information. Isolated interrogative recasts also correct the sentence but with a rising intonation. Incorporated declarative recasts correct the error with added information and a falling intonation. Incorporated interrogative recasts correct and enhance the sentence with rising intonation and additional information. However, Nassaji (2015) posits that recasts can vary in terms of *how* they address errors and incorporate corrections within their linguistic context. Nassaji (2007a) classified recasts into distinct types: isolated, embedded, and incorporated recasts.

Isolated recasts solely target the error, restating it without repeating the rest of the sentence.

Example 2 – Isolated recast:

Learner: And a girl behind the woman is rob, rob her.
Instructor: Robbing her.

Embedded recasts rephrase the error while retaining the original sentence structure.

Example 3 – Embedded recast:

Learner: Her friend pointed … pointed … another woman and said to her friend said to his friend …
Instructor: OK, another man pointed to the woman.

Incorporated recasts not only correct the error but also expand upon the sentence by adding more information.

Example 4 – Incorporated recast:

Learner: I finish my homework soon last night
Instructor: What did you do when you finished your homework?

***Partial versus Full* recast:** Another distinction lies in the scope of correction. Partial recasts rectify only a portion of the error, while full recasts correct the entire erroneous utterance, even if multiple errors are present. According to Nassaji (2015), partial and full recasts differ "(i)n relation to *how much* of the erroneous utterance a feedback instance corrects" (p. 51).

Example 5 – Partial recast:

Learner: I have sell that books now.
Instructor: Sold?

Example 6 – Full recast:

Learner: I like travel when I have a time and free.
Instructor: You like to travel when you have time and you are free.

***Declarative versus Interrogative* recast:** "Depending on their linguistic mode" (p. 50). Sheen (2006) provides the following examples:

Example 7 – Declarative recast:

Learner: They just think hypocritic, hypocritic.
Instructor: They are hypocritical.

Example 8 – Interrogative recast:

Learner: Yeah, he know Michael.
Instructor: He knows Michael?

***Communicative versus corrective* recast:** Recasts can also be categorized by their intent as either corrective (pedagogical) or communicative (conversational) recasts. Communicative recasts serve as a communication strategy, used to convey meaning. They come into play when one party misunderstands and seeks clarification by repeating the learner's sentence without the error. Communicative recasts are considered a type of corrective feedback that teachers use to reformulate learners' erroneous utterances in a communicative context. Han and Kim (2008) argue that communicative recasts can be considered corrective, depending on how they are delivered and perceived by the learners. They propose a continuum of communicative recasts, ranging from implicit to explicit, based on the following features: intonation, number of recast moves, and degree of change. They suggest that more explicit recasts (e.g., with rising intonation, multiple moves, and greater change) are more likely to be noticed and interpreted as corrective by the learners, while more implicit recasts (e.g., with falling intonation, single move, and minimal change) are more likely to be ignored or misinterpreted as confirmation or repetition. Therefore, communicative recasts are not inherently corrective, but rather their corrective value depends on how they are designed and processed by the interlocutors. Example nine below (Lyster & Mori, 2006) shows a communicative recast that corrected the learner's word order in a yes-no question.

Example 9 – Communicative recast:

Instructor: What do you think? Is it easy to learn English?
Learner: Easy English learn? [an erroneous utterance]
Teacher: Is it easy to learn English? [a recast]
Learner: Yes, it is.

Corrective recasts, on the other hand, have a clear intention to rectify errors and are employed when the meaning is apparent, but the teacher or interlocutor chooses to rephrase the

error for accuracy. In the example provided below by Han and Kim (2008), a corrective recast is used to clarify the learner's intended message.

Example 10 – Corrective recast:

T: Has anyone tried horsemeat? . . . XX, have you?
S: No, I am not adventurous of food.
T: I am not adventurous with food. S: Adventurous with?

However, recasts do vary in their communicative obtrusiveness, the degree to which they pinpoint the location of the initial error, and the salience of their corrective intent. This variation depends on the length of the reformulated component (full or partial recast) and the degree to which the recast is isolated from or incorporated into additional information. According to Ellis et al (2006), full recasts, which consist of reformulations of the entire utterance containing the initial error, may not be as helpful in pointing learners to the location of the error as are partial recasts, which consist only of reformulations of the error minus the rest of the initial utterance.

In spoken interaction, the embedded alterations may be particularly difficult for learners to notice and analyze, especially if the utterance being recast is long. Philp (2003) suggests that limitations of working memory, which constrain the amount of time one can retain and access incoming data, impede the learner's ability to make comparisons between their initial utterance and the recast. In text-based SCMC, however, this limitation of working memory capacity is negated by the record of the text-based conversation retained on the computer screen, potentially increasing the learner's ability to identify the source of the error and compare it with the targetlike reformulation. Partial recasts, in contrast, because they contain an abbreviated reformulation of the initial utterance and are therefore shorter than full recasts, may in fact be easier for learners to notice and analyze during spoken interaction.

It has also been suggested by Panova and Lyster (2002) that recasts, because they already contain the targetlike reformulation of the learner's error, at best prompt immediate repetition of

the form as opposed to actual self-repair. Thus, in contrast to feedback that does tend to promote learner repair or modification (e.g., elicitation), recasts might not lead to the deeper processing that may be more facilitative to L2 learning (Panova & Lyster, 2002). While the depth of form processing cannot clearly be examined, face-to-face comparative research on L2 learner knowledge and use following different feedback interventions does suggest that recasts may not be as facilitative to L2 learning as are other feedback approaches (Ellis et al., 2006).

Direct correction: As indicated by the name, this reformulation sub-type refers to utterances that both rephrase the learner's erroneous utterance into a correct form and also clearly indicate to the learner that his or her utterance is erroneous by using very explicit words or phrases. Examples of such explicit phrases or words include *no, that is not correct*. Nassaji (2015) state that, "since direct correction overtly informs the learner about the error, it is motivated by a deliberate attention to form" (p. 52). It rephrases the erroneous utterance into the correct form and uses very explicit words or phrases to clearly highlight the error diverting the focus of the conversation towards rules.

Example 11:

Learner: He has catch a cold.
Instructor: Not catch, caught.

Output-prompting feedback

Contrastive to input-providing feedback types, output-prompting interactional feedback or prompts are a particular type of feedback that provides stimuli to the learner to self-correct.

Elicitations. According to Panova & Lyster (2002), "elicitation is a correction technique that prompts the learners to self-correct" (p. 584). There are at least five techniques that research has identified in observational and classroom-based studies, namely, *clarification requests,*

repetition, direct elicitation, metalinguistic cues, and *nonverbal cues.* Each of these sub-types are defined as follows:

Clarification requests. Utterances indicating a problem in comprehension, accuracy or both are called clarification requests. These requests can be general or specific in nature. It is the feedback that occurs when the teacher or interlocutor does not fully understand a learner's utterance and asks for clarification. An important characteristic of clarification requests as feedback is that they do not provide the correct form which is how the learner has the opportunity to self-correct. Such feedback is usually indicated through phrases such as *pardon me?, sorry?,* etc. Saxton et al (2005) show the following examples (p. 397):

Example 12 – General clarification request:

Learner: Knights have horse, they do?
Instructor: They have what?

Example 13 – Specific clarification request:

Learner: Knight have horses, they do?
Instructor: They have what?

Two different types of clarification requests are usually identified (Saxton, 2005), *general* and *specific.* While the former is in response to the entire utterance without targeting any specific part(s), the latter focusses on a certain part of the erroneous utterance, particularly the segment that is erroneous.

Repetitions. Interactional feedback that repeats all or part of the utterance containing the error, often accompanied by a change in intonation. Resembling clarification requests in nature, this sub-type of feedback does not provide the correct form, therefore, providing an opportunity to the learner to self-correct. Sheen (2004: 279) provide the following example:

Example 14:

Learner: Oh my God, it is too expensive, I pay only 10 dollars.
Instructor: I pay?

Direct elicitation: Direct elicitation is feedback that attempts more overtly to push the student to provide the correct form. Nassaji (2007a), mentions two different ways of doing so, for instance, by repeating the learner utterance up to the error and waiting for the learner to complete the utterance, or by asking the learner more directly to reproduce the utterance by using phrases such as, *can you say it again?* Nassaji (2007a, p. 529) provides the following example:

Example 15:

Learner: And when the young girl arrive, ah, beside the old woman.
Instructor: When the young girl…?

Metalinguistic cues. As prompts, metalinguistic cues provide the learner with metalinguistic information in the form of a comment or a question. It can be provided in the form of comments about language rules or structures and how they work, or questions about the grammaticality of learner's utterance. This type of feedback does not provide the correct form, rather it simply gives the learner metalinguistic signals about the error. The difference between the question cue and comment cue is that the question cue does not provide the correct form at all. The question only provides some indication about the nature of the error in the form of a question.

Example 16 – Metalinguistic question:

Learner: My mom wen to shop yesterday.
Instructor: Is went to shop correct?
Learner: Went shopping?

Example 17 – Metalinguistic comment:

Learner: I see him in the office yesterday.
Instructor: You need a past tense
Learner: Oh I saw him.

Nonverbal cues. Interactional feedback can also be provided using nonverbal cues, such as gestures, facial expressions, and intonation. For example, in face-to-face and video-based SCMC, shaking the head, hand, and or finger movements can indicate the presence of an error. The above sub-section provided a discussion of the interactional feedback types that are produced by an interlocutor in response to a learner 'error'. The question of what constitutes a learner error is discussed in the following sub-section.

What is an 'Error'?

In this section, the concept of errors in language learning along with the varied definitions of *error* is explored, with recognition that errors are inherent to human nature. After this, the classification of errors relevant to the current study is described.

In an early critique by Ellis (1991), it was highlighted that learners engage in errors during both language comprehension and production. These errors are classified variably based on the learner category, including L1 children, adult NS, and L2 learners. Historically, errors were perceived as negative markers, often associated with ineffective teaching approaches. However, the perception of errors has evolved, recognizing their potential as catalysts for learning. Traditionally, errors were viewed pessimistically, linked to shortcomings and obstacles in the learning process. Despite challenges to this viewpoint, the idea of errors as impediments to language acquisition persisted within behaviorist frameworks. Nevertheless, behaviorism contributed to considering individual differences and reducing harsh punitive measures.

Robert Lado highlighted the significant importance of errors in the process of language acquisition within the framework of his suggested contrastive analysis approach. He highlighted that the errors made by those learning an L2 often mirror disparities between their native tongue and the target language. He underscored not just the identification but also the comprehension of

these errors, in relation to the structural distinctions between languages. Therefore, he argued that through this contrastive analysis framework, educators could anticipate and tackle the difficulties learners might face in mastering a new language. He viewed errors as crucial indicators of linguistic interference arising from the differences between the first and second languages (Lado, 1970).

While Lado viewed errors as the result of linguistic interference and the basis for contrastive analysis approach, Chomsky (1975) proposed a different perspective on language acquisition. Chomsky proposed that humans have a natural ability to form language in their minds by experimenting with different structures and that language is not just simply habit formation. Learners of an L2 hypothesize the rules of the new language, compare them with what they hear, and adjust them as needed, resulting in improvement. This view of language learning is based on mental processes, unlike the previous view that focused on observable behavior. It also sees errors as chances for growth. Similar findings were also reported by Whitman and Jackson (1972) whose study showed that transfer is not automatic. Their study examines the hypothesis that contrastive analysis can predict the levels of difficulty that NNS will have in learning English syntactic patterns. The authors administered two tests of English syntax to nearly 2500 Japanese students and compared their results with the predictions of contrastive analysis. They found that contrastive analysis was not a reliable predictor of syntactic difficulty, as it failed to account for many factors that affect language learning, such as transfer, interference, overgeneralization, and fossilization.

Dulay and Burt then claimed to demonstrate that only a fraction of L2 errors were actually transfer errors, as assumed by Lado and colleagues. Dulay and Burt conducted influential studies in 1974 and 1975 that significantly shaped our understanding of errors in SLA.

Their work challenged the perception of errors as random occurrences by proposing a systematic and predictable pattern to language learners' mistakes. They emphasized that these errors were not simply faults but rather signposts reflecting learners' evolving comprehension and assimilation of language structures. This perspective highlighted the significance of errors as pivotal indicators of language development, providing educators with valuable insights into learners' progression and the identifiable patterns within their errors as they navigated the complexities of acquiring a new language.

Another approach considers errors as products of social-cognitive interaction, implying a blend of social norms and cognitive processes. Errors possess both social and cultural components that vary across societies. This perspective highlights the multifaceted nature of errors and their significance in language learning. Encompassing this approach, Lennon's (1991) defines “error” in general as “a linguistic form or combination of forms which, in the same context and under similar conditions of production, would, in all likelihood, not be produced by the speakers’ native speaker counterparts” (p. 182).

Several studies have proposed analytical systems for assessing NNS utterances that contain linguistics errors in both text-based and voice-based synchronous CMC interactions. Bower and Kawaguchi (2011) proposed an analytical framework that focused on identifying errors made by NNS. Their system involved a categorization of errors based on their linguistic characteristics and the potential sources of these errors. They categorized errors based on grammar, vocabulary, pronunciation, and discourse organization. Additionally, they emphasized the importance of understanding the underlying causes or sources of these errors, such as interference from the native language or overgeneralization of language rules.

Their framework involves a breakdown of errors across various linguistic domains that included grammatical, vocabulary, pronunciation, and discourse errors. The ‘grammatical’ errors were divided into *omission* (missing elements e.g., articles, prepositions, tense markers; *addition* (including unnecessary elements that alter sentence structure or meaning; *misordering* (incorrect word order within sentences or clauses); *Substitution* (using the wrong grammatical elements e.g., wrong verb tense, incorrect subject-verb agreement). The ‘vocabulary’ errors included *semantic* errors (using words inaccurately or inappropriately in context); *L1 interference* (errors arising from the influence of the learner's native language); and *collocation* errors (incorrect combinations of words that do not naturally occur together in the target language). The ‘pronunciation’ errors were divided into *segmental* errors (mistakes in individual sounds or phonemes); *suprasegmental* errors (issues related to stress, intonation, rhythm, etc.); *accent-related* errors (Pronunciation patterns influenced by the learner's native language). ‘Discourse’ errors included *cohesion and coherence* errors (lack of logical connection between sentences or ideas); *information structure* errors (problems in organizing and presenting information in discourse); and *pragmatic* errors (misunderstanding or misusing language in different social contexts or situations).

Bower & Kawaguchi's error framework, while providing a systematic categorization of NNS errors, faces several critiques that challenge its comprehensive applicability. Critics highlight concerns regarding its potential oversimplification of the intricate nature of language errors (Yousefi & Nassaji, 2021). The framework's emphasis on categorization may overshadow a deeper exploration of the diverse complexities inherent in non-native speech.

Bower and Kawaguchi's focus lies in categorizing language errors, while Iwasaki & Oliver's perspective delves into pragmatic factors, offering a broader view of the challenges

encountered by NNS, extending beyond the realm of grammar. Specifically, Iwasaki and Oliver's significant 2003 contribution to error analysis greatly enhanced the comprehension of non-native speaker errors by highlighting the pivotal role played by pragmatics in language usage. Their framework introduced a paradigm shift by emphasizing the contextual nature of errors, shedding light on how pragmatic competence influences communication. By redirecting attention from solely linguistic inaccuracies to the sociocultural dimensions of language, they highlighted the impact of differing pragmatic norms between a learner's native language and the target language. This approach offered a more holistic perspective, recognizing errors not just as linguistic deviations but also as reflections of pragmatic misunderstandings within specific social and cultural contexts.

Moreover, their work offered an analysis of errors viewing them not only as language mistakes but also as potential sources of miscommunication. This paradigm underscored the intricate interplay between pragmatic knowledge and effective communication, emphasizing that errors often hinder comprehension and successful interaction in diverse social settings. Their framework prompted a nuanced understanding of errors beyond grammar and vocabulary, acknowledging their role as barriers to achieving meaningful communication among NNS.

Furthermore, Iwasaki and Oliver's contribution had a profound impact on language pedagogy. Their emphasis on pragmatic awareness advocated for a more comprehensive approach to language instruction. They highlighted the necessity for learners to develop not only grammatical accuracy but also pragmatic competence to navigate various sociocultural contexts effectively. Their framework spurred the integration of pragmatic elements into language curricula, urging educators to incorporate activities and strategies that fostered pragmatic

understanding among NNS, thereby enriching language learning experiences and enhancing communicative proficiency.

The intricate and multifaceted nature of L2 linguistic errors is undeniable, making the utilization of concise and simplistic error coding systems prone to generating ambiguous boundaries and haphazard classifications. This imprecision in describing the types of errors can limit the full potential of data analysis, as it may obscure the underlying causes and patterns of the errors. It is imperative to underscore that the present study focuses on feedback that targets linguistic errors, rather than feedback that addresses the content of the utterance. Hence, instances wherein a NNS utters a statement such as "I went to the zoo" and the NS replies with a question like "What animals did you see?" or a comment like "That must have been fun", this is considered 'content' feedback in everyday usage, and not 'language' feedback. The investigation at hand focuses on the examination of feedback targeting linguistic errors, distinct from feedback concerning content.

Negotiated Interaction

Long (2007) ascribed a key role to interactional feedback in his Interaction Hypothesis (1996) and situated it within a context of what he calls *negotiated interaction*. Long (1996) argued that during interaction, interlocutors negotiate mutual understanding by manipulating and re-formulating how their utterances are encoded. In other words, feedback can induce a reformulation by providing learners with input that they notice and subsequently modify in their output.

Negotiated interaction has been the focus of L2 acquisition research largely due to its effect of making input comprehensible, drawing learners' attention to form, and enabling modified output (Gass, 1997; Long, 1996). In negotiated interaction, learners negotiate the

meanings of utterances to make input more comprehensible (Long, 1996). Such negotiations can draw learners' attention to target-like forms and promote *noticing*, which has been hypothesized to be the first step to interlanguage (IL) development (Schmidt, 1995). *Pushed output* (Swain, 1995) is proposed to be another benefit that results from interactional moves, which take place as learners engage in meaning negotiations or respond to feedback. According to Schmidt's (1995) noticing hypothesis, L2 learners must consciously notice linguistic forms and the meanings that they carry to move their L2 development forward. This role for noticing is termed as "the very foundation on which the efficacy of corrective feedback… is based" (Smith, 2005, p. 2).

Synchronous Computer-Mediated Communication

The popularity and significance of the synchronous chat room for language learning is increasing; therefore, it is presumably imperative to investigate aspects of language development that may result (Doughty & Long, 2003; Ortega, 1997; Smith, 2003; Warschauer & Kern, 2000). Synchronous chat environments are conducive to investigations of interactionist theory (Blake, 2000; Smith, 2004). In the past two decades, the field of CALL has witnessed a shift away from the conventional use of multimedia or stand-alone programs in language learning to the more "communicative and interactive" aspects of language learning that "technologies can offer or reinforce" (Hoven, 2006, p.237). This motivates the need to further investigate CMC technologies. With the recent theoretical and methodological development in CMC, the number of studies examining computer-mediated contexts from an interactionist perspective has also increased.

Since CMC had traditionally been depicted as one-dimensional and passive, previous research failed to distinguish between myriad CMC technologies and their relationship to language learning. Smith, Alvarez-Torres, and Zhao (2003) advocated for CMC effectiveness to

be evaluated in terms of its impact on language learning, not as "a uniform technology, but based on the unique characteristics or features embodied in the different sub-tool and technology utilized in the interaction process" (p. 710). Four qualities were proposed by Smith et al (2003), to describe and distinguish different CMC sub-technologies: 1) temporality, 2) degree of anonymity, 3) modality, and 4) spatiality. Temporality describes the mode of time in which communication can take place: either simultaneous (synchronous) or delayed (asynchronous) depending on whether or not there is a substantial time gap between the responses or messages received from/sent to the interlocutors. Anonymity refers to the degree to which the interlocutors are known to each other in a CMC environment. Some tools such as e-mail are more capable of concealing a user's identity (ensuring anonymity) than others such as video conferencing. Modality refers to the way interaction is supported. Some technology tools, such as chats, support both voice and written communication while others, such as the bulletin boards, allow only textual communication. Spatiality refers to the spatial distance felt by the interactants when engaging in online communication and is of consequence because it is believed to have an impact on the nature of interaction.

Numerous studies have explored these CMC qualities mostly anchored within an array of existing SLA theoretical frameworks, among which the interactionist theory of SLA has enjoyed immense attention (Bower & Kawaguchi, 2011). From the interactionist perspective, text-based CMC alters human interaction in that it becomes easily transmitted, stored, archived, reevaluated, and edited, all of which encourage reflection and interaction (Warschauer, 1996). Over the years, such aspects of text-based synchronous communication have motivated IF-focused studies in CMC.

SCMC that occurs between people in real time via networked computers can be conveyed in either text or video mode. Text-based SCMC (i.e., text chat) integrates features of text-based discourse with spoken discourse and it also carries unique features such as lack of turn adjacency (cf. Sacks, Schegloff, & Jefferson, 1974) and use of simplified registers (e.g., timesaving spellings; Smith, 2003a). Video or audio-based SCMC (i.e., video/audio conferencing), on the other hand, is more like face-to-face communication in terms of the availability of visual and vocal cues such as intonation and gestures. The following sections will present more details in relation to the two synchronous modes.

Text-based SCMC

Text-based or text-based SCMC is an umbrella term covering a host of technologies that allow for instant transfer of text messages between users on different computers. These technologies include modern communication software and applications such as Skype, Google, and Zoom. These online text-based communication tools require that users connect by simply initially installing the application on their computer and then connect by registering with an account. These software programs that allow users to communicate across computer networks include instant messenger programs allowing users to connect across the Internet; chat and discussion rooms in which multiple (one-to-one or many-to-many) users can meet online; and learner interactions in virtual online environments in which users can chat.

Kern (1995) conducted a study on text-based SCMC and its impact on language production. Kern found that SCMC was primarily associated with an increase in the quantity of language production. In other words, learners produced more language output in synchronous CMC environments than they did in large group face-to-face classroom settings. Similarly, Chun (1994) and Chun (2011) are two studies that investigated the effects of SCMC on L2 acquisition.

Both studies found that SCMC can result in greater quantity of language production than face-to-face interaction. Chun (2011) also found that the grammatical accuracy and sophistication of learners' language production improved significantly in synchronous CMC environments. However, it is important to note that Chun (1994) and Chun (2011) were conducted in different contexts. Chun (1994) was conducted in a laboratory setting with 16 Korean learners of English, while Chun (2011) was conducted in a university-level ESL classroom with 22 students.

Text-based SCMC has several features that may make it an especially useful media for L2 learning. Table 1 below summarizes the beneficial features of text-based SCMC for L2 learning.

Table 1: General features of text-based SCMC for L2 learning.

	Features	Reference
General benefits	Equal participation	Abrams, 2003; Kelm, 1992; Mendelson, 2010
	Language production	Kern, 1995; Smith, 2005;
	Language complexity	Chun, 1994; Lai & Zhao, 2006; Smith, 2003
	Reduced anxiety	Blake, 2005; Warschauer, 1996
	Real-time interaction	Schwienhorst, 2004; Sotillo, 2005
	Chat logs	Smith, 2008; O'Rourke, 2008
	Greater text-based fluency	Garrison, Anderson, & Archer, 2000; Warscheur, 1999

Synchronous CMC exhibits qualities of text-based and spoken language as well as attributes unique to CMC. It is sometimes considered a blend of 'oral' and 'text-based' language (Kern, 1998) and other times dubbed 'speak-writing' (Erben, 1999). A number of studies on SCMC (e.g., Abrams, 2003; Kern, 1995; Kenning, 2010; Sauro, 2009; Sotillo, 2005; Warschauer, 1996) have shown that text-based SCMC can promote equal participation, language

production and complexity, and reduce anxiety caused by time or psychological pressure. Moreover, given that negotiated interaction can facilitate SLA by connecting input, feedback, and output through noticing (Long, 1996), many studies (e.g., Shekary & Tahririan, 2006; Smith, 2004; Sotillo, 2005) have shown the potential for L2 learning in text-based SCMC through the investigation of feedback and focus-on-form activities in meaning negotiation. Similarly, Lee (2008) found text-based SCMC can support focus-on-form in collaborative interaction primarily from a sociocultural perspective. Lai and Zhao (2006) suggested the text form (re-readability) and the extended processing time in text-based SCMC can enhance the processes of noticing (attention) that is essential for SLA (Schmidt, 2001).

The features of text-based SCMC that may promote L2 learning processes (i.e., noticing the gap, pushed output) include the visual saliency of forms that are typically low in perceptual salience in oral interaction, the greater processing and planning time than that afforded by face-to-face oral interaction, and the enduring as opposed to ephemeral nature of text-based turns that are recorded in the chat window on the computer screen. Each of these features is described separately as follows:

Enhanced perceptual salience. According to Gass (1997), "salience can be said to help ensure that particular forms are noticed by the learner and hence lead to rule strengthening" (p. 19). Certain forms, however, because they are brief and, if they contain a vowel, also unstressed in rapid spoken interaction, are low in perceptual salience and appear to be particularly difficult for learners to notice. However, text-based interaction, such as that afforded by text-chat, increases the visual saliency of linguistic forms (Chapelle, 2001). Thus, the increased visual saliency of linguistic forms during text-chat may facilitate form noticing and thereby help learners to either confirm or disconfirm currently held hypotheses about the target language. This

confirmation of pre-existing L2 knowledge may also promote rule strengthening and lead to greater automaticity, potentially freeing up attentional resources to deal with new or less familiar L2 features (Gass, 1997). In this manner, the increased visual saliency of text-chat has the potential to facilitate noticing of aurally low-salient forms and to subsequently promote the learning of new TL forms (Sauro, 2007).

Enduring discoursal trace refers to the affordance of scrolling back through the interaction to review and reuse L2 forms available in the input. Accordingly, the enduring nature of text-chat permits quick hypothesis confirmation and may promote the reuse of L2 forms over which learners do not yet have full control, and by extension, may promote a more optimal level of processing of feedback for learning to occur. In contrast to the highly ephemeral nature of most face-to-face oral interaction, one of the key features of interaction via text chat is an enduring visual record of the exchange in the chat window. This chat window, Smith (2005) suggests, functions as an accessible record that may mirror the benefits of repetition and redundancy by allowing chatters to continually "refresh memory traces"(Payne & Whitney, 2002. 14). Thus, L2 learners who struggle to notice the gap or recognize the nuances of interactional feedback, may benefit from renewed opportunities to review and compare their initial utterance with their interlocutor's more target-like reformulation.

Greater planning and processing time. An increased processing time (Payne & Whitney, 2002) and increased online planning time is afforded by the slower turn-taking in text-based SCMC. The pace of a text-chat conversation is slower than that of a spoken conversation which is evidenced by the need for abbreviated systems of shorthand in professions like court reporting and in general by users of text-chat. Furthermore, increased processing and planning time results from the delay between each user turn. Most text-chat applications do not allow

users to read their interlocutor's responses until the full message has been typed and transmitted. This protracted wait for the completed message contrasts with the immediate unfolding of a spoken utterance that interlocutors in real time spoken conversations must process.

Thus, the increased on-line planning time afforded by text-chat may be particularly beneficial for promoting not only attention to L2 forms in the input but also closer attention to and monitoring of L2 output. Essentially, learners may take advantage of the additional online planning time afforded by text-chat to ensure form accuracy and to attempt to use rule-based L2 forms that require greater control and monitoring, forms which they may otherwise avoid using during interaction where on-line planning time is more limited. Table 2 summarizes the SCMC features reported in the literature as beneficial to L2 learning.

Table 2: Interaction-specific features of text-based SCMC.

	Features	Reference
Interaction-specific features	Negotiation of meaning in NNS/NNS	Abrams, 2003; Blake, 2000; Chun, 1994; Fernandez-Garcia & Martinez-Arbelaiz, 2002; Kenning, 2010; Pellettieri, 2000; Smith, 2003, 2005; Sotilla, 2005
	Negotiation of meaning in NS/NNS	Iwasaki & Oliver, 2003; Kotter, 2001, 2003; Lee, 2006; O'Rourke, 2005; Sotillo, 2005; Tudini, 2003; Vandergriff, 2013
	Provision of feedback	Iwasaki & Oliver, 2003; Morris, 2005; Sauro, 2009; Sotilla, 2005; Yilmaz, 2012; Yilmaz & Yuksel, 2011
	Focus-on-form	Chun & Young, 2006; Lee, 1999, 2008; Salaberry, 2000;
	Text form (re-readability)	Abrams, 2003; Lai & Zhao, 2006
	Processing time	Hung & Higgins, 2016; Lai & Zhao, 2006; Smith, 2008;
	Noticing	Lai, Fei, & Roots, 2008; Lai & Zhao, 2006; O'Rourke, 2005; Shekary & Tahririan, 2006
	Fluency development	Lee, 2002b
	Authentic communication	Darhower, 2002; Yilmaz & Granena, 2010
	Target language use	Freiermuth & Huang, 2012; Yilmaz, 2012

Voice-based SCMC

Even though text chat withstands comparison to face-to-face interaction, it may be that voice chat negotiation routines more closely match the conditions of face-to-face interaction. In voice chats, learners orally converse in real-time using personal computers, the Internet,

microphones, and earphones or speakers. Each spoken turn is transmitted within seconds and is broadcast with varying degrees of clarity over the interlocutor's headphones or speakers. Unlike face-to-face interaction, however, voice chat speakers cannot see one another or one another's environment, gestures, or facial expressions.

While the majority of SCMC studies investigate L2 learning in the text-based mode, studies in voice-based SCMC are less common. Empirical studies in the field have cautioned that voice-based SCMC, and by extension video-based SCMC, may not promote equal participation or reduce psychological pressure as text-based SCMC does (Kinginger, 1998; Zohner, Fauverge, & Wong, 2000). However, when used with other modalities of communication such as text-based chats and visual aid (e.g., pictures), it has the potential to promote interaction and facilitate the processing of L2 (Hampel & Stickler, 2012; Wang, 2006). In addition, the faster pace of interaction in voice-based SCMC can reinforce fluency, which is promoted (Lee, 2002b) more than accuracy in text-based SCMC as learners tend to ignore linguistic mistakes due to its fast meaning exchanges. Table 3 below lists the beneficial features of voice-based SCMC for L2 learning.

The advent of voice environments has prompted a further extension to various forms of voice-based SCMC interaction (Jepson, 2005; Lamy, 2004; Sauro, 2004), but without necessarily focusing specifically on the area under discussion. Sauro's (2001) unpublished work with text and voice chat and negotiation of meaning, which was set in task-based interactions, found that voice chat technology generated more challenging tasks for learners. However, as relates to the present study, published research concerning naturalistic English NS and NNS interaction in text-based and voice chats seems to be nonexistent, which, along with the substantial amount of NNS interaction in text-based and voice chat rooms across the Web, implies that this study may

be essential. The absence of research in voice-based SCMC may also be explained by the fact that voice-based chat technology is relatively new to online language schools. In any case, substantive research has emphasized the value of NS-NNS conversations for language development (for example, Ziegler & Mackey, 2017). Table 3 below presents interaction-specific features of voice-based SCMC beneficial for L2 learning.

Table 3: Interaction-specific features of voice-based SCMC.

	Features	Reference
Interaction-specific	Low time pressure	Chun & Young, 2006
	Processing time	Sattar & Ozdener, 2008;
	Noticing	Hung & Higgins, 2016; Parlak & Ziegler, 2016
	Explicit communication	Sykes, 2005
	Provision of feedback	Hung & Higgins, 2016; Smith 2004;
	Repair moves	Jepson, 2005; Kenning, 2010

Interactional feedback arguably has the potential to induce a learner to notice mismatches between their own utterance and target-like norms. To date, CMC studies have overwhelmingly investigated two major types of IF, namely recasts and metalinguistic feedback, mostly conducted in instructional settings with English and Spanish as the target languages. The earliest group of classroom and experimental studies, comparing recasts and metalinguistic feedback, reported no statistically significant gains in response to either type of feedback. Loewen and Erlam (2006), a partial replication of a face-to-face study (Ellis et al, 2006), cited variable learner proficiency and, to an extent, difference in test types for the lack of any significant gains in learner output. Similar results were reported by Sauro (2009) who compared the relative effects of recasts and metalinguistic information focused on omission of the zero article with abstract noncount nouns with Swedish university learners. The results showed no significant short-term advantage for either feedback type on immediate or sustained gains in target form which the author ascribed to the "ambiguity of the corrective intent of recasts" (p. 110). As Ellis et al.

(2006) point out, full recasts, that is, recasts which consist of reformulations of the entire utterance containing the initial error, may not be as helpful in pointing learners to the location of the error as are partial recasts, which consist only of reformulations of the error minus the rest of the initial utterance. In other words, the more information the learner is confronted with, the more difficult it may be for the learner to locate and identify the portion that is reformulated.

On the question of noticing and uptake in SCMC in relation to IF types, studies have reported mixed results. Sotillo (2010), for example, found that text-based chats afforded more opportunities for error noticing and awareness of linguistic forms as the language tutors, in the study, provided more direct or explicit forms of IF to the ESL learners and that more than 60% of the uptake was successful. These findings were echoed in Samnani and Noordin (2013) who studied the effects of recasts and prompts on the learning of new grammatical forms in CMC. According to the study, using both recasts and prompts was effective for learning new grammar items with prompts being more effective than recasts in SCMC. Sotillo (2010) ascribes the success of prompts over recasts to pushed-modified-output on part of the learner. Findings in these studies are congruent with Lyster and Ranta (1997), in that recasts are found to be less effective in facilitating the uptake of L2 forms even though they are more available than other IF types in CMC environments.

To summarize, computer-mediated communication has been linked with numerous benefits for language learners. Synchronous CMC has been primarily associated with an increase in the quantity of language production, an enhancement of language production, and equality of participation. It is theorized that it leads to both speaking and writing skills in the L2, and that it fosters negotiation of meaning and focus on form, resulting in increased *uptake*.

Uptake in SCMC

The notion of learner uptake has received much attention in the SLA literature. Lyster and Ranta (1997) defined uptake as an "utterance that immediately follows the teacher's feedback and that constitutes a reaction in some way to the teacher's intention to draw attention to some aspect of the student's initial utterance" (p. 49). As such, learner uptake can be understood as a specific type of pushed output (Swain, 1995). Expanding Lyster and Ranta's (1997) definition of uptake, Ellis, Basturkmen, and Loewen (2001a, 2001b) proposed that uptake can also be preemptive, in that, it can occur even when the previous move did not involve any feedback. According to Ellis et al (2001a), uptake occurs when "a student correctly repair[s] a linguistic feature or clearly demonstrate[s] understanding of an item" (p. 299). They further summarize uptake as follows: 1) uptake is a learner move; 2) the move is optional, 3) the uptake move occurs where learners recognize gaps in their knowledge of some target language feature, and 4) the uptake move occurs as a reaction to a preceding move in which the interlocutor had, explicitly or implicitly, provided information about a linguistic feature. Taken together, both Lyster & Ranta (1997) and Ellis et al (2001a) consider uptake as some kind of an utterance by the learner after the teacher's feedback. However, reformulated utterance cannot be taken as evidence that the more correct or advanced form has been integrated into the learner's interlanguage. Nevertheless, a reformulated learner response may offer some reason to suspect that the mismatch between learner utterance and target utterance has been noticed (Schmidt, 1995), representing a step at least toward acquisition.

In addition to face-to-face interaction, the definition of uptake offered by Ellis (2001a) can also be applied to the SCMC environments. However, SCMC researchers call for minor adjustments in its definition and application because SCMC interaction is different in many ways

from face-to-face interaction. The major adjustment is the restriction of applying Ellis's definition of uptake to moves immediately following a feedback move. In SCMC, such an application of uptake has been removed to allow for delayed uptake (Smith, 2003a). Delayed uptake, as defined by Smith (2005), refers to the evidence of learner output that may not necessarily occur immediately after the feedback move.

As previous research has reported potentially extended delays between triggers and indicators in SCMC interactions (e.g., Lai et al., 2008; Smith, 2005, 2012), the notion of *delayed uptake* becomes more relevant. Furthermore, SCMC does not adhere to the same pattern of turn adjacency found in face-to-face interaction. Research suggests that SCMC negotiation triggers may be followed by an indicator, but may initially go unaddressed, only to be answered later after a repeat indicator in subsequent turns (Kenning, 2010; Smith, 2008, 2012).

The existing literature suggests that negotiations in SCMC are prone to encountering considerable delays between triggering events and observable cues, potentially affecting the outcomes of such interactions (Lai et al., 2008; Smith, 2003, 2012). These temporal constraints stem from factors like the brief delay in relaying messages in text-based chat and the divergence in turn-taking patterns between SCMC and face-to-face (FTF) communication. Unlike FTF interactions characterized by immediate turn adjacency, SCMC negotiations often display a distinct pattern wherein negotiation triggers are followed by cues that remain initially unaddressed. Subsequent responses then come later, often triggered by a repeated indicator. This phenomenon, known as a "split negotiation routine" (Smith, 2003), underscores the intricate nature of temporal dynamics in SCMC. These delays between triggers, indicators, and responses, referred to as a split negotiation routine (Smith, 2003), "highlight the possibility that negotiation and the efficacy of feedback may be hampered by time restrictions due to the complex nature of

split negotiation routines (emphasis added) in SCMC" (Ziegler et al., 2017, p. 88). These complexities emphasize the potential for time-related limitations to impede effective negotiation and feedback efficacy within split negotiation routines in the SCMC context.

In his 2003 study, Smith used a phenomenological approach to examine the subjective experiences of the participants in computer-mediated negotiated interaction and lexical acquisition. He analyzed the transcripts of their online interactions and their posttest scores to understand how they perceived and interpreted the unknown lexical items, the negotiation process, and the learning outcomes. He also analyzed data from his study to highlight the unique dynamics of negotiation in CMC settings compared to face-to-face communication. Smith introduced the concept of a "split negotiation routine" within the context of CMC and posited that a split negotiation routine is a common feature of CMC discourse, where the negotiation of meaning is not strictly adjacent to the trigger of non-understanding. This means that the interlocutors may continue their conversation on a different topic while resolving the previous communication problem in parallel. Smith (2003) proposed an expanded model of computer-mediated negotiated interaction that accounts for the split negotiation routine and other characteristics of CMC. Based on the phenomenological approach to investigating computer-mediated negotiated interaction, Smith argued that any model of negotiation in CMC should factor in the occurrence of delays between the initiation of a triggering event and the subsequent indicator of non-understanding.

The asynchronous nature of CMC causes delays in responses and initial lack of answers to triggers due to the absence of strict turn adjacency. In face-to-face interactions, participants would respond immediately. These delays sometimes derail communication episodes, but it is uncommon for triggers to be permanently ignored.

Smith's model introduces split negotiation routines as a new concept. These routines differ from traditional negotiation sequences because they often involve a trigger followed by an indicator of non-understanding, and then another repeat indicator after some delay. These split routines may continue with more indicators before ending with a response. In this model, the trigger remains the same throughout the routine, while the initial indicator of non-understanding is referred to as Indicator 1 (<Ii>), followed by Indicator 2 (<Iii>), and the eventual response is denoted as <R>. This pattern allows for negotiation episodes to unfold overtime, with participants revisiting the issue until clarity is achieved. The following example is provided by Smith from his data (p. 48):

Example of Split Negotiation Routine:

J: There are Ax, Rake, and so on.
[11 lines of text]
<T> J: He hold ax in a clean garage, and everything is in order in everywhere.
[43 lines of text]
<I> B: ax mean is hammer?
J: no
J: That's different
B: what is it?
<R> J: Ax is used to cut tree
J: or wood

The permanence of CMC discourse, especially in the form of scrolling chat logs, enables split negotiation routines to occur, as Smith emphasizes. The asynchronous nature of CMC allows such routines to take place, as participants can go back and reply to previous indicators at their own speed. Smith's (2003) study highlights the importance of factoring in delays and split negotiation routines when examining negotiation in CMC, recognizing "the unique dynamics and temporal aspects that set it apart from face-to-face communication" (p. 47).

Interlocutor characteristics and interactional feedback in SCMC

The role of an interlocutor in SCMC interactions has also been a topic of research. Various studies have explored how the native or non-native status of the interlocutors may influence noticing (Bueno-Alastuey, 2013; Hung et al., 2016; Sotillo, 2000) and negotiation in online chat and voice platforms (Kenning, 2010; Toyoda & Harrison, 2002). For instance, Toyoda & Harrison (2002) discovered that learners produced output that was modified by both NS and NNS interlocutors when they received feedback during text-based SCMC in a virtual university campus setting. In contrast, Bueno-Alastuey (2013) found that NNSs with different L1s were the most effective partners for language tasks, as they generated significantly more triggers, responses, and modified output than NNSs with the same L1 and, sometimes, even than NSs, and thus enhanced SLA more. Tudini (2003) also examined NNS and NS dyads, and investigated whether text-chats between NNSs and NSs of Italian offered negotiation possibilities during open-ended tasks. The findings showed that SCMC interactions enabled negotiation for meaning and modified output, and that NS interlocutors also gave feedback in some cases.

Bueno-Alastuey (2010) also looked at the effect of dyad composition on pronunciation in video chat. The study investigated the aspects of pronunciation related to vowel quality, consonant clusters, and word stress. Bueno-Alastuey used acoustic measurements and perceptual ratings to assess the pronunciation improvement of learners who participated in video chat interactions with different types of interlocutors. The study found that learner dyads with different L1s were the most beneficial for improving L2 pronunciation, followed by learner dyads with NSs, and lastly, learner dyads with the same L1. and found that learner dyads with

different L1s were the most beneficial for improving L2 pronunciation in terms of modified output and achievement, although learner dyads with the same L1s also improved.

Bueno-Alastuey's study specifically showed that NNS-NNS different L1 dyads were the most advantageous for pronunciation improvement, followed by NNS-NS dyads and NNS-NNS same-L1 dyads. In summary, the results suggest that learners with different L1s may engage in more negotiation and produce more modified output, followed by learners with NSs, and finally, learners with the same L1. However, it should be noted that most of the studies on the effects of dyad feedback were conducted in classrooms, universities, language learning institutes, or under experimental conditions. There is a pressing need in the field to examine NS feedback in NNS-NS interactions in the digital wild.

Language learning in the Digital 'Wild'

The topic of language learning mediated by technology calls for a discussion of digital learning in general and the wealth of language learning possibilities afforded by technology. According to Thorne (2019), *digital learning* is "the study of language and literacy development in the context of digitally mediated communication and information technologies" (Thorne, 2019, p. 1). He explains that digital learning involves analyzing how people use language and other semiotic resources to communicate, create, and learn in various online and offline environments, such as social media, online games, mobile apps, and augmented reality. According to Weble et al (2004), the success of any approach to *digital learning*, rests to a great extent upon finding a match between the nature of the particular domain of learning (e.g., physics, history, or language) and the details of the digital environment provided for that learning.

In today's noisy digital environments, people are increasingly learning languages informally by going online, taking part in chat/discussion rooms, interactive games, and engaging with NS of a particular language as it is. Language, in this sense, is ubiquitous in the digital wild. Unlike the case with, for example, math or history, in order to be in an environment suitable for learning a language, thanks to SCMC, one need not enter a 'language classroom'. In fact, the driving assumption of the proposed ubiquitous support for computer-mediated language learning is that every online environment is a potential 'language learning' environment (Wible et al, 2004). In the context of the present study, every online 'English' environment is a potential 'English learning' environment.

Furthermore, what sets language apart from other domains of learning is that the cognitive mechanisms of language learning differ from those of other learning domains (for reviews, see Ullman, 2016; Robinson, 2015; Li et al, 2014). In other words, while it is impossible to master physics or geography without consciously acquiring content knowledge, it is indeed possible to learn an L2 without conventional instruction. Given that the central purpose of language is to communicate, i-e, convey, construct, and negotiate meaning, the question that arises is how effective the NS-NNS interaction is in this digital wild.

Motivation for the Study

My dissertation delves into the realm of interactional feedback within text-based and voice-based SCMC, aiming to shed light on its impact on the language proficiency of nonnative speakers. This investigation is not merely an academic pursuit; rather, it is fueled by a profound personal motivation born from the realities of communication barriers faced in regions like my own.

Coming from a country where frequent travel between South Asian countries and the US is not feasible, I have experienced firsthand the necessity and prevalence of digital communication platforms like Zoom and Skype. These free services serve as lifelines for maintaining connections with family, friends, and educational centers where I volunteer. The affordability factor is pivotal; many individuals, like me, rely on these cost-effective options for communication, given the prohibitive expenses associated with traditional modes.

Moreover, there is a global trend emerging where people from diverse corners of the world are leveraging platforms like Zoom to connect with native speakers or language instructors for language learning purposes. This trend underscores a poignant reality: many language learners across the globe lack access to immersive, face-to-face interactions essential for language acquisition and fluency development.

It is within this broader context of global connectivity and the democratization of language learning that my dissertation finds its impetus. By investigating the dynamics of interactional feedback in CMC settings, I aspire to contribute not only to academic discourse but also to the practical realm of enhancing language learning opportunities for individuals who, like me, rely heavily on digital platforms for communication and education.

Transitioning from the sphere of personal motivation, it becomes crucial to acknowledge the scholarly underpinnings that bolster this research endeavor. As elucidated in the literature review, a multitude of empirical studies and meta-analyses have demonstrated positive effects for interaction in CMC in general and SCMC in particular (e.g., Ziegler, 2016; Keck et al., 2006; Mackey & Goo, 2007). However, despite an increasing body of evidence examining SCMC from an interactionist perspective housed in cross-sectional and experimental designs (e.g., Hung &

Higgins, 2016; Monteiro, 2014; Yilmaz, 2012; Yilmaz & Granena, 2010), little research has been done on the effects of NS feedback in NS-NNS interaction in naturalistic SCMC environments.

Even more lacking is research investigating NS feedback in two different modes of SCMC, text-based and voice-based, in the same empirical study. While previous research studies, albeit very few in number, have explored text-based and voice-based SCMC, they have done so with their primary focus on one or a combination of: (1) productive or receptive skills, (2) specific linguistic target(s), (3) specific feedback types, mostly recasts.

Furthermore, the methodological practices seen in the extant empirical feedback-in-SCMC literature leave some queries unanswered. For example, in investigating the effect of feedback types, various types of feedback or their combinations have been used. However, often times the suitability of the choice of feedback type and its timing, i.e., study participants' developmental readiness for a particular type of feedback, was not accounted for. It is likely that these conditions hindered the beneficial effects of feedback in general. The question that arises is whether a more naturalistic environment for NS feedback and data collected over an extended period of time would be more constructive in investigating the effects of feedback.

In addition, due to the fact that the majority of empirical studies conducted on feedback-in-SCMC used instructor-learner or NNS-NNS dyads, not much is known about the extent to which NS feedback is effective on NNS language development if delivered in a longitudinal and naturalistic discourse environment mirroring the digital 'wild'.

Research Question

In light of the gaps in research that remain concerning the effects of NS interactional feedback in text-based and voice-based synchronous computer-mediated communication, the current study set out to investigate the following general research question:

General Research Question: To what extent is native speaker interactional feedback effective in and across text-based and voice-based naturalistic synchronous computer-mediated communication?

Chapter 3: Methodology

This chapter describes the methodology proposed in the current study. It begins with a description of naturalistic CMC discourse, which served as the context of the study. Then, a pilot study is briefly summarized, focusing on the methodology and limitations that paved the way for the current study. Afterward, the present study is described, beginning with operationalization of key constructs, an overview of the design, followed by the description of participants, the data collection procedures, tasks, and finally, data analysis with a description of data coding.

This section contextualizes the study both methodologically and situationally. It begins with an overview of research methodologies used in studies of second language acquisition and computer-mediated communication and the theoretical frameworks from which they are drawn. This is followed by a brief appraisal of their relative strengths and weaknesses highlighting methodological gaps in the literature. Following that, the research setting for the study, naturalistic online interaction, is introduced, along with the participants and, finally the research questions in the study.

Recent SLA Theoretical Perspectives in SCMC

Owing to the multidisciplinary nature of the field of SLA, those who study it, draw their research methodologies from a multitude of related fields including but not limited to education, psychology, sociology, linguistics, and even hard sciences like physics and mathematics (Mackey & Gass, 2012; Ortega & Han, 2017). It is perhaps for this reason that the research methodologies in SLA keep evolving in general and new methods and designs are introduced on a regular basis. The same also applies to the study of L2 acquisition in SCMC. However, research methods cannot be understood in a vacuum "[as] they are dependent on the theories that they are designed to investigate" (Mackey & Gass, 2012, p. 1), which in turn relates to specific

conceptual frameworks. Hence, in order to have a comprehensive discussion of the study of L2 acquisition in SCMC, it is imperative to first acknowledge the various theoretical perspectives that comprise this sub-field.

Researchers in the multidisciplinary field of SLA face widespread obstacles in their empirical investigations, the most significant being that the phenomenon that they wish to investigate cannot be directly observed. Although recent findings from physical and brain-based studies have allowed researchers (e.g. N. Ellis, 2007; MacWhinney, 2001; Scovel, 1969; Ullman, 2001) to identify areas of the brain that are activated in response to linguistic stimulation and as L2 learners engage in various language tasks; knowing what happens in the L2 learner's mind, particularly regarding the L2 learner's *competence*, or what the language learner *knows*, is still quite impossible. On the other hand, linguistic *performance,* or what the learner *does* and the way the learner actually uses the language (Lightbown & Spada, 2017), is directly observable. This characteristic of observability is perhaps best, and naturally, manifested in studies conducted in CMC due to its particular affordances (Smith et al, 2003), namely temporality, degree of anonymity, modality, and spatiality (For a discussion of these affordances, see Chapter 2).

In her seminal article, Chapelle (1997) called on research in CALL to incorporate theoretical approaches and research methodologies from SLA to study design, effectiveness, and use of CALL materials and tools. Since then, a significant body of empirical studies on SCMC has adopted myriad approaches of interactionist, cognitive, and socio-cognitive in SLA. CMC researchers have sought to anchor their investigations of CMC in an array of existing SLA theoretical frameworks; however, the two most cited theoretical perspectives in the study of SCMC are the sociocultural perspectives and the interactionist perspective.

Sociocultural and L2 *interactionist* perspectives regard features of computer-mediated communication (SCMC), including text-based interactions, as beneficial for second language (L2) acquisition. Warschauer (1997) argues in his paper on computer-mediated collaborative learning that SCMC facilitates L2 acquisition by providing opportunities for meaningful interaction, negotiation of meaning, and a focus on form. Moreover, he asserts that SCMC enriches the social and cultural aspects of language learning, fostering a more egalitarian and collaborative environment.

The sociocultural perspective delves deeper into the social and cultural aspects of second language acquisition (SLA), exploring activities, contexts, and communities' impact on the acquisition of communicative, strategic, and sociolinguistic competence (Lantolf et al., 2018). This perspective emphasizes the mediating role of language as a tool for communication, cognition, and identity development, aiming to explain how learners co-construct meaning and knowledge and internalize the norms and values of the target language and culture (Swain, 2000).

Supporting sociocultural perspectives, Lantolf (2000) emphasizes that 'the human mind is mediated' (p. 1), highlighting the reliance on tools for changing the world and regulating social relationships. Among these tools, Lantolf considers language the most important mediation tool, enabling people to work jointly in co-constructing a context and developing their mental abilities (Lin, 2014, 121).

Ellis (1999) posits that L2 acquisition is a social phenomenon, with meaningful communicative and cognitive activities exposing learners not only to but also teaching them new linguistic forms. Social interaction is viewed as a means to achieve language development, enabling internalization 'through a dynamic transformative process called microgenesis'

(Wertsch, 1985a in Ohta, 2000: 54). In other words, microgenesis is a learning process observable as learners engage in dialogic communication, allowing for study within the situated activity. L2 learners, taking on roles like authors, narrators, and interpreters (Lantolf, 2000), find the SCMC environment providing opportunities to assume these roles more seamlessly than in a face-to-face setting.

The *interactionist* perspectives in SLA are a group of theories and approaches that emphasize the role of interaction in the learning process. Interaction is defined as the exchange of linguistic and non-linguistic information between two or more interlocutors, which can be modified or negotiated to facilitate comprehension and learning. One of the common assumptions of the interactionist perspectives is that interaction provides learners with comprehensible input, which is the language that they can understand and that contains new linguistic information. Another assumption is that interaction also provides learners with opportunities to produce output, which is the language that they produce to communicate their messages and that can reflect their interlanguage system. A third assumption is that interaction enables learners to receive feedback, which is the information that they get from their interlocutors or themselves about the accuracy and appropriateness of their output. These assumptions imply that interaction helps learners to notice the gaps and mismatches between their interlanguage and the target language, which can trigger cognitive processes such as attention, awareness, and memory (Loewen & Sato, 2017; Mackey & Gass, 2015).

One of the common claims of the interactionist perspectives is that interaction facilitates the acquisition of various aspects of linguistic competence, such as grammatical, lexical, pragmatic, and sociolinguistic knowledge, as well as communicative and strategic skills. This claim is supported by a large body of empirical research, both classroom and laboratory-based,

that has used various methods and measures to investigate the effects of interaction on SLA. Some of the research methods include discourse analysis, experimental design, eye-tracking, and neuroimaging. Some of the research measures include pretest-posttest, stimulated recall, introspection, and online processing (Gass, 2012; Loewen, 2021).

One of the variations of the interactionist perspectives is that interaction can occur in various modes, such as face-to-face, written, or computer-mediated, and in various settings, such as naturalistic, classroom, or laboratory. These variations affect the quality and quantity of the input, output, and feedback that learners receive and produce, as well as the cognitive and social processes that they engage in. Another variation is that interaction can involve different types and features, such as task-based, collaborative, or corrective interaction. These types and features influence the nature and outcome of the interaction and learning that occur, as well as the motivation and attitude of the learners and interlocutors (Li & Li, 2023).

One of the debates from the interactionist perspectives is about the relative importance and effectiveness of input, output, and feedback in SLA. Some researchers argue that input is the primary source of language learning, and that output and feedback are only secondary or facilitative factors. Other researchers argue that output is the main driver of language learning, and that input and feedback are only supportive or corrective factors. Still other researchers argue that feedback is the key factor of language learning, and that input and output are only necessary or complementary factors.

Another debate of the interactionist perspectives is about the linguistic domains and developmental stages that are most influenced by interaction in SLA. Some researchers claim that interaction has a stronger effect on the acquisition of morphology and syntax, which are more rule-based and explicit aspects of language. Other researchers claim that interaction has a

greater impact on the acquisition of pragmatics and sociolinguistics, which are more context-dependent and implicit aspects of language. Yet other researchers claim that interaction has a similar effect on the acquisition of all aspects of language, regardless of their complexity or salience.

A third debate of the interactionist perspectives is about the individual and contextual factors that mediate the relationship between interaction and SLA. Some researchers suggest that learner characteristics, such as proficiency level, learning style, and personality, affect the amount and quality of interaction and learning that take place. Other researchers suggest that interlocutor characteristics, such as native or non-native status, proficiency level, and feedback style, affect the nature and outcome of interaction and learning that occur. Still other researchers suggest that task characteristics, such as type, complexity, and goal, affect the mode and content of interaction and learning that happen. The interactionist perspectives have contributed to the understanding and improvement of SLA by providing empirical evidence and theoretical insights. However, they also face some challenges and limitations, such as the generalizability and validity of research findings, the complexity and diversity of research constructs, and the interaction with other perspectives and approaches in SLA. Despite these challenges and limitations, there is a growing body of research that investigates the role of SCMC in second language acquisition.

SCMC, whether in text-based (Warschauer, 1997), voice-based (Kenning, 2010), or video-based modes (Hung & Higgins, 2015), facilitates easily transmitted, stored, archived, reevaluated, and edited human interaction. Given these SCMC characteristics, researchers advocate ongoing exploration of methods in computer-mediated contexts to deepen the understanding of these innovative spaces for language learning (Blake, 2008; Chapelle, 2000).

Therefore, selecting the best research approach, method, and tools should align with the research purpose, questions, and context, taking into account potential limitations. The next section provides an overview of research processes and contexts as a first step.

Methodological Procedures and Gaps in Researching IF in SCMC

Long (2015) identified four sequential but overlapping phases of SLA research particularly in the context of language classroom interaction from the early 1960s to the present. He identifies four sequential and overlapping phases of research. In the first phase were comparative and quantitative studies that focused on the product or outcome as opposed to analyzing learning processes. In the second phase, researchers focused mostly on descriptive studies that highlighted teaching and learning observations in the 1970s and 1980s. According to Antón (2015), the qualitative trend was kickstarted during these years which Long (2015) views as a problem with the second phase in that research in this phase lacked both focused and contextualized objectives as well as clearly articulated and anticipated learning outcomes.

A third phase was then triggered naturally, which Long refers to as "process–process, descriptive and correlational" (2015, p. 63). In this phase, the instructor's behavior that directly correlated with the quality and quantity of student learning was the primary focus. Lastly, the fourth and the most recent phase is considered to be focused on the impact of variables such as language use on learning outcomes. According to Long, studies in this "process, product, quasi-experimental and experimental" phase (Long, 2015, p. 64) have a more limited scope with fewer participants and shorter durations. The nature of the studies in the fourth phase renders the research easily duplicated and allows room for generalizations based on multiple studies. Further, these types of studies also allow for greater control of variables, including context,

learner, and type(s) of interaction. Creswell and Plano-Clark (2011) opine that this recent phase shares the characteristics of mixed-method research.

However, in CALL, specifically SCMC studies, the approaches mentioned above may not adequately document interactions in non-traditional learning spaces, such as online naturalistic interactional environments (Hartwick, 2018). This so-called shortcoming is an important consideration for SCMC studies, as an understanding of interactions in an online space might help to explain not just how L2 acquisition takes place in these environments but also shed light on the role of these environments in language learning. Three major factors that help understand the methodological gaps in SCMC are discussed below, namely research setting, types of interlocutors, and tasks.

Research Setting

With each new study, "the popularity and significance of the synchronous chat room for language learning is increasing" (Jepson, 2005, p. 81). Synchronous chat environments are particularly conducive to an examination of interactionist perspectives (Smith, 2004). In a typical text chat room, L2 learners engage in real-time interactions using personal computers or devices and the Internet to send typed messages, which appear within seconds on their interlocutors' screens. Each textual turn appears in the same format in which it was sent, containing the learner's language and typographical errors (Blake, 2000). An overwhelming majority of SCMC studies have taken place in classroom or instructional settings. For example, one of the earlier studies investigating SCMC is Sotillo (2000), which sought to investigate syntactic complexity in synchronous and asynchronous CMC and was a classroom-based study. It had two groups of university-level students from two intact ESL academic writing classes that used computers. The

two groups interacted with two instructors and the tasks were content-based and included as part of the syllabus.

A similar setting is reported in Lai and Zhao (2006), in which twelve ESL learners of intermediate English proficiency were recruited from an intensive English summer program in the US. The participants were paired to form six mixed proficiency "dyads of low-high intermediate English level with the intent of stimulating instances of negotiated interaction" (p. 105). Bueno-Alastuey (2010), focused on phonetic improvement and modified phonetic output, is another example of SCMC study conducted in an instructional setting involving three classes of ESP in Spain. A slightly different version of instructional studies focuses on eTandems, a form of per-to-peer learning, in which students interacted with a language learning partner from another country and exchanged messages in both languages and to assist each other in developing their language communication skills (Hung & Higgins, 2016).

Previous studies have examined several characteristics and potential benefits of eTandem exchanges, including comprehensibility development (Akiyama & Saito, 2016), learner perceptions of intercultural and linguistic development (Tian & Wang, 2010), and scaffolding and role-taking (Cappellini, 2016). However, these studies also take place under the auspices of a set curriculum and under the directions of language instructors. To date, an L2 study entirely based on naturalistic interactions between NS of a language and learners of that language does not exist.

Type of Interlocutors

The type of interlocutor is key to any SCMC study. Interlocutors can be same-target-language peers, different-target-language peers, instructors and/or their assistants, researchers and/or their assistants, and NS. As mentioned earlier, most SCMC studies in the literature are

instructional in nature or classroom-based with L2 learner participants (Levy, 2015). Hence, it is not surprising that the interlocutors in these studies are either instructors and/or their assistants, who are also the researchers (e.g., Blake, 2005; Mendelson, 2010; O'Rourke, 2008), or L2 learners and their peers (e.g., Dao, Duong, & Nguyen, 2021; Kenning, 2010). Native-speaker and nonnative-speaker dyads have also been investigated but in instructional settings (e.g., Jepson, 2005; Strawbridge, 2021). NS-NNS dyads in a naturalistic setting outside the classroom environment or outside the influence of a prescribed curriculum or syllabus are highly underreported in SLA.

Tasks

Tasks play an important role in SCMC research similar to mainstream SLA research. One of the most promising aspects of SCMC is in its potential to provide L2 learners with the opportunity to engage in authentic and *real world* language use to which they would otherwise not have access (Bueno-Alastuey, 2011; Yanguas, 2010). This frequently takes the form of eTandems, in which organized dyadic conversations take place between language partners, separated by geographic location but united by SCMC platform. Instructor-peer and/or peer-to-peer learning is another commonly explored dyadic interaction in research studies. SCMC studies of this nature exhibit highly controlled and organized tasks as they are usually part of an ongoing syllabus or a course.

Most reported tasks involve collaborating online reading and writing tasks (e.g., Abrams, 2003); only online collaborative writing tasks (e.g., Díez-Bedmar & Pérez-Paredes, 2012); jigsaw (Blake, 2000), dictogloss and jigsaw (e.g., Strawbridge, 2021); digital gaming (Chik, 2013), information-gap tasks (Gurzynski-Weiss & Baralt, 2015), picture differences, consensus, and conversation (Loewen & Isbell, 2017). The bulk of such tasks are controlled by the

researcher or the teacher, targeting specific linguistic features. However, research investigating naturalistic interaction controlled by tasks at a lesser extent and not having a superimposed linguistic feature(s) is underrepresented in the literature. This is noteworthy given the prevalence of studies employing dyadic exchanges relative to those designed around other task types. Akiyama and Cunningham (2018), in a synthesis of 55 telecollaboration projects, found that over half (n=29) of the projects investigated utilized an "Information Exchange" task, which was defined as the "least structured task type," usually taking the form of "a discussion regarding cultural differences/similarities" (p. 56). Moreover, these tasks are either one-off or constitute a few short sessions at the most.

Previous studies have also shown that more naturally occurring conversational communication in face-to-face contexts is fruitful for negotiation and the production of LREs (e.g., Fernández-García & Martínez-Arbelaiz, 2014; Nakahama et al., 2001). Nakahama et. al. (2001) performed an analysis of negotiation of meaning in the FTF interaction of NNSNS dyads in two different environments: a spot-the-difference information gap task, and a relatively uncontrolled and open-ended conversational activity. Results show a clear trend for higher mean levels of negotiation of meaning in the information gap activity as compared to the conversational interaction; however, whereas in the information gap task negotiation was focused "rather mechanically" on individual lexical items, in conversational interaction the focus was "on aspects of overall discourse or textual coherence, the creation of shared schema and frame, the maintaining of face and the building of rapport" (p. 388). In tandem or eTandem exchanges, these beneficial characteristics may furthermore be aided by the fluid roles played by participants as both language learner and language expert (Cappellini, 2016; Fernández-García and Martínez-Arbelaiz, 2014).

Defining Naturalistic SCMC Context

Computer-Assisted Language Learning (CALL) is an interdisciplinary research area positioned at the crossroads of social science, computing, education, linguistics, and applied linguistics. In recent years, technological advancements have expanded the scope of CALL, encompassing both formal and informal learning contexts. This evolution allows language learners to integrate computer usage and non-language materials into their second language (L2) acquisition journey.

Naturalistic SCMC within informal learning involves L2 learners pursuing leisure interests in digital environments, as noted by Hine (2013). This approach emphasizes the use of a second or foreign language for non-academic purposes. In contrast, naturalistic CMC, as described by Chik (2013), goes beyond explicit language learning objectives. It entails actively organizing digital practices for both pleasure and learning, highlighting a more holistic engagement with technology.

The rise of telecommunication software applications, such as Zoom, Google Meet, and collaborative tools like Google Docs and Microsoft Teams, has triggered a creative reassessment of the computer's role. These technologies are now seen as dynamic tools for real-time communication, fostering effective interactions in diverse contexts.

In the current investigation, task-based naturalistic Computer-Mediated Communication (SCMC) pertains to interactions occurring beyond the confines of a classroom or experimental setting. The study is structured to address the imperative of gaining a deeper understanding of the dynamics involved in interactions between native speakers (NS) and non-native speakers (NNS) in task-based natural production data. Specifically, the research aims to explore whether

conclusions drawn from studies conducted in instructional settings can be extrapolated to language use in everyday, naturalistic Computer-Mediated Communication (CMC) contexts.

It is noteworthy that the majority of research on CMC and feedback is predominantly situated within experimental or instructional environments, as indicated by Parlak and Ziegler (2017), Gurzynski-Weiss and Baralt (2015), and Bueno-Alastuey (2013). Surprisingly, there is a paucity of CMC-feedback research conducted in naturalistic SCMC conditions. In an era characterized by widespread computer and Internet access, there arises a continual need to reassess the role of computers in language learners' everyday practices.

Cross-Sectional and Longitudinal Studies in SLA

Ortega (2005) aptly argued that "fundamental problems about L2 learning that SLA researchers investigate are in part problems about "time," and that any claims about "learning" can be most meaningfully interpreted only within a full longitudinal perspective" (p. 26). This means that SLA research should study how language learners develop their skills overtime, as this is the only way to understand the process and outcomes of learning a second language (L2). However, most SLA research and disciplinary discussions adopt a cross-sectional view of language development, which Ortega considers "unfortunate".

Cross-sectional studies, as Schutt (2006) defined, are "a research design that involves observations… at one specific point in time" (p. 215). They are often nonexperimental and descriptive in their design. As a result, these studies lack the ability to establish causal relationships, may exhibit low internal validity, and are unable to capture changes overtime—an essential aspect for comprehending language development. They can only compare different groups of learners at different stages, but they cannot track the progress of individual learners or the factors that influence their learning. In SLA, cross-sectional studies are mostly used to

compare groups of L2 learners at different ages or proficiency levels and make generalizations about language development (Lightbown & Spada, 2017). However, these comparisons may not reveal the actual learning trajectories or the individual differences of the learners.

The most often quoted cross-sectional L2 acquisition studies are the 1973 and 1974 studies of Dulay and Burt. Using the Bilingual Syntax Measure (BSM) to elicit speech, Dulay and Burt have claimed that for L2 learners there is an invariant order of acquisition of the morphemes which the BSM regularly elicits. The 1973 study contained three samples of Spanish-speaking 5-8 year olds, and the 1974 study included 60 Chinese-speaking and 55 Spanish-speaking children. According to Doughty (2003), "the vast majority of SLA studies are cross-sectional, with serious resulting limitations on the conclusions that can be drawn on some important issues" (p. 3). As such, it has been argued that "cross-sectional studies, by definition, just do not capture what is happening to individual learners" (Selinker & Mascia 1999, p.257; the authors were referring in this case to fossilization phenomena).

Some advantages though are recorded in the literature. First of all, cross-sectional studies allow researchers to collect large quantities of data in shorter periods of time. On the other hand, longitudinal studies are time-consuming by nature, some (e.g., Abrahamsson, 2003; Heubner, 1983) spanning years. As a result, long-term studies are not always practical, or even possible. In addition to their time-consuming nature, longitudinal studies yield a different type of data that is rich but is normally limited to a few individual learners. In contrast, cross-sectional studies employ a larger sample size and as a result allow researchers to "draw general conclusions…that cannot be drawn from studies with a smaller number of participants" (Ritchie & Bhatia, 2009, p. 31). This, in turn, increases the reliability and generalizability of findings in cross-sectional studies (Bialystok & Swain, 1978).

Longitudinal research, defined as a "data-gathering procedure in which data are gathered from one or more learners over a prolonged period of time in order to gather information about change overtime" (Gass, Behney, & Plonsky, 2013, p. 527), is often used to investigate the genesis of individual learners' language development. Thus, longitudinal studies allow researchers to track individual learners' language development diachronically (Lightbown & Spada, 2017). For this reason, it is particularly well-suited for studies of persistence. While admittedly lacking in the reliability and generalizability characteristic of cross-sectional studies, longitudinal research nonetheless has much to offer. As has been seen in the seminal case studies of Dulay and Burt (1973), Dulay (1974) and Long (2003), longitudinal studies make it possible to track and trace L2 learners' language development, permitting for detailed, learner-specific analyses. Hence, they provide a breadth and depth of analysis that cannot be attained elsewhere (Finneran, 2020).

Research in SCMC reflects the overall field of SLA in its lack of longitudinal studies. Although scarce in number, longitudinal SCMC studies have investigated diverse topics including pragmatic competence (e.g., Di Sarno Garcia, 2020), L2 Spanish development (e.g., Glick, 2013), L2 speech fluency (e.g., Hanzawa, 2021), L2 speech development in foreign language classrooms (e.g., Kazuya & Hanzawa, 2017), online conversation analysis (CA) in second and foreign language classrooms (e.g., González-Lloret, 2011; Markee, 2008), CA for SLA (e.g., Piirainen-Marsh & Tainio, 2009). Investigating the progress of interactional (pragmatic) competence, Gonzales (2012, 2013) explored politeness and the development of closing sequences in *Livemocha*, a social network for learning languages, while Gonzalez-Lloret investigated the development of addressivity (2008) and troubled-talk sequences (2011) in text-based CMC.

Results from these studies suggest that CMC environments, especially synchronous CMC, are valuable sources for meaningful, natural, and authentic interaction. The quality and quantity of rich input in SCMC environments may "not be easily available in all language classrooms" (Gonzalez-Lloret, 2015, p. 581). It has been claimed that the qualities of SCMC interaction that sets it apart from traditional classrooms are the presence of pragmalinguistic and sociopragmatic feedback from more advanced speakers, a variety of speech act sequences, and a flexible space for engagement and learner autonomy.

While various studies have explored different aspects of L2 learning in SCMC, only one study, conducted by Heift in 2010, delved into computer-generated feedback across three semesters. Heift's longitudinal investigation involved analyzing program logs capturing learner behavior overtime. The learners utilized a parser-based program, the E-Tutor, which provided two distinct types of feedback – Metalinguistic Explanations (ME) and Metalinguistic Clues (MC). Over the three semesters, ten L2 learners of German participated in the study. The results indicated that the specificity of feedback influenced learner uptake in diverse ways. In the cross-sectional analysis, significant differences in learner uptake were observed for the more advanced courses (German 103 and 201). However, for the introductory course, German 102, no significant difference was found regarding the impact of the two feedback types on learner uptake.

Furthermore, the longitudinal data revealed a noteworthy increase in learner uptake from German 102 to 201 for error-specific feedback (ME), while learner uptake for the generic feedback type (MC) showed insignificant variation across the three courses. Importantly, the study highlighted a significant impact of both feedback types on learner uptake, irrespective of error type (grammar and spelling).

Findings concerning the longer term effects of interactional feedback offered by NS of a language on learner uptake in naturalistic SCMC environments are therefore still lacking. Additionally, Lyster (2007) noted that "because uptake alone does not constitute learning, it is important to examine the effects of interactional feedback and learner repair on long-term second language development" (p. 117). The current study thus aims to provide insights into L2 learner-native speaker naturalistic interaction in text-based and voice-based synchronous CMC.

Pilot Study

The purpose of the exploratory pilot study (Akbar, 2017) was to make a preliminary inquiry into the types of corrective feedback that occurred and evaluating their relative effects on learner 'uptake', in naturalistic synchronous and asynchronous computer-mediated environments between native speaker/nonnative speaker dyads. As a measure of effectiveness, learner uptake was defined as immediate or delayed learner responses to IF. It was operationalized as the incorporation of NS feedback by NNS in their production. The participants (N=5) in the study included four NNS and one NS of English. The NNS participants, selected through convenience sampling technique, were upper intermediate adult learners enrolled in a 10-week intensive ESL course in a community language school in New York City. The NS interlocutor was a 26-year-old female, first-year master's student at Teachers College, Columbia University. She spoke Spanish as an L2 and did not have any prior formal or informal experience in teaching ESL or EFL. Lack of teaching experience was important because the primary objective of the pilot study was to collect naturalistic interaction data. Moreover, none of the participants knew each other at the onset of the study or were told the purpose of the study.

With the focus of the investigation being the occurrence of IF in naturalistic interaction, the study used three different tasks to collect a "*general* (emphasis in the original) sample of

learner language" (Ellis & Barkhuizen, 2009, p. 30). The tasks were designed to provide a context for the participants to use the L2 in a purposeful manner focusing on meaning exchange and use of language for real world, non-linguistic purposes.

The first two tasks were conducted in the synchronous environment. Task 1 (Appendix A) was an introductory task that lasted 40 minutes. The participants were asked to introduce themselves to their partner as one would in an online chatroom. They were also given a few guiding questions to ask their partner (e.g., *what did he/she do last weekend? What is his/her favorite food/pastime?*). The second task was a video discussion task that lasted 50 minutes. Each dyad watched a short video clip (1:57) from the animation movie ***Bolt***, after which they discussed the content of the clip. After completing tasks 1 and 2 in the synchronous mode, the second phase of data collection ensued in the asynchronous mode. In task 3, the dyads had to cooperatively devise a 2-day travel plan based on competing sets of travel preferences. The dyads were asked to make a joint travel plan through discussions and negotiations.

Data for the present study were collected in two phases. The first phase lasted four days, one day for each pair to complete tasks 1 and 2 in the synchronous environment. The SCMC tool used in phase-1 was *Google Hangout*, an instant messaging service. Workstations, including a laptop with headphones, were set up in two different rooms in a library for each pair. In phase-2, the NNS participants interacted with the NS interlocutor from the comfort of their homes and at their leisure to complete task 3 in the asynchronous environment. *Gmail*, a free web-based email service was used for collecting data in the second phase. The duration for phase-2 varied among the dyads depending on the number of emails each dyad wrote and the time they took in replying to the interlocutor. The shortest duration of two days was recorded for Dyad 3 and the longest

duration was recorded for Dyad 2, both for the third task, which took four days to complete. Table 4 below presents an overview of the pilot study.

Table 4: Pilot study overview.

Procedure	**Phase 1**		**Phase 2**
	Synchronous CMC		Asynchronous CMC
Tool	*Google Hangout*		*Gmail*
Tasks	Task 1	Task 2	Task 3
	Introductions	Video Discussion	Decision-making Task
Duration	40 minutes	50 minutes	2 – 4 Days

All NNS turns were coded as either having an error or not. A turn was operationalized as a transfer of the *floor* from one participant to the other when a message appears on the computer screen by pressing the 'Enter' key on the keyboard . The term conversational *floor* in SCMC refers to the right or opportunity to speak in an online conversation, similar to face-to-face communication (Simpson, 2005). Two coders coded twenty-five percent of the data, whereas the researcher coded the rest of the data. Short NNS turns (one or two words) with little or no potential for error such as *yes, no,* greetings or salutations, and names of people, places, and objects were excluded from the data. The data set consisted of chat scripts and the analysis consisted of both quantitative and qualitative procedures.

The first research question asked whether corrective feedback existed in naturalistic text-based SCMC and ACMC, and if yes, what types. According to the results, two types of corrective feedback were identified in the two environments. Recasts were observed in synchronous CMC whereas clarification requests were observed in asynchronous CMC. Part (b) of the research question sought to explore the extent to which the types of IF found in the two modes were effective within and across the environments. The results indicate that there was just one instance of delayed uptake and no instances of immediate uptake in the data across the two

modes. Moreover, the delayed uptake was observed in the SCMC mode. Table 5 below displays a summary of the results of the pilot study.

Table 5: Summary of pilot study results.

Synchronous CMC	NNS	Errors			Corrective Feedback		Delayed Uptake
		Grammatical	*Lexical*	*Spelling*	*Recasts*	*Clarification Requests*	
Task 1	1	18		6	1		
	2	13		1	3		
	3	28	1		2		
	4	22		2			
Task 2	1	9		8	2		
	2	15		4	3		1
	3	19	1	1	5		
	4	27		2	1		
Asynchronous CMC							
Task 3	1	9		3		1	
	2	7	1	1			
	3	12					
	4	13		2			
Total		192	3	30	17	1	1

Several inter-learner patterns of feedback were observed in the data that warranted a qualitative analysis. The qualitative analysis revealed that the NS provided more recasts in response to linguistic errors compared to spelling or lexical errors. A closer examination of interactions revealed that among the array of linguistic errors, most of the recasts were in response to errors pertaining to the regular and irregular plural nouns, especially the use or lack of the plural *s*, and the definite and indefinite articles. The two L1 Japanese participants produced most of the linguistic errors. The analysis further revealed that the NS's responses to L1 French participants were mostly different from her responses to the L1 Japanese participants.

When interacting with L1 French participants, the NS interlocutor would mostly follow-up on the topic under discussion with further questions rather than simply reformulating

erroneous NNS utterances, as in the case of most of her interactions with L1 Japanese participants. The data also showed that the two L1 French speakers readily engaged in topics related to music, movies, and travel, whereas the L1 Japanese participants mostly remained focused on the personal topics for example the English language courses they were enrolled in at the time of data collection. Topics of conversation thus played an important role in determining the length of turns and the kind of recasts (full vs. partial, integrated vs. isolated) provided by the NS. As such, if the topic was related to the NNS participant's personal experiences then the NS was more likely to simply reformulate the erroneous utterances. However, if the topic of the conversation was more 'neutral' and/or objective (e.g., movies, sports) then the NS was more likely to add to the information, propelling the conversation forward and rendering longer turns as a result.

The qualitative analysis revealed multiple instances of unprompted self-corrections and clarification requests on the part of the NNS participants in the SCMC mode. The unprompted self-corrections were, however, *selective*, in that, the NNS participants did not self-correct each time they produced an error. Further qualitative analysis reveals three instances where the NNS participants would ask the NS to explain or clarify meanings of certain lexical items. NNS-1, 3, and 4, each requested for a clarification.

The report of the pilot study recognized several methodological limitations. First, the procedures in which data were collected were a clear limitation. Since the SCMC tasks were conducted first and the ACMC task was conducted later, it was impossible to observe *effects* of feedback from the ACMC to the SCMC mode. Thus, in the larger study, the two environments should be investigated simultaneously in the larger study to allow for data analysis across the environments. Another important methodological issue was the unequal number of tasks in the

two environments. There were two tasks in the SCMC mode and only one task in the ACMC mode. This led to an unequal amount of time that the participants spent interacting in the two modes, consequently producing an overall lesser amount of language in the ACMC task and very few opportunities for native speaker feedback.

Another limitation to the current study came with the selection of the coding scheme, which was the exclusive use of Lyster & Ranta's (1997) CF typology. Their typology has pedagogical underpinnings and is developed based on what transpires in the language classroom as opposed to a naturalistic interaction between native and nonnative speakers. Given the difference in the nature of communication – CMC as opposed to classroom and NS-NNS interaction as opposed to teacher-learner – the pilot study could not lend itself to the typology. Learner self-corrections, for example, were observed multiple times in the data but could not be coded appropriately based on the typology.

Finally, the present study only investigated text-based interaction in asynchronous and synchronous environments, thus the results may not generalize to voice-based or video-based synchronous and asynchronous environments. Replicating the study in text-based and voice-based synchronous CMC would be especially desirable, given the similarities in characteristics of these two modes of CMC. Overall, the pilot study revealed several methodological weaknesses that needed to be revised and refined for the present study.

The Present Study

The present longitudinal study sought to investigate the effects of NS interactional feedback in L2 English text-based and voice-based naturalistic SCMC involving ten NS-NNS dyads. The study investigated the most common linguistic error produced by L2 learners that received the greatest amount of NS feedback, and whether any trends can be detected in relation

to proficiency level, topic domain, and the most common linguistic errors. The research question (first introduced in Chapter II) is restated below, along with four sub-questions.

Research Questions. The research question (first introduced in Chapter 2) is restated below, along with three specific questions.

General Research Question: To what extent is native speaker interactional feedback effective in and across text-based and voice-based naturalistic synchronous computer-mediated communication? More specifically,

RQ1. To what extent is NS interactional feedback (IF) effective in naturalistic text-based compared to naturalistic voice-based synchronous computer-mediated communication (SCMC) between NS and NNS of English?

RQ2. What is the most common linguistic error, produced by L2 learners, that receives the greatest amount of NS feedback in naturalistic text-based and voice-based SCMC interactions?

RQ3. Does L2 learners' production of the most common linguistic error change throughout the course of online naturalistic interactions? If so, can any patterns be detected regarding proficiency level, topic domain, and article type?

Participants

Purposive sampling (Patton, 2002), using a specific set of criteria for identifying participants, informed the recruitment process. Learners of English as a second language (L2) ranging from intermediate to advanced proficiency, as well as NSs of English were invited to participate in the study. The NNSs were recruited from a language school and the NS were recruited from different social circles known to the researcher. A two-tiered sampling technique

was adopted, starting with listing participants based on their willingness to participate and their commitment to the study's ten-week duration. Initially, participants were invited to a Zoom meeting where the researcher explained the study's general purpose and expectations. After this meeting, participants completed an informed consent form (Appendix B), followed by background questionnaires to determine their suitability for the study.

Given the length of the data collection period and the need for sustained engagement, fully random assignment for assembling dyads was not feasible. While efforts were made to balance pairings in terms of linguistic background and proficiency levels, the logistical challenge of accommodating individual schedules was a critical factor. Over the ten-week period, participants had varied availability due to work, school, or personal commitments. Thus, dyads were primarily formed based on schedule compatibility to ensure consistent participation. This approach minimized the risk of absenteeism or scheduling conflicts but introduced a potential limitation in terms of randomization. Future studies could address this by employing more flexible or staggered scheduling techniques to allow for a wider range of pairing options.

Separate questionnaires were administered to the NS (Appendix C) and NNS (Appendix D) participants to identify each participant’s proficiency level, L1, length of stay, language learning experience, language teaching experience, as well as other information regarding their experiences with the target language. Since computer skills were crucial in the study, both NS and NNS background questionnaires asked about the participant’s familiarity with basic computer use (e.g., using mouse keys, adjusting volume), typing in English, online and social media engagements, and their specific availability for the ten weeks of data collection. The questionnaires also elicited sociodemographic information about the participants and their levels of interest in discussing various topics, pre-established for this study, in an online format.

The questionnaires were administered online on Qualtrics and could be completed at the participants' own pace. If the participants completed the questionnaire, they were invited to meet with the researcher over Zoom for approximately 20 minutes to complete an introductory session. In the introductory session, the researcher shared the overall aim of the study which was to investigate how language development takes place online in synchronous environments. Specific information about the goals of the study or the research questions were not shared with the participants. Time was also given to the participants for any questions that they had before embarking on a 10-week online interaction. Of the 26 NNS participants who completed the language background questionnaire, ten (38.46%) committed to the 10-week study, whereas ten NS (35.71%) qualified for the study out of the 28 participants who had completed the online questionnaire. Each NS participant was then randomly paired with a NNS participant to form a total of ten NS-NNS dyads. After completion of the study, participants received a compensation of $50 online gift card and were debriefed with full details of the study, including its purpose.

The following section describes the information collected via background questionnaires regarding the NNS participants and the NS participants.

Nonnative Speaker Participants. The nonnative speaker (NNS) participants were ten adult ESL learners enrolled in a community language school. The community language school is located in New York City and offers courses in English as a second language to adult students of diverse nationalities and backgrounds. All first-time registrants take an in-house placement test, and are assigned to one of the six ESL levels (beginner, elementary, low intermediate, intermediate, upper-intermediate, and advanced) based on their test performance. The English classes typically meet three times a week for two hours a day during the spring and fall semesters. In the summer A and summer B semesters, the ESL classes meet four days a week for three hours. The

language school is housed in a graduate school of education in New York City. The teaching staff comprises M.A. student-teachers working toward a degree in Applied Linguistics or TESOL, doctoral students in Applied Linguistics or TESOL, and hired ESL teachers. L2 learners from intermediate to high advanced proficiency level were solicited for the study except the beginner level. The beginner level L2 learners were not considered for the study because a participant with too low a proficiency may not produce enough data to establish interpretable findings.

The ten NNS participants came from diverse nationalities and 7 different first language backgrounds (3 Portuguese, 1 Arabic, 1 Chinese, 1 German, 1 Japanese, 1 Korean, 1 Spanish, and 1 Thai). The participants' proficiency levels, as indicated by their class levels, included intermediate 1 (n = 1), intermediate 3 (n = 1), upper intermediate 2 (n = 1), Grammar and Writing 2 (n = 5), intermediate pronunciation (n = 1), and intermediate writing (n = 1). Out of the ten participants: four participants completed the ten weeks of data collection living in the U.S.; two participants started data collection in the U.S. but had to leave the country and travel back to their home countries due to COVID-19, and continued their participation from their home countries – one from Brazil and one from Japan; four participants joined and completed the study from their home countries that included two participants from Brazil, one participant from Germany, and one participant from Thailand. The rationale to include learner participants with diverse L1 backgrounds was to construct a representative naturalistic context as closely as possible.

Most participants held graduate degrees, such as an M.A., and engaged in various occupations, such as homemaking, caregiving, economics, translation services, education, social research, law, and car service. All NNS participants were between 22 and 54 years of age (M =

31.7, SD = 9.87) and included nine female and one male participant. The age range for learners followed theoretical assumptions that once beyond the so-called sensitive/critical period (Long & Granena, 2018), adult language learners tend to diverge from a native-like L2 performance, and that such divergence may increase with age (Granena, 2016). In this study, divergence referred to L2 learner errors, specifically linguistic errors that prompt NS interactional feedback. All study participants were given pseudonyms. Detailed sociodemographic information for each NNS participant based on the background questionnaire is given below:

Sally (NNS-1) was a 24 year-old homemaker from China who spoke Cantonese as her L1. Her length of residence (LOR) in the U.S. was three months at the time of data collection. Sally had an M.A. in Economics from China and worked at a company before coming to the U.S. to join her husband who was a Ph.D. student at Columbia University. Sally was a student of Intermediate-1 at the language program. The only other language she knew was English which she had studied for eight years in China. She liked watching movies, especially animation, comedy, and romance. She used WeChat and Facebook occasionally and she mostly used text and/or voice chat. She rarely used video chat. Sally used social media to connect with family and friends in China, thus she mostly used her L1 on social media. She rarely interacted with NSs of English in her daily life. Her local supermarket was the only place where she had any opportunity to interact with NSs of English. She had taken some online courses and could type up to 29 words per minute.

Jade (NNS-2) was a 53 year-old caregiver from Korea who lived with her husband and daughter in NYC. Her LOR was almost 5 years at the time of data collection. Jade had an active social life due to her husband's job and had travelled and lived around the world. She spoke Korean as her L1 and knew Chinese and English as additional languages. Jade had an M.A. from

Korea and was enrolled in the Intermediate pronunciation course at the language program. She also attended language classes offered at her local New York Public Library (NYPL) twice a week. Her reason for learning English was that she wanted "to be able to communicate with people around in different situations and be polite" (Online Language Learning_NonNative Speaker Questionnaire, July 3, 2019). She had studied English for more than ten years in Korea. She occasionally used Snapchat but rarely text-chatted and never used video chat. Jade mostly used voice-chat on *KakaoTalk* with her family and used Korean as the primary language of communication. She has multiple opportunities to interact with NSs of English including in language classes, restaurants, art galleries, etc. Jade liked discussing current affairs and art with NSs. She had never taken any online courses, but she was familiar with Zoom and could type up to 19 words per minute.

Skye (NNS-3), a 27 year-old female from Brazil, Skye, spoke Portuguese as her L1 and had lived in the U.S. for almost three years. She had a B.A. in journalism from her country and in the U.S., she was working as a nanny. Skye had completed the ESL course on Grammar and Writing-2 course at the language program which corresponded to higher-intermediate to advanced ESL level. She had learned English for two years in the U.S. and opined that she had basically learned the language by working as a babysitter and talking with NSs. She was recently married and lived in the U.S. with her husband. Skye was an avid reader and she read both in Portuguese and English. She was fond of travelling and had lived in different cities in the U.S. She was an active user of social media and used Facebook and Instagram very frequently. She used text chat very frequently but occasionally used voice chat and almost never used video chat. The online application that she used mostly was *WhatsApp* which she used with family, friends, and for work. She used her L1 with her family and English with her friends and at work. Her

interaction with NSs was very frequent due to her work and language school. Skye travelled to Brazil for vacation in week 5 of data collection for three weeks but stayed connected and continued participating in the study from Brazil. She came back to the U.S. in week 9 and completed the last two weeks of the study from NYC. She was familiar with Zoom and could type up to 29 words per minute.

Zara (NNS-4) was a 22 year-old Law student who joined the study as a participant from Germany. Her L1 was German, and she was also proficient in French and English. Shortly before the start of data collection, Zara had completed the ESL course on Grammar and Writing-2, which corresponded to higher-intermediate to advanced ESL level. She had worked two part-time jobs, one as an assistant at a law firm and the other as an interviewer at a social research institute. She stayed in the U.S. as an au pair for 14 months before travelling back to Germany at the wake of the COVID-19 pandemic. She was fond of reading English fiction and studying English grammar and vocabulary. English was her "favorite language" because English is a "prerequisite for international communication" (Online Language Learning_NonNative Speaker Questionnaire, May 5, 2021). She was a frequent user of Instagram and occasionally used Snapchat. Zara used text chat very frequently and occasionally used voice and video chat. She connected with her family and friend mostly through WhatsApp and used both German and English. She had relatives who were NSs of English and she interacted with them almost always on topics such as daily life, school, work, and other activities. She was familiar with Zoom and could type up to 29 word per minute.

Hazel (NNS-5) was a 31 year-old homemaker from Japan who had travelled to the U.S. with her husband and had lived in NYC for almost a year at the time of the study. She spoke Japanese as her L1, and English was the only other language she knew. Although she was not

working in the U.S. at the time of data collection, Hazel had an M.A. in English Literature from the UK and taught English composition at a university in Japan prior to coming to the U.S. Prior to the start of the study, she had completed two ESL courses, upper intermediate-2 and Grammar and Writing-2. She studied English for more than ten years in Japan and she wanted to continue learning in order to be able to communicate with as many people as possible in the U.S. Hazel used Twitter very frequently, Instagram frequently, and rarely used Facebook. She preferred using text chat over voice and video chat, and used WhatsApp, LINE, and Facebook Messenger to connect with family and friends. Her interaction with native English speakers was limited to supermarkets and shopping, etc., and she would mostly talk about recipes, cooking, and TV shows when talking to NSs. Hazel travelled to Japan in week 6 of data collection and completed the rest of the study from Japan. She was familiar with Zoom and could type up to 49 words per minute.

Nabi (NNS-6) was a 35 year-old male from Mauritania and spoke Arabic as his L1. He was also proficient in French and English as additional languages. He was an engineer in Mauritania and worked as an Uber driver in the U.S. His length of stay in the U.S. at the time of the study was almost three years. He had completed the ESL course on Grammar and Writing-2 at the language program just before the start of the study. He had studied English for almost ten years in school in his home country and continued to learn the language in the U.S. He used English at his work daily and also interacted with NSs in daily activities. His social media use was limited to an occasional use of Twitter, and he rarely used Facebook. Nabi was, however, an active user of WhatsApp which he used to connect with family and friends and for work-related purposes. He was used to talking on topics like the weather and other general topics with NSs.

Nabi had taken an online course at a university, and he was familiar with Zoom. Nabi typed less than ten words per minute.

Tiana (NNS-7) was a 23 year-old Thai-speaking female who joined the study from Thailand. She knew conversational Chinese and was learning Japanese at the time of the study. Prior to her participation in the study, she had completed Grammar and Writing-1, which corresponded to intermediate ESL level at the language program. She lived in the U.S. for two years and was working as an au pair when the pandemic hit due to which she had to travel back to her country. At the time of the study, Tiana was working as a Thai-English translator with local farmers in Thailand. She had an M.A. in Drama and was interested in writing screenplays. She learned English for more than ten years in school and was interested in learning more in order to have a better job. Her social media use included a very frequent use of Facebook, occasional use of Twitter and LinkedIn, and she rarely used Instagram. Like most of the NNS participants in the study, Tiana also used WhatsApp in addition to LINE, WeChat, and Facebook Messenger to connect with friends and family. She interacted with NSs of English very frequently due to her job as a translator. Tiana was familiar with Zoom and could type up to 39 words per minute.

Luna (NNS-8) joined the study from Brazil. She was a 35 year-old female who spoke Portuguese as her L1 and also spoke B2 level French and basic Spanish. She had an M.A. in Gender Studies from Brazil and worked as a consultant. She was enrolled in Intermediate 3 ESL level at the language program but had to continue the course online due to COVID-19. She lived in the U.S. for almost a year but did not work during her stay. She learned English to achieve her professional goals. She frequently used Instagram to document her travels but never used any other social media platforms. She used text-chat very frequently, video chat frequently, and

never used voice chat only. She used WhatsApp, Telegram, and phone text to connect with her family, friends, and work-related purposes. She used Portuguese with family but used English and French with friends and at work. She was familiar with Zoom and could type up to 39 words per minute.

Demi (NNS-9) was a 25 year-old female from Mexico who had been working as an au pair in the U.S. for two years. She joined the study from Chicago. Demi spoke Spanish as her L1 and knew B2 level Italian. She had a B.A. from Mexico and was taking the online ESL Grammar and Writing-2 course at the time of data collection. She studied English for more than ten years in school and was still learning English because "it is the lingua franca at the moment" (Online Language Learning_NonNative Speaker Questionnaire, June 14, 2021). Twitter and Instagram were the main social media platforms that Demi used very frequently, and she occasionally used Facebook. Demi used video chat frequently, and she used text and voice chats more frequently than video chat. She used Spanish with family and friends from home, and English to connect with friends in the U.S. She was always interacting with NSs of English due to her work as an au pair. Demi was familiar with Zoom and could type up to 49 words per minute.

Bella (NNS-10) was a 42 year-old practicing lawyer who joined the study from Brazil. She spoke Portuguese as L1 and knew Japanese and Spanish in addition to English. She was enrolled in upper-intermediate-2 ESL level at the language program and had lived in the U.S. for one year prior to the study. She had studied English for more than ten years in Brazil but was interested in learning more. To that end, she took private tutoring lessons to improve her English communication skills. Her social media use included occasional use of Facebook, Instagram, and LinkedIn. She used text and video chat very frequently to connect to family and friends and occasionally used voice chat. Apart from her private tutor, Bella interacted with NSs of English

some of the times due to her work as a lawyer. She could type up to 29 words per minute and was familiar with Zoom.

Features of NNS Language Experience. Responses to the background questionnaire were explored for variables regarding the NNSs' language experience that could potentially impinge upon their L2 performance. The following variables in relation to language experience were highlighted: (1) English language proficiency, (2) length of residence (LOR) in English speaking countries, and (3) frequency of L2 English use in naturalistic/non-instructional/informal settings.

English Language Proficiency. All NNS participants (N = 10) were either enrolled in online language classes or had recently completed a language course at the same language program in NYC. The language program employs a placement test that includes all four language skills and grammar. Students are then placed in the corresponding ESL class. The placement test results were deemed sufficient for the purposes of this study and no additional language tests were conducted. Three NNS participants were in lower intermediate, three NNS in upper intermediate, and four NNS participants were in advanced ESL level according to the placement test results at the language program. The English proficiency levels of the NNS participants are displayed in Table 6 below:

Table 6: NNS participants' proficiency levels at the language program.

Participant	Proficiency level
Sally (NNS-1)	Lower Intermediate
Jade (NNS-2)	Lower Intermediate
Skye (NNS-3)	Advanced
Zara (NNS-4)	Advanced
Hazel (NNS-5)	Advanced
Nabi (NNS-6)	Advanced

Tiana (NNS-7)	Lower Intermediate
Luna (NNS-8)	Upper Intermediate
Demi (NNS-9)	Upper Intermediate
Bella (NNS-10)	Upper Intermediate

Length of Residence (LOR) in English-Speaking Country. LOR is an important variable in studies of L2 development and a number of studies have demonstrated a clear relationship between LOR, age of onset, and L2 usage (Higby & Obler, 2017). The LOR for the NNS participants was based on the added number of years they reported to have lived or been living in the U.S. and years living in any other English-speaking country. The totals were converted into percentages, relative to each participant's age. All of the NNS participants (100%) reported to have lived in an English-speaking country at some point in their lives or were living in the U.S. at the time of data collection. The LORs ranged from 1.25% to 11.11% of their lives. Detailed information on LOR in English-speaking countries was considered relevant to the study in order to characterize the NNS participants under the assumption that language learning is essentially usage-based (Wulff & N. Ellis, 2018) and further to explore potential relationship between LOR and NNSs' L2 use in the study.

Usage-based language (UBL) learning in L2 adopts an approach grounded in the belief that language acquisition occurs through language use, facilitated by social skills and generalizations drawn from usage events in interaction. UBL underscores the significance of frequency, exposure, input, output, and feedback in language development, considering the cognitive, social, and pragmatic factors influencing language use. This framework delves into how learners cultivate interactional and constructional competence across various communication modes, including text, audio, or video (Bybee, 2008; Ellis & Wulff, 2015).

The relevance of UBL to the study becomes apparent as the investigation explores the impact of interactional feedback in different modes of online communication – specifically, text-

based and voice-based SCMC – on learners' production of the target language. By contributing empirical evidence and theoretical insights, the study enriches the field of usage-based language learning, shedding light on how diverse modes of communication influence language learning outcomes and processes in SCMC contexts. The percentage LOR for the ten NNS are shown below in Table 7:

Table 7: NNS participants percentage LOR.

Participant	Age	Years in the U.S.	% LOR
Sally (NNS-1)	24	0.3	**1.25**
Jade (NNS-2)	53	5	9.43
Skye (NNS-3)	27	3	**11.11**
Zara (NNS-4)	22	1	4.55
Hazel (NNS-5)	31	3	9.68
Nabi (NNS-6)	35	3	8.57
Tiana (NNS-7)	23	2	8.7
Luna (NNS-8)	35	1	2.86
Demi (NNS-9)	25	2	8.33
Bella (NNS-10)	42	1	2.38

Frequency of L2 English Use in Naturalistic/Non-instructional/Informal Settings. It was important to gather information about the NNS participants' experience with L2 English and the frequency of its use in naturalistic, informal, and non-instructional settings. This information was collected via the background questionnaire. For this general aspect of language experience, learner participants were asked about the frequency of L2 English use regarding the four language skills: speaking, listening, reading, and writing. Responses from each participant relative to the four skills were coded according to the coding scheme in Table 8 below:

Table 8: Coding scheme for NNS L2 English use in naturalistic settings.

Never	Almost never	Once a month	Several times a month	Once a week	Several times a week	Everyday
0	1	2	3	4	5	6

All of the four language skills were considered in tandem to represent L2 English use. Therefore, scores for each of the four skills were added for each NNS participant and the total sums were then converted into percentages, relative to the highest possible score combining all four skills (i.e., 24). Overall, more than half of NNS participants used English over 70% of the time. Considering that language learning is usage based (Wulff et al, 2018), frequency of L2 English use was considered relevant to characterize NNS participants.

In the next section, sociodemographic information about the NS participants is presented.

Native Speaker Participants. Ten native speaker (NS) interlocutors were recruited to form dyads with NNS participants. Since ESL and EFL teachers are potentially trained in providing corrective feedback to language learners, the NS interlocutors were screened to ensure that they do not have any prior formal or informal ESL or EFL teaching experience. Not knowing each other was a key condition for the participants, as it ensured that their responses or behaviors of one were not influenced or skewed by the other and that their privacy and confidentiality were respected (Creswell & Creswell, 2022; Trochim et al, 2014). A call for participants was issued through flyers, email, and in-person announcements. Twenty-eight interested people responded to the call, out of which ten qualified for the study.

The ten NS participants came from diverse professional and racial backgrounds. Six of the NS participants were monolingual speakers of English while four participants were familiar with a second language that included Spanish, Romanian, Swedish, and a West African creole language. Nine NS participants lived and worked in the State of New York and one participant lived in Pennsylvania. All the participants completed the ten weeks of data collection in the U.S.

Most participants held graduate degrees, such as an M.A. and/or professional certifications and engaged in various occupations, such as homemaking/caregiving, psychology,

photography, social work, content writing, performance arts, early childhood education, rehabilitation and counseling, and public service. The NS participants were between 23 and 70 years of age (M = 39.5, SD = 14.72) and included nine females and one male participant. All study participants were given pseudonyms. The NS participants' typing speed varied from 29 to 50 words per minute. Facebook and Instagram were the most frequently used social media platforms by the NS, while Snapchat was the least commonly used platform. Other apps that the NS participants used included WhatsApp, iMessage, and Facetime. None of the participants had any formal or informal language teaching experience or any close interactions with NNS of English.

Theme-based Interactional Task

The study used theme-based interactional tasks to collect a "*general* sample of learner language" (Ellis & Barkhuizen, 2009, p. 30) for a study on naturalistic online interaction. The tasks were designed to provide a context for the NS and NNS participants to use the target language, namely L2 English, in a purposeful manner focusing on meaning exchange and use of language for real-world, non-linguistic purposes (Tomlinson & Masuhara, 2021). Since the NS-NNS dyads were complete strangers to each other, the first week's theme was *Getting to Know You*.

There were five themes[1] in total and each theme comprised a list of topic domains for interaction. The themes, as shown in Figure 2 below, originated from the individual participating in the interaction and grew outward encompassing the individual's home, school life, the community, and so on. In other words, the themes begin from the participants' self, the *internal* (micro-level), leading out to the world around them, the *external* (macro-level). The rationale for

[1] Adapted from the Ecological Systems Theory developed by Urie Bronfenbrenner in 1979.

selecting themes in such an approach was to mitigate participants' language anxiety (Dewaele, 2023) and to support and promote their willingness to communicate. The topics for each theme were selected to reflect the flow from the tangible to the abstract.

Figure 2: Themes in theme-based interactional task

To gather naturalistic L2 production, the tasks were open-ended. The pilot study had shown that the introductory and the video discussion tasks generated discussion that was rich in breadth and depth and yielded meaningful and interactive language output. The purpose of the video discussion task was to stimulate the study participants to talk. The pilot study participants interacted beyond the time duration of the tasks which was interpreted as the result of the task being engaging and interesting to the study participants.

Theme-Based Video Discussion Task. Regarding the theme-based video discussions, there were nine short video clips ranging between two to three minutes each. Each video had a

list of 5 prompts in the shape of questions in order to stimulate and facilitate the discussions. The videos were chosen based on four-point criteria that included the following:

(1) Thematic: the video clips should be related to the weekly theme

(2) Silent: the video clips should not have any linguistic input/content

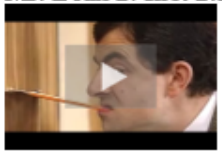
(3) Explicable: the video clips should present a main idea, and

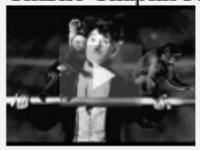
(4) Relatable: the video clips should be engaging and understandable to study participants

A thematic association between the video clips and the weekly topics was deemed important for ensuring the dyads stayed within similar topic domains. The video clips chosen for the study were from the target-culture and represented generally known characters. The video clips were excerpts from silent films, that is, there were no synchronized recorded sound, spoken dialogue(s), or subtitles. The study used silent video clips to prevent any language input from sources other than the native speaker interlocutor, such as dialogues or audio tracks. In silent films for entertainment, dialogue is mostly conveyed by the use of muted gestures and mime in conjunction with title cards, or, rarely, text-based indications of the plot and key dialogue lines.

The pilot study results showed that video clips from silent films generated extensive discussions. Explicability was the next criterion. It was deemed important for the participants to be able to recognize the *props* used in the clips and to be able to describe the scene(s) and actions. Lastly, relatability was a crucial aspect as it was important for the study participants to be able to understand the context and relate to the idea(s) presented in the video clips. Table 9 below lists the weekly themes, video clips, and prompts used in the study.

Table 9: Tasks by weekly themes, videos, and prompts.

Week	Theme	Video Clips	Facilitation questions
1	Intro		1) Introduce yourself to your partner: for example, your name, country, interests. 2) What do you like/dislike about your city? 3) How do you usually spend your weekdays and/or weekends? 4) Do you look forward to the weekends? Why? Why not? ... Really, anything you'd like to talk about!
2	Interests; Hobbies	Mr. Bean 1: first 3 min. 	1) Would you like to describe what happened in the clip? 2) What do you think will happen in the end? Why do you think so? 3) Do people usually go to libraries in your country/culture? 4) Do you watch (funny) clips on YouTube? What types of movies do you watch? ... Anything you'd like to talk about!
3	Home; Family	Charlie Chaplin 1: full clip. 	1) Would you like to describe what happened in the clip? 2) Share your impressions about the clip. 3) Have you ever been in a similar situation? 4) What is your dream home like? Where would it be? Please elaborate. ... Anything you'd like to talk about!
4	Home; Daily Chores	Mr. Bean 2: first 2:35 min. 	1) What do you think might happen next? 2) What could Mr. Bean have done differently? 3) Do you have 'Spring cleaning' in your culture? 4) Have you ever been in a similar situation? Elaborate. ... Anything you'd like to talk about!
5	Social Life; Sports	Charlie Chaplin 2: first 1:55 min.	1) Describe your feelings after watching the clip. 2) Was the clip funny or scary to you? Why? 3) What kind of outdoor activities do you like/do? 4) Have you played / Do you play a sport?

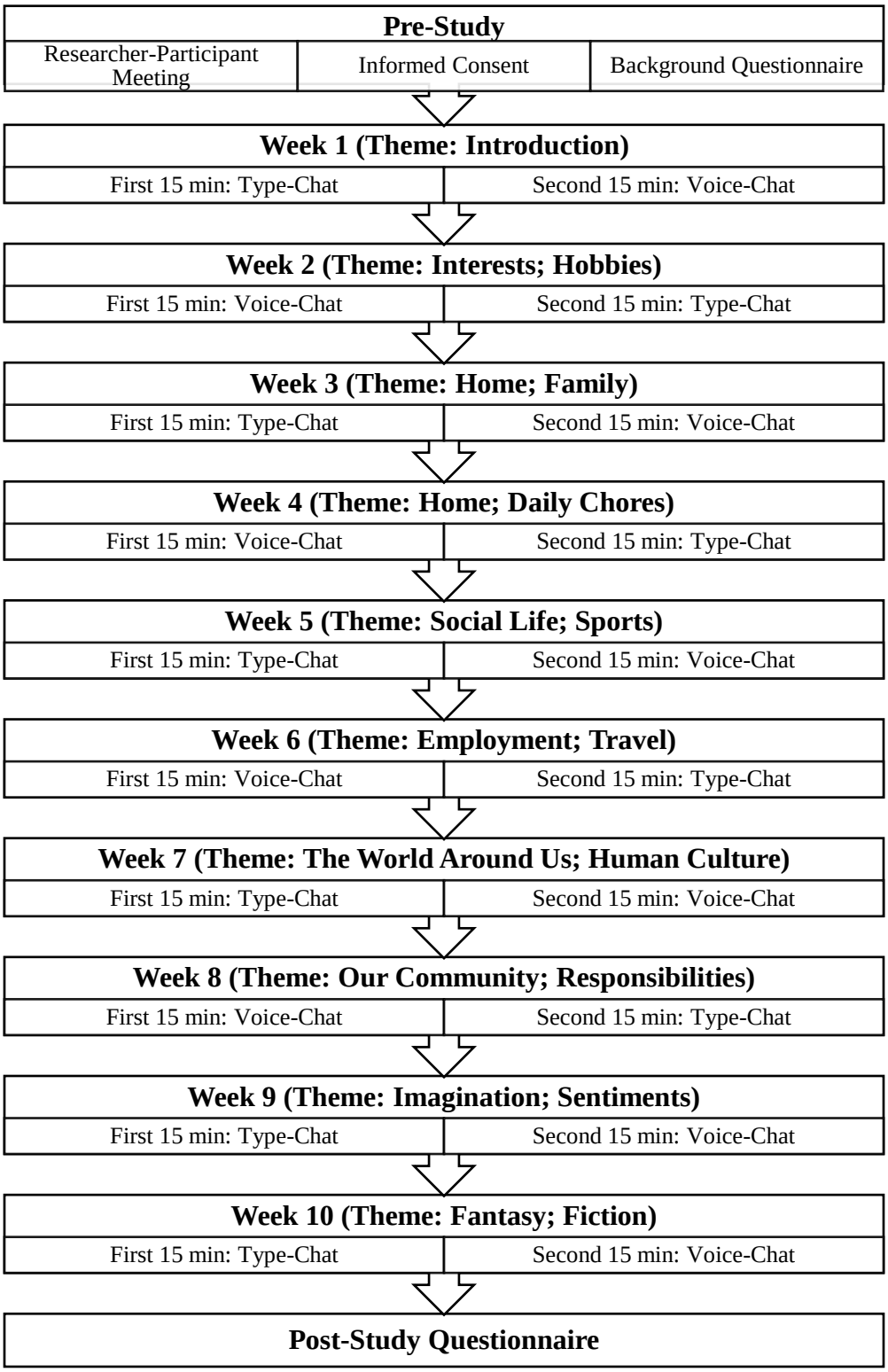
			... Anything you'd like to talk about!
6	Employment; Travel	Mr. Bean 3: first 1:44 min. 	1) What do you think about the clip? 2) How does the clip make you feel? 3) What do you think happened at the end? What makes you think so? 4) Have you ever travelled with children on board your flight? How was the experience? ... Anything you'd like to talk about!
7	The World Around Us; Human Culture	Charlie Chaplin 3: first 1:30 min. 	1) What do you think happened at the end? What makes you think so? 2) Have you ever attended a circus show? Where did you go? How was the experience? 3) Are circus shows common in your culture/country? What kind of circus shows do you have in your country/region? ... Really, talk about anything you'd like!
8	Our Community; Responsibilities	Mr. Bean 4: first 2:10 min. 	1) How do you relate to this clip, if at all? 2) What is your morning routine like? What helps you wake up in the morning? 3) How often do you exercise? 4) Do people in your culture/country exercise regularly? ... Really, anything you'd like to talk about!
9	Imagination; Sentiments	Charlie Chaplin 4: 2:35 min. 	1) What do you think happened at the end? What makes you think so? 2) Does the clip signify anything to you? Please elaborate. 3) Have you ever experienced a dangerous situation? 4) ... Really, anything you'd like to talk about!
10	Fantasy; Fiction	Charlie Chaplin 5: first 2 min. 	1) Does this clip signify anything to you? 2) Would you like to share what you felt after watching the clip? 3) Is the main actor a 'good' parent? Why/Why not? 4) What do you think happened at the end? What makes you think so? ... Really, talk about anything you'd like!

Post-Study Questionnaire. Each participant also completed an exit questionnaire adapted from Sachs and Suh (2007) after the last online interaction in week 10. Altogether, there were 17 questions to answer in both native (Appendix E) and nonnative speaker (Appendix F) post-study questionnaires. The questions focused on whether the participants figured out the main purpose of the study; whether they have learnt something specific during the study; whether they have realized the goals of the interaction with their dyads; their favorite mode of communication vis-à-vis type-based and voice-based interaction; and their favorite video clip(s) and topic(s).

In the NS post-study questionnaire, the participants were asked if they noticed any language errors in their chat partner's speech and/or writing; if yes, how often did they try to correct their partner's language errors, and did their partner react to any corrections that were offered on his/her language errors? Lastly, the NS participants were asked if there were any specific things that they realized or learned during the sessions. Similarly, for the NNS post-study questionnaire, the participants were asked if, during their online discussions with their chat partner, they made any language errors; what their NS partner's reaction to their language errors was; whether their partner tried to 'correct' their language errors, and how often they did so; finally, if there were any specific things that the NNS realized or learned during the session.

The last question asked the participants to share any tips/suggestions for other English language learners or NSs on how to interact with NSs of English online, based on their experience in the study. Figure 3 below presents the overview of the present study.

Figure 3: Present study overview



As shown in Figure 3 all dyads started their interaction with type-chat in the first session. The interactional modes then alternated between voice and type-chat up to the 9th session. In the 10th session, all dyads started with type-chat and ended the session with voice-chat. The participants completed the post-study questionnaire within two days of their last session.

Coding and Data Analysis

This section presents coding and analysis for data obtained from the ten online interaction sessions. The interactional data were analyzed in response to research question one, regarding the effectiveness of NS interactional feedback in naturalistic voice-based SCMC, type-chat and voice-chat. In response to research question two, the interactional data were coded and analyzed for the most common linguistic error produced by the NNS participants that received the greatest amount of NS feedback. NNS interactional data were then analyzed to determine any change that occurred in NNS L2 use of the most common error. The following subsection describes coding and analyses of the data in order to answer the research question one concerning the effectiveness of NS interactional feedback in naturalistic text-based and voice-based SCMC.

Research Question 1 asked about the impact of NS feedback on NNS's language development in online text-based and voice-based interaction. The logs for type-chat were recorded on Zoom and downloaded on a local folder on the researcher's personal computer. Similarly, the voice-chats were audio recorded on Zoom. As a preliminary step to transcription, the researchers downloaded the Zoom-generated 'raw' transcriptions and converted them to Word files. This helped in saving time and using the timestamps for data analysis. A total of 100 Word files were prepared and a pseudonym was given to each participant. The recordings and the transcriptions were saved in a password-protected folder marked with dyad numbers. The

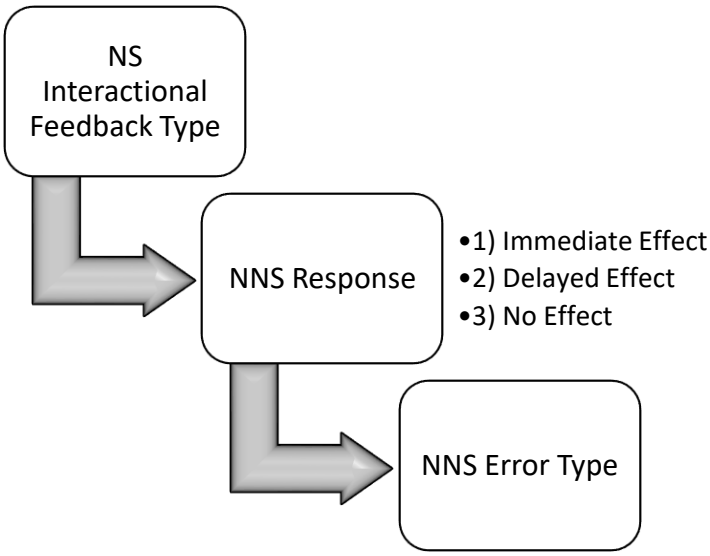
first step toward analyzing the data was to transcribe and cross-check the auto-generated transcription of the audio recordings, and to check the chat logs for personal identification information. The voice-chat recordings were transcribed in three rounds. First, the automated transcriptions were prepared for the researcher to manually transcribe and cross-check with the audio recordings. Then, the researcher listened to all audio-recordings and completed an elaborate transcription of the voice data. A second transcriber, a fellow doctoral student in SLA, then cross-checked all the recordings with the researcher's transcriptions for any mistakes. The second transcriber pointed out 48 mistakes that included 13 mistranscribed words, eleven typos such as '**swiming*' for 'swimming'; 18 missing words; six repetitive lines. The third round of transcription involved fixing the mistakes pointed out by the second transcriber and revising each dataset before coding. Table 10 below presents a sample comparison of Zoom generated transcription versus the elaborate transcription completed by the researcher.

Table 10: Sample Zoom transcription versus manual transcription.

Zoom generated transcription **NS** = Native Speaker / **NNS** = Nonnative Speaker	***Manual transcription*** **Olivia** = Native Speaker / **Sally** = Nonnative Speaker
NS: Yeah yeah. It's crazy, you know, the, you know, I want point in time Africans were also put in cages, as though we were animals, you know, and looked at and **NNS:** And before I yeah I just go to the to understand the performance and jazz, but before that I every year as a child, I really want to speak and was after that I have. I don't have to say that again. **NS:** Yeah, it's not a it's not a good thing. and nobody should be put on display. **NNS:** Yeah, every four to see some. Magician to bring some magic. **NS:** Huh, yeah you know something really entertaining. Something that will make me say, wow. That's cool. How do you do that, you see how did you do that because I can't do that. And I'm a human being. So how did you do that. That's what captures my attention. You're right. Oh my goodness. **NS:** I just say say that handle. What magic performance test. The test on TV. Yeah, to attend our. Attendance as candle. Magic apartments in the Area Leona. **NS:** No, I don't get on because I have three small children come **NS:** You can you can want in the problem is together. **NS:** Yeah, well, we all like, watch it on TV or something but Yeah, because we just don't have time or money ever **NS:** Again, Man is an interview. **NS:** Yeah.	**Olivia:** Yeah, yeah. It's, it's crazy. Do you know? One point in time, Africans were also put in cages, as though we were animals, you know, and looked at, and **Sally:** And before I, yeah, I just go to the zoos and see the performance just once but before that I, I, yeah, as a child, I really wanted to see animals, but after that I have, I don't want to see that again. **Olivia:** Yeah, it's not a, it's not a good thing. And nobody should be put on display. **Sally:** Yeah, actually if want to see some uh ma- magician doing, some magics. **Olivia:** Hm yeah, you know, something really entertaining. Something that will make me say, wow. That's cool. How do you do that? Can you show me? how did you do that? because I can't do that. And I'm a human being. So how did you do that? That's what captures my attention. You're right. Oh my goodness. **Sally:** I just see, see, that kind of m- ma- magic performance just in t- just on TV. **Olivia:** Hmhm. **Sally:** Do you, do you attend, attend, such kind of magic performance? Uh, in real life? **Olivia:** Uh no, I don't, Sally, because I, I have three small children um {laugh} **Sally:** So you can, you can watch the performance together? **Olivia:** Yeah, well, we like, watch it on TV or something but **Sally:** Watch on TV. **Olivia:** Cuz we, we just, we just don't have time or money ever {laugh} **Sally:** So, maybe it's really expensive. **Olivia:** Yeah {laugh} Yeah.

The interaction data were analyzed in terms of (1) NS feedback type and (2) NNS-response or lack of a response. At this stage, it was important to determine the NNS error that triggered NS feedback. Thus, the third step was to code for the type of NNS language error. Figure 4 illustrates the coding steps that were followed by the various coding categories described in the ensuing sections.

Figure 4: Coding scheme for NS interactional feedback



During the first step of data coding, all instances of NS interactional feedback were manually identified, and listed exactly as they were expressed by the participants. The following section presents examples of NS interactional feedback types in the data.

NS interactional feedback types. To code the feedback types, the study utilized the model of interactional feedback proposed in Nassaji (2015), which groups feedback types into two main categories: reformulations and elicitations. Reformulations are further divided into recasts and direct correction, whereas, elicitations are further subdivided into clarification

requests, repetition, direct elicitation, and metalinguistic cues, nonverbal cues. Recasts, under reformulations, were further divided into eight subtypes: declarative, interrogative, isolated, embedded, incorporated, partial, full, and communicative. Clarification requests, under the umbrella term of elicitations, were further divided into general and specific clarification requests. Metalinguistic cues, according to Nassaji (2009), could be in the form of a comment or a question. A discussion of each of the feedback types and subtypes is presented in Chapter 2. For recasts, the subtypes also occurred in combination, for instance, a NS recast was *partial* and *interrogative* at the same time. The coding scheme for NS feedback types is summarized in Table 11 below.

Table 11: Coding scheme for NS feedback types.

Types of feedback	***Sub-types***	
Reformulations	1. Recast	a) Isolated b) Embedded c) Incorporated d) Full e) Partial f) Declarative g) Interrogative h) Communicative
	2. Direct correction	
Elicitations	1. Clarification request 2. Repetition 3. Direct elicitation 4. Metalinguistic cues	

The following are examples of NS interactional feedback as coded in the data (the feedback instances are underlined).

Input-providing embedded recast was coded as follows:

Line	Sally (NNS); **Olivia (NS)**		**Type of feedback**
23	*Sally*	*So you are, you are *PhD student or uhh*	
24	***Olivia***	*Masters, masters*	
25	*Sally*	*Masters*	
26	***Olivia***	*Yes, I'm, I'm a master's level, my, my husband attended Columbia for, for history, he's <u>a PhD</u>.*	**Embedded recast**

In the above episode that took place in Week 1 voice-based chat by Dyad 1, Olivia (the NS) responded to Sally's (the NNS) question and provided two instances of embedded recast '*a master's*' and *'a PhD*' both using the indefinite article *a* (Line 26). Sally incorporates Olivia's embedded recast in her utterance 'a PhD' (line 27).

Declarative recast was identified in the data as follows:

Line	Skye (NNS); **Ivy (NS)**		**Type of feedback**
94	*Skye:*	*in Brazil, kids, i mean, in my kids, from my age, they are like obsess-ed, we love it but they are not like very uh educated educa- uh they not like teach very much, {giggles} yeah, so my mom*	
95	***Ivy:***	*<u>educational</u>*	**Declarative recast**
96	*Skye:*	*yeah, so my mom, she was like, okay you can watch like one episode but not like {laughs}*	

The above was coded during voice-based chat by Dyad 2 in Week 4. Ivy (the NS) provides a declarative recast (Line 95) in response to Skye's (the NNS) utterance in Line 94.

Another type of reformulation, interrogative recast, was coded as follows:

Line	Jade (NNS); **Hana (NS)**		**Type of feedback**
228	*Jade:*	*yeah so i was a very i was in a very hurry to {laughs} yeah so mhm*	
229	***Hana:***	*you're <u>hurried</u>?*	**Reformulation**
230	*Jade:*	*hurried just uh roading? Roading the downloading download*	
213	***Hana:***	*Yes*	

The above was coded in voice-based chat by Dyad 2 in Week 4. Hana (the NS) provides an interrogative recast (Line 229) in response to Jade's (the NNS) utterance in Line 228.

Given the nature of naturalistic interactions, there were multiple examples of NS interactional feedback type in one episode. The following is an example of multiple feedback types around one episode. The types of feedback coded in this episode are both input-providing (specific clarification request) and output-prompting (full recast).

Line	**Julie (NS);** Luna (NNS)		**Type of feedback**
62	*Luna*	*and did you did you see some lion in the zoo where in some zoo?*	
63	***Julie***	*have I seen what?*	**Specific Clarification Request**
64	*Luna*	*what?*	
65	***Julie***	*have I seen lions at the zoo in real life?*	**Full recast**
66	*Luna*	*yeah*	
67	***Julie***	*yeah like as a kid I don't really I don't remember ever been overwhelmingly impressed with the zoo though I don't know*	
68	Luna	yeah	

In the above example from Dyad 8, coded in Week 9 during voice-based chat, Julie (the NS) requests Luna (the NNS) with a specific clarification (Line 63). After Luna's response in Line 64, Julie incorporates the information in Line 65 and provides a full recast.

Coding for NNS uptake. Uptake was operationalized as any indication of 'repair' manifested in NNS modified output. Repair, in the study, referred to the 1) repetition or correct reformulation of NS feedback in a single NNS turn, 2) sequence of turns resulting in the correct reformulation, or 3) recognizing the information received in the NS interactional feedback (Lyster & Ranta, 1997; Smith, 2005). Clearly, uptake of feedback should not be interpreted as constituting learning or development (as noted by Mackey & Philp, 1998), but uptake may be

related to learners' perceptions about feedback at the time of the feedback. Recognition or acknowledgement of the feedback can be expressed using a variety of linguistic tokens (e.g., *Okay, I see, I got it, yeah?, hmm*). In the study, uptake is defined as the NNS's correction of their initial utterance based on the NS' feedback in the online communication. The NNS's use of feedback as either *immediate* or *delayed*. Immediate use meant that the NNS applied the feedback in the next turn, while delayed use meant that the NNS applied the feedback later in the same session, either in the same mode (text or voice) or in a different mode.

The following is an example of immediate uptake in the same mode in Dyad 6, Week 10 voice-based interaction session (the instances of uptake are underlined).

Line	**Nabi (NNS)**; Alex (NS)		**Type of feedback**
20	***Nabi***	*Yeah {laughs} yeah, so I was asking you, if you guys went to the uh attend any uh fourth of July event yesterday. I saw a lot of people come into different places to see* ****a fireworks*** *in uh Williamsburg here in Manhattan*	
21	*Alex*	*I didn't-*	
22	***Nabi***	*And so many events w-*	
23	*Alex*	*Saturday, I went somewhere but yesterday, no, I stayed home and with* ***the fireworks*** *my neighbors kept personal um firing a lot of fireworks*	Embedded recast
24	***Nabi***	*Yeah*	**Immediate uptake**
25	*Alex*	*So it was close to me, I didn't have to go anywhere to see* ***the fireworks***	Embedded recast
26	***Nabi***	*Yeah, I know, I know so many places, they doing that yeah like so many places even after <u>the firework</u> has done, you know, the official one, so many neighborhoods you know I see still going on {laughs}*	**Immediate uptake**

Alex (the NS) provides two instances of input-providing interactional feedback in the form of embedded recasts (Lines 23 and 25). Nabi's (the NNS) first response is 'yeah' in Line 24. This was coded as immediate uptake. Nabi's second response in Line 26 was the correct use of NS feedback 'the firework' in Line 26. This was also coded as immediate uptake.

As for delayed uptake across interactional modes in the same session, the following is an example of coding from type-based chat of Dyad 1 in Week 5. Sally (the NNS) in Line 29 correctly uses the interactional feedback provided by Olivia (the NS) in the form of an embedded recast in Line 21. This was an instance of delayed uptake because the NNS response comes after eight turns of the NS feedback.

Line	**Sally (NNS)**; Olivia (NS)		**Type of Feedback**
20	***Sally***	*Do you have a *kneepad?*	
21	*Olivia*	***I *hv knee braces.***	**Embedded recast**
22	*Olivia*	*You mean pads for going skating?*	
23	***Sally***	*No*	
24	*Olivia*	*If so no. but knee braces I do have*	**Second embedded recast**
25	***Sally***	*I mean pad protect your knee*	**Error persists**
26	*Olivia*	*Ok*	
27	***Sally***	*Like a small piece of clothes*	
28	*Olivia*	*To tie around the knee? yes*	**Specific clarification request**
29	***Sally***	*Yeah, knee brace,you have.*	**Delayed uptake**
30	*Olivia*	*Yes.*	
31	*Olivia*	*I don't wear it often though.*	Topic continuation

No uptake was coded in instances where the NNS, 1) did not respond to the NS interactional feedback, or 2) provide any recognition of the NS feedback. The following is an example of 'no uptake' as it was coded in voice-based chat of Dyad 4 in Week 9. Betsy (the NS) provides a declarative recast (Line 134) of Zara's (the NNS) non-targetlike utterance of 'asset' in Line 133. However, Zara continues with the topic and does not provide any recognition of the feedback or any reformulated use of the feedback in Line 135. Betsy's declarative recast is underlined in Line 134.

Line	Betsy (NS); **Zara (NNS)**		**Type of feedback**
132	*Betsy*	*{laughs} Well, the reason why I signed up for the Rum Bucket League is coz it's just a fun league, it's not serious*	

133	***Zara***	*That's uh and also it's, it's like a very nice, like social event, I feel like it, and also you gotta drink a lot of rum, you know also an *↘asit*	
134	*Betsy*	*It's <u>an asset</u>*	**Declarative Recast**
135	***Zara***	*I wish we had we would have something like that here, but I don't think we do*	**No uptake + topic continuation**

Research Question 2 investigated the most frequent linguistic error that NNS produced, and that NS gave interactional feedback on in online text-based and voice-based chats. In order to answer research question 2, all of the NNS non-targetlike utterances that received any type of NS interactional feedback (as discussed in the previous section) needed to be coded. The utterances with errors were identified in order to answer research question 1 above, the same instances were then reanalyzed but this time with a focus on the NNS participants' non-targetlike utterances that triggered NS interactional feedback. We identified and coded different kinds of errors in the data. The table below, Table 12, shows how we classified the errors made by NNS that led to NS giving them feedback during the interaction.

Table 12: NNS Nontarget-like Error Types in the Data

1. Adverb errors	2. Article errors
3. Agreement error	4. Collocation errors
5. *Do*-support errors	6. Morpheme errors
7. Pronoun errors	8. Pronunciation errors
9. Tense errors	10. Semantic errors
11. Singular/Plural errors	12. Syntax errors
13. Verb tense errors	14. Word formation errors
15. Idiom errors	16. Preposition errors

Fourteen error types were identified and coded in the data in both type-chat and video-chat environments. Spelling errors were classified as typographical errors, however, abbreviations and acronyms that are commonly accepted as part of the chat and instant

messaging/synchronous genres, such as “LOL” “lol” (laughing out loud) or BTW (By The Way), were not counted as typographical errors. The following are examples of each of the fourteen error types in the data (the error is underlined, and error type is coded in the adjacent column):

1) Example of an Adverb error

Line	**Sally (NNS)**; Olivia (NS)		Type of NNS error
82	***Sally***	*Sometimes I listen to music, I like *<u>classic</u> music*	**Adverb error**
83	*Olivia*	*I like classical, I like you know peaceful*	
84		*meditative music, yeah*	
85	***Sally***	*Yeah.*	

In the above example, Sally’s use of ‘classic’ in Line 82 is coded as an adverb error. Moreover, Olivia (the NS) provides Sally with interactional feedback in the form of an embedded recast using the correct word ‘*classical*’ in Line 83.

The following is an example of underuse of indefinite article *a* (Line 72) by the NNS in Dyad 7, Tiana, in voice-based interaction mode in Week 6. The missing indefinite article is coded as a morphological error. It should be pointed out that in Line 72, two more errors can be detected vis-à-vis a missing *do*-operator ‘does’ in *she *not have* and a missing plural-*s* marker in **friend.* However, these errors are not coded or analyzed because the NS only provided feedback (isolated recast) to the non-targetlike use of **cat* (the error is underlined).

2) Example of an Article error

Line	**Tiana (NNS)**; Hudson (NS)		Type of NNS error
72	***Tiana***	*No tsk she *not have many friend in the building, her*	**Article error**
73		*best friend is *<u>cat</u> {laughs} so*	
74	*Hudson*	*A c↗at!*	
75	***Tiana***	*Yes {giggles} a cat*	

Idiom errors or unnatural usage concerns the expressions that may be grammatical but may not be accepted in the target language, as idiomatic expressions should be used instead. The following is an example of an idiomatic error in Week 7 by Luna, the NNS in Dyad 8. In this voice-based mode of interaction, Luna used a non-targetlike idiomatic expression ‘a bird person’ (Line 178) to mean ‘a morning person’. The NS, Julie, provides interrogative recast (Line 179) to clarify her understanding of Luna’s non-targetlike utterance (the error is underlined).

3) Example of an Idiom error

Line	**Luna (NNS)**; Julie (NS)		Type of NNS error
177 178	***Luna***	*Because I, I am a, how you say in English, i'm a bird uh bird, *<u>bird person</u>*	**Idiom error**
179	*Julie*	*Um you’re a, a morning person?*	
180 181	***Luna***	*Y- yeah, yeah, it’s bird, *bird persons, I prefer the mornings *then the night.*	

Next is a word formation error (the error is underlined) as presented below. The example is from Dyad 2, Week 2, voice-based session. In her non-targetlike utterance in Line 8, Jade (the NNS) struggles to form the word ‘despicable’ and misformulates it as ‘disposible’.

4) Example of Word Formation error

Line	**Jade (NNS)**; Hana (NS)		Type of NNS error
8 9 10	***Jade***	*She's, do you know the character of this *<u>disposable *dis- dis- disposible</u> me, what is, I I cannot even*	**Word formation error**
11	*Hana*	*Oh Despicable Me?*	
112	***Jade***	*Despicable Me, the small yellow guys yeah {laughs}*	

For an example of a syntax error in the data, the following was coded as such. Sally, the NNS participant of Dyad, uses a non-targetlike phrase ‘top of the building’ (Line 57) to mean for ‘roof’ during a voice-based chat in Week 4. Olivia (the NS) provides an interrogative recast to

verify her understanding of the non-targetlike utterance (Line 58). Then in Line 60, Olivia provides a direct correction to Sally using the word used in the target language. The NNS error is underlined in the example below.

5) Example of Syntax error

Line	***Sally (NNS)****; Olivia (NS)*		Type of NNS error
55 56 57	***Sally***	*And we can, our building also in the top of our building, we can go, we can go there and put out things on *<u>top of the building</u>*	**Syntax error**
58	Olivia	On the top, on the roof?	
59	***Sally***	*Yeah, yeah*	
60	Olivia	The top of the building is called the roof	

Another error type that was identified in the data is pronunciation errors. This type of error was coded in the voice-based interaction data accounting for any errors in the use of English pronunciation. In the following example from Dyad 2, Week 1, voice-based chat, Jade (the NNS) mispronounced the word 'live' (Line 42) by inserting a long vowel [i:] but Hana (the NS) provides an embedded recast pronouncing the word *live* correctly in Line 44. Jade's error is underlined in Line 42.

6) Example of Pronunciation error

Line	**Jade (NNS)**; Hana (NS)		Type of NNS error
42 43	***Jade***	*Mhm so you don't have any chance to <u>leave</u>* [liːv] *in other country?*	**Pronunciation errors *(leave vs. live)***
44	Hana	Um did we live [lɪv] in another country?	
45	***Jade***	*Mhm*	
46 47 48	Hana	no there was one point that my um when i was pregnant with my first child that my partner was offered a job in Dubai	

Collocation error was another type of NNS error identified in the data. A collocation error is a type of error that occurs when a learner uses a word or phrase that is not natural or idiomatic in English. In the exchange between Sally and Olivia in the following example, Sally makes a collocation error (Line 20) when she says, "Do you have a **kneepad*?", inquiring about a protective gear for the knees. The correct collocation in this context would be "knee braces," as indicated in Olivia's response in Line 21, which is also a different type of device that supports the knee. Sally eventually understands what Olivia means and repeats the correct word “knee brace” in Line 29.

7) Example of Collocation error

Line	Sally (NNS); Olivia (NS)	Type of NNS error
20	***Sally*** *Do you have a *<u>kneepad</u>?*	**Collocation *kneepad**
21	Olivia I hv knee braces.	
22	Olivia you mean pads for going skating?	
23	***Sally*** *no*	
24	Olivia if so no. but knee braces I do have	
25	***Sally*** *i mean pad protect your knee*	
26	Olivia ok	
27	***Sally*** *like a small piece of clothes*	
28	Olivia to tie around the knee? yes	
29	***Sally*** *yeah, knee brace,you have.*	
30	Olivia yes.	

Errors of singular and plural nouns were also identified in the data. In the exchange presented below between Sally and Olivia, Sally makes an error when she says “**man* in tights” in Line 1 instead of “men in tights”. This is a common noun that has an irregular plural form that changes the vowel sound. Olivia, the NS partner, corrects Sally by using the correct plural form “men in tights” in Line 2.

8) Example of Singular/Plural error

Line	**Sally (NNS)**; Olivia (NS)		Type of NNS error
1	**Sally**	**<u>man</u> in tights?*	**Singular error**
2	Olivia	Men in tights	
3	Olivia	i will try to send you the link when we are done.	

Pronoun errors were also identified in the data. For example, the pronoun error in the exchange below is that Sally uses the pronoun **we* in Line 54 instead of "they" when referring to her parents. The pronoun "they" is used to refer to two or more people who are not the speaker. Sally may have confused the pronouns 'we' and 'they' because they both have the same plural form but have different meanings depending on the context. Olivia may have also misunderstood Sally's meaning because of the pronoun error.

9) Example of Pronoun error

Line	**Sally (NNS)**; Olivia (NS)		Type of NNS error
52 53 54	***Sally***	*Yeah, really tired but uh but I think, I have a brother, and we, and my parents had two children, but I think *<u>we</u> are tired but *<u>we</u> are happy with us.*	**Pronoun error: *they* required**
55	Olivia	With one? Yeah, did you say happy with one?	
56	**Sally**	*Happy with us, with, with two children*	

Do-support errors were also identified in the data. A *do*-support error is a type of error that occurs when a learner does not use the auxiliary verb "do" in a question or a negative sentence. The auxiliary verb "do" is used to form questions and negatives in English when there is no other auxiliary verb present. In the exchange between Sally and Olivia below, Sally (NNS) makes a *do*-support error when she says "**are* you usually get angry or get upset sometime?" in Line 112 instead of "do you usually get angry or get upset sometimes?". This is a question that requires the auxiliary verb "do" before the subject "you" and the main verb "get". Sally may

have confused the use of "do" with the use of "be", which is another auxiliary verb that can form questions and negatives, but only with certain types of verbs. For example, "*Are you angry?*" versus the incorrect form "**Do you angry?*".

10) Example of *Do*-support error

Line	**Sally (NNS)**; Olivia (NS)		Type of NNS error
112	***Sally***	**<u>are</u> you usually get angry or get upset sometime?*	***Do*-support error [*do* you]**
113	Olivia	Say the last part again	
114	***Sally***	*So you have done it, done this housework*	
115	Olivia	Oh, so	
116 117 118	***Sally***	*So many, so many years, so sometimes, are you sometime, you will also be very upset or angry I think, how can you get through this bad feeling?*	
119 120 121 122 123	Olivia	Oh yeah, you know, how can I put this so like my husband is very, I don't know, different in some ways because you know, when we met, he was in school and I was working, and, you know, so he got a stipend from Columbia	

The bound morpheme errors are another type of error found in the data. In the exchange below Zara (NNS) uses the wrong form of the suffix "-ing" to modify the verb "fuse". A suffix is a type of bound morpheme that is attached to the end of a word to change its meaning, tense, or part of speech. In the exchange between Zara and Betsy (NS), Zara wants to express the idea that reality and dreams are not separate, but rather they are mixed or combined. She tries to use the verb "fused" but instead of the past tense marker "-ed", Zara uses the suffix "-ing" to form a present participle verb. The correct form of the verb in this context is "fused", which is supplied by Betsy as a response in Line 74.

11) Example of Morpheme error

Line	**Zara (NNS);** Betsy (NS)		Type of NNS error
67 68 69 70 71	***Zara***	*yeah but when you're like like when you're kind of still like sleeping like like you're half-awake half sleeping in your your I feel like sometimes you just like like reality and dreams are just like *fuse *fuse *fusing* {laughs}	**Bound morpheme error [fus*ed*]**
72	Betsy	yes	
73	***Zara***	{laughs} *I don't know if you can say it or uh fuse?*	
74	Betsy	They fused together	
75 76	***Zara***	*yeah exactly they fused together so* {laughs} *that happens sometime*	

There were semantic errors in the data, for example, the semantic error in the exchange below between Tiana (NNS) and Hudson (NS) occurs in lines 107 to 110, where Tiana says, "make people laugh with with the physical joke yeah most of them like hit with the uh tsk I don't know how to say hit the plastic." There is redundancy in the phrase, but the more significant semantic error lies in the latter part of the sentence. Tiana seems to struggle to express the idea clearly, leading to confusion. She says, "most of them like hit with the uh tsk I don't know how to say hit the plastic," which lacks precision and coherence. The use of "tsk" and the phrase "I don't know how to say hit the plastic" makes the statement unclear and challenging to understand, indicating a semantic error in conveying the intended message.

12) Example of Semantic error

Line	***Tiana (NNS);*** Hudson (NS)		Type of NNS error
107 108 109 110	***Tiana***	*mhm and and make people laugh with with the physical joke yeah most of them like hit with the uh tsk I don't know how to say hit the plastic*	**Semantic error (Unclear meaning)**
111	Hudson	say again, please?	

There were also agreement errors in the data. The subject-verb agreement error in the exchange below occurs in line 49 to 50, where Sally says, "so you have one, you have a large family so you *_be_* happy." The correction for this error is "are happy". The verb be error in the exchange below is that Sally uses the wrong form of the verb “be” to refer to the present tense. The verb “be” is an irregular verb that has different forms depending on the subject and the tense. In the present tense, the verb “be” has three forms: “am”, “is”, and “are”. The form “am” is used with the subject “I”, the form “is” is used with singular subjects (such as “he”, “she”, “it”), and the form “are” is used with plural subjects (such as “you”, “we”, “they”). In this case, the subject "you" requires the verb "are" instead of "be" to form a grammatically correct sentence. The correct sentence would be, "you have a large family so you are happy."

13) Example of Agreement error

Line	**Sally (NNS);** Olivia (NS)		Type of NNS error
49 50	***Sally***	*Yeah, so you have one, you have a large family so you *be happy*	**Verb *be* error [*are* happy]**
51	Olivia	Yeah, yeah, say that again, oh happy but tired	
52	***Sally***	*Yeah, really tired*	

Preposition errors were also identified in the data. In the example below, the preposition “to” is needed to show the relationship between the verb “go” and the noun “bed”. Without the preposition, the sentence is incomplete and ungrammatical.

14) Example of Preposition error

Line	**Skye (NNS);** Ivy (NS)		**Type of NNS error**
63	Skye	*what time they go *bed?*	Preposition [*to*]
64	Ivy	they usually are in bed by it {giggles} we're all in bed by 10.	

Lastly, there were verb tense errors produced by NNS participants. The exchange below contains an incorrect verb tense in line 7. Sally, the NNS, uses the simple present tense ‘get’

instead of the past tense ‘got’ to describe an action that happened in the past. Olivia, the NNS interlocutor, does not understand what Sally means and asks for clarification. “I **got** up a bit earlier” would make the sentence clear and consistent with the past tense form of the verb ‘to get’.

15) Verb Tense error

Line	**Sally (NNS)**; Olivia (NS)	Type of NNS error
7	*Sally Uh today I get up a bit earlier*	**Verb tense [*get*]**
8	Olivia You have a what?	

Finally, it should be noted that where a NNS turn that contained more than one type of error or multiple errors of the same type, only the error that received NS interactional feedback was coded and analyzed.

According to Krippendorff (1980), “[i]f research results are to be valid, the data on which they are based, the individuals involved in their analysis, and the processes that yield the results all must be reliable” (p. 129). The initial phase of data analysis for research question 2 involved a bottom-up coding approach performed by the researcher primary coder, who also served as the first coder. Prior to this coding process, the data underwent preparation for the current analytical phase, during which digital copies of data points featuring non-native speaker errors and corresponding native speaker (NS) feedback were created. The first coder systematically examined the first copy to discern and formulate initial codes for NNS errors that prompted NS feedback. Employing an iterative framework for data coding and analysis (Huberman & Saldaña, 2020), the second copy of the data was revisited and coded after a lapse of three days. To ensure the reliability of intra-rater coding, the researcher engaged in repeated coding sessions, scrutinizing and comparing the initial codes for consistency and accuracy. This process continued until the researcher achieved a satisfactory level of consistency in the coded data.

Following that, the second coder, a then doctoral candidate in Applied Linguistics with specialization in Second Language Acquisition and a senior member of the doctoral seminar in SLA, independently read and coded all of the data points that contained a NNS error triggering NS interactional feedback. This included type-based and voice-based interactions. Similar to the researcher, the second coder is an ESL instructor, and he is also a native speaker of English. The second coder has over 15 years of experience reading and assessing ESL and EFL students' oral and written productions in US colleges and abroad. For norming, the second coder was instructed to identify and code the non-native speaker (NNS) errors that received linguistic feedback from the native speaker (NS) interlocutor. Working remotely and on their own, the second coder completed the coding task in ten days.

Inter-coder reliability. Inter-coder reliability for both readers for this cross-sectional data was calculated at 98.3%. Any conflicts or disagreements that occurred were resolved via discussion. The concordance of scores between the two coders may be attributed to measures taken by the researcher to avoid, to the extent possible, common threats to inter-coder reliability, among them: ambiguity in the coding system, inadequate coder expertise or training, coder bias, and coder drift (Mackey & Gass, 2012). The first two steps, ambiguity in the coding protocol and the extensive training and experience of the coders, have already been described above. To help reduce coder bias, the researcher removed any identifying information from the transcripts and provided the coders only clean/unmarked digital copies of the original transcripts with pseudonyms for the participants. Since the subset of the data with NS interactional feedback was relatively sizeable (91 feedback moves) the independent coding sessions took place at each coders' convenience in terms of time and space. To help prevent coder drift, drinks and nutritious snacks were on hand and coding sessions did not exceed two hours in a single sitting.

Descriptive statistics. The transcripts with NNS utterances that triggered NS interactional feedback were read, the linguistic errors were identified, and incorrect utterances were coded by each coder. Next, the total number of NNS errors in type-chat and voice-chat were counted and tallied according to type of error (article, pronoun, etc.). As the quantity of NNS errors was relatively low, there was no need for percentages, and the raw numbers can be found in the Results chapter (Chapter 4). Once the numbers were counted and tallied, the most common error in the NNS production was identified. The data were then subjected to further analyses in order to provide a fine-grained analysis of the most common linguistic error in the NNS use of English.

Research Question 3 examined whether the online naturalistic interactions affected the non-native speakers' (NNS) frequency of making the most common grammatical mistake. It also looked for any patterns related to the NNS's proficiency level, topic domain, and article type. The study examined the use of the article system by the ten NNS participants. The entire corpus of 131,689 words produced by the NNS participants in the text-based and voice-based environments were analyzed based on the results of research question 2. The linguistic structure identified as the most common linguistic error produced by the NNS participants was the English article system.

Coding scheme. A coding scheme was developed deductively by going through the transcripts multiple times. Two coders coded the selected data vis-à-vis NNS production for the TLU analysis of the English article system. A total of 21 categories of the use of the English articles was coded in the selected data. Table 13 below presents the categories of article use.

Table 13: Classification of English articles in the data.

	Referent	NNS Use in context	Error or Correct Use	NNS Participant
Definite article the	**Plural**	"even with *the subtitles*"	Correct use	NNS-2 Week 2 Voice
	Singular	"I think it's **same* here"	Underuse: Definite article *the*	NNS-10 Week 1 Type
	Noncount	"that kind of *music* is K-pop"	Correct use	NNS-2 Week 2 Voice
	Abstract	"to compare that time and **present time*"	Underuse: Definite article *the*	NNS-2 Week 1 Voice
Indefinite article a/an	**Gerund Abstract Ø**	"I fell asleep without *noticing* i'm sleeping"	Correct use	NNS-5 Week 8 Voice
	Noncount *a*	"*gas* in the US is so cheap"	Correct use	NNS-4 Week 2 Voice
	Noncount Ø	"I didn't have **a work*"	Overuse: Indefinite article *a*	NNS-1 Week 1 Voice
	Singular	"now he has **internship* in Japan"	Underuse: Indefinite article *an*	NNS-5 Week 1 Voice
	Singular Ø	"I need to take **test* uh 72 hours before"	Underuse: Indefinite article *a*	NNS-5 Week 3 Voice
	Plural Ø	"so you are *friends*?"	Correct use	NNS-1 Week 1 Voice
	Generic Ø	"they feel like they wanna renting from *place* to *place*"	Correct use	NNS-6 Week 3 Voice
	Abstract Ø	"like New York uh you know *lifestyle* everything is bad"	Correct use	NNS-6 Week 2 Voice
Generic Ø, a, the	**Plural**	"So he can't solve *problems*"	Correct use	NNS-1 Week 3 Voice
	Noncount Ø	"it's **a crazy* stuff related with this government"	Overuse: Indefinite article *a*	NNS-8 Week 1 Voice
	Zero Ø	"yeah they serve **the meals* twice"	Underuse: Generic zero article needed	NNS-5 Week 6 Voice
	Gerund Ø	"I like *yoga*. You like *yoga*?"	Correct use	NNS-1 Week 1 Type NNS 5
	Noncount Indefinite	"she *love to spend *time* with me"	Correct use	NNS-7 Week 6 Voice
	Gerund Indefinite Ø	"I thought you are you are *talking* to someone else"	Correct use	NNS-1 Week 10 Voice
Lexicalized	***the***	"by the way"	Correct use	NNS-4 Week 6 Voice
	a	"they fight *a lot*"	Correct use	NNS-9 Week 8 Voice
	Ø	"*last week* I had the opportunity"	Correct use	NNS-9 Week 9 Voice
Ambiguous	"So you are, you a student in **a teachers* school?"		Referring to *the* Teachers College, the researcher is affiliated with OR *a* teachers school in general.	NNS-1 Week 1 Voice

Descriptive statistics. As in research question one, the total number of occurrences for articles and the total number of article errors in each of the NNS text-based and voice-based transcripts were counted and tallied according to the article error types derived from the NNS production as identified in Table 14 above. Two readers, a faculty member at the Applied Linguistics and TESOL program at the College and the researcher independently read and coded all of the 200 transcripts: ten text-based and ten voice-based transcripts per NNS participant (n=10).

Table 14 summarizes the number of words produced by each NNS participant in the text-based and voice-based environments during the ten weeks of data collection.

Table 14: Total words by NNS participants in the SCMC environments.

	Text-based	**Voice-based**	**Total**
NNS-1	1243	6062	7305
NNS-2	1415	10065	11480
NNS-3	2232	14130	16362
NNS-4	1778	12418	14196
NNS-5	1692	6775	8467
NNS-6	1687	18308	19995
NNS-7	1809	13261	15070
NNS-8	1903	15305	17208
NNS-9	2670	11003	13673
NNS-10	1938	5995	7933
Total	18367	113322	**131689**

Inter-coder reliability. Inter-coder reliability for both readers was calculated at 96.11%, any disagreements having been resolved via discussion. Once again, the researcher attempted to minimize the risk of known threats to inter-coder reliability by having an expert in the field (a faculty member with extensive experience in teaching and researching the English grammar) be the first reader for the second stage of data analysis. Furthermore, all identifying information

were removed from the transcripts, including the dates on which the sessions were held; presenting the transcripts in random order (in terms of dyads and session dates); using only 'clean' (unmarked) Word copies of the 200 original transcripts; and reminders for the coders to take short breaks during the coding process. This preliminary analysis identified 21 types of article use in the NNS productions in both written and voice-chat environments. As in research question one, intra-rater reliability was established through repeated coding of the data.

Target-like use analysis. To calculate the accuracy of the participants' use of articles, the researcher next subjected the target structure to a TLU analysis, a type of performance analysis developed by Pica (1983). In Ellis's (1994, p. 716) words, "obligatory context requires the obligatory use of a specific grammatical feature in samples of learner language", in the current study, that specific grammatical feature is the English article system. In an attempt to identify possible IL patterns, the NNS participants' whole production of L2, not only errors, but also accurate items, were analyzed using TLU analysis proposed by Pica (1983). According to Pica's equation, TLU is the number of correct uses in obligatory context divided by the number of obligatory contexts added to the number of incorrect contexts (Tarone & Swierzbin, 2009, p. 31). All instances in which the NNS participants produced correct and incorrect versions of the target articles in obligatory context were identified. The formula is applied to determine a language learner's "correct use, underuse, and overuse of a particular linguistic item" (Ahmed, 2017, p. 24), using the formula below (Ellis & Barkhuizen, 2005, p. 80):

$$\frac{n \text{ correct suppliance in context}}{n \text{ obligatory contexts} + n \text{ suppliance in non-obligatory contexts}} \times 100 = \text{percent accuracy}$$

Pica (1983) proposed the TLU analysis method to respond to the critiques of the OOA method that Brown (1973) had introduced. Based on the concept of suppliance in obligatory context (SOC), OOA focused solely on standard-like usage of linguistic structures in obligatory contexts. In contrast, TLU analysis considers not only the correct application of linguistic structures in required situations but also the learner's excessive use of these structures in non-obligatory contexts. As a result, TLU analysis provides a more comprehensive and precise representation of the learner's progress in acquiring the target language. In this particular investigation, TLU analysis was employed to examine the data and address the third research question, aiming to achieve a more detailed examination of the most prevalent error, namely in the use of articles, observed in the data from NNS participants.

To analyze the NNS participants' article use, a second round of coding was performed, drawing inspiration from Huebner's (1983) dynamic paradigm. In general, Huebner's model outlines four linguistic environments, or noun phrases (NPs), in which articles can be present. The specific form of the article (i.e., a/an, the, Ø) used in each of these linguistic environments is determined by the semantic and pragmatic function of the NP. This model has been widely utilized to study the acquisition of articles in second language learners (L2 learners) (Ekiert, 2004). Huebner's paradigm, inspired by the works of Bailey (1973) and Bickerton (1975),

offered an alternative approach to the more traditional 'order of acquisition' methods (such as Brown, 1973) that were prevalent at the time.

In order to mitigate the potential impact of the novelty effect as outlined by Rogers (2017), the initial chat session for each pair of participants was omitted from the subsequent round of analysis. Following this exclusion, the subsequent phase involved the administration of a statistical test to assess the significance of English article usage overtime. Upon establishing statistical significance through this test, a post hoc analysis was undertaken to identify the specific weeks wherein significant disparities existed in the production of English articles for each nonnative speaker (NNS) participant.

Choice of Statistical Test. The Friedman test was selected as the appropriate statistical test for analyzing changes overtime across multiple time points, encompassing 10 weeks of data in a nonparametric setting. This choice was driven by the nature of the research question and the qualitative data type under investigation. Given the qualitative nature of the data and the focus on the use of English articles among nonnative speakers overtime, the Friedman test offers robustness in analyzing repeated measures data without relying on assumptions of normality. It allows for the examination of differences across multiple time points while accommodating the ordinal nature of the data collected from the interactions. Thus, the Friedman test provides a suitable framework for assessing variations in the use of English articles among nonnative speakers throughout the 10-week period.

Following the application of the Friedman test to assess the significance of English article usage overtime, subsequent steps entailed a comprehensive post hoc analysis. This analysis aimed to pinpoint specific weeks with notable differences in English article production among

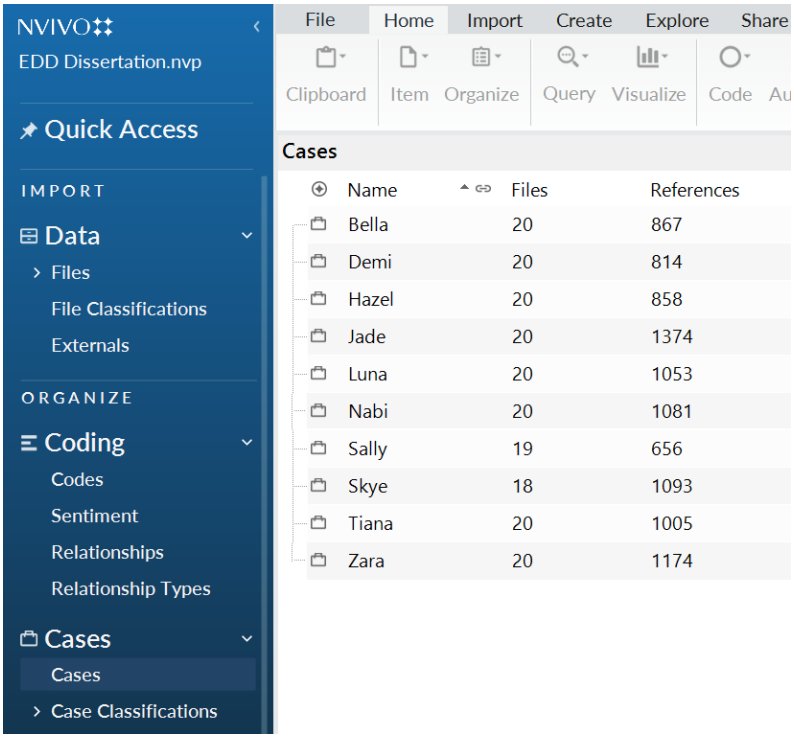
nonnative speakers, facilitating the discernment of subtle language usage patterns and the evolving linguistic behaviors of participants throughout the study duration. Utilizing pairwise comparisons as the chosen post hoc method allows for a meticulous examination of inter-week disparities while controlling for multiple comparisons. Moreover, adjustment techniques such as the Bonferroni correction were implemented to mitigate Type I errors. This methodological approach promises to yield a nuanced understanding of the temporal dynamics of English article usage among nonnative speakers, enriching the interpretation of study findings and providing valuable insights into language acquisition and interactional patterns within the study context.

Qualitative analysis

Based on the outcomes of the TLU analysis, a comprehensive examination was conducted to investigate NNS utilization of English articles in both text-based and voice-based environments, encompassing inter-learner and intra-learner analyses. The qualitative approach was employed to delve into the intricacies of learners' moment-by-moment actions during online tasks, thereby exemplifying the strengths of qualitative analysis in enriching our comprehension of mediated learning (Levy, 2015).

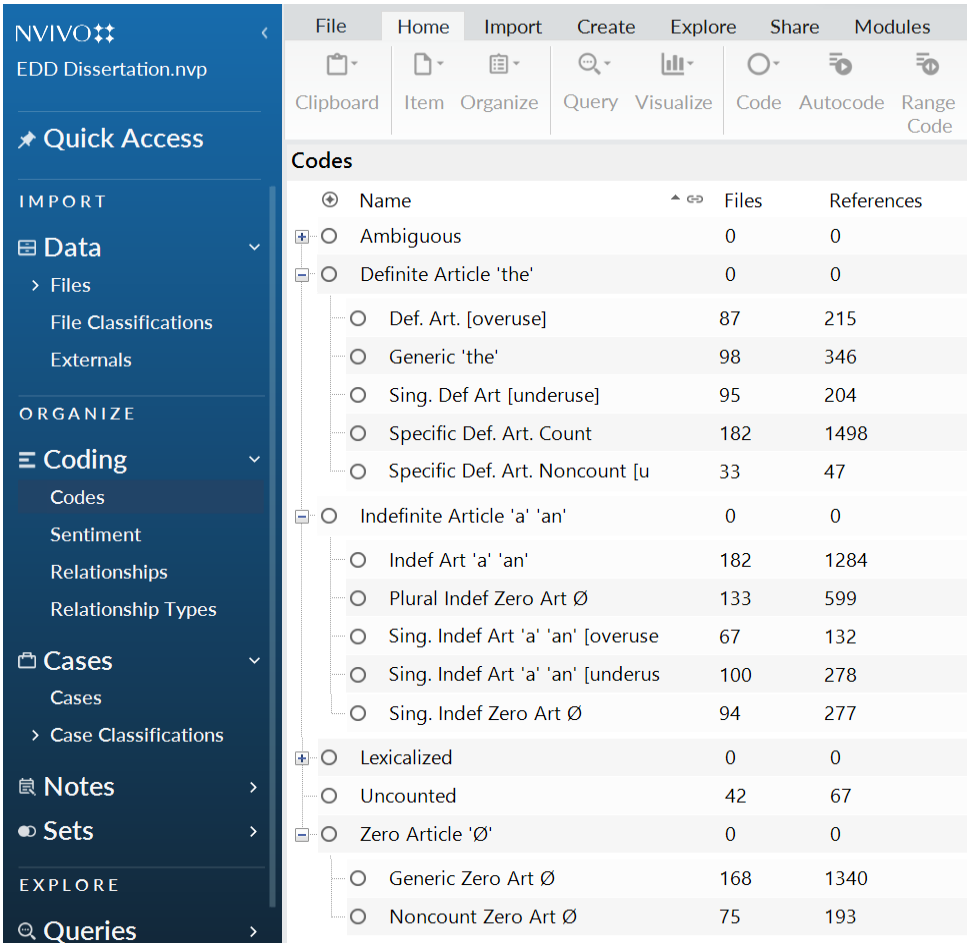
In the current study, the qualitative analysis of the data provided a micro-level perspective, yielding a finer-grained understanding of the patterns underlying article usage in NNS naturalistic language production. To facilitate this analysis, the QSR NVIVO-14 software application for Windows was employed (Jackson & Bazeley, 2019) at this stage of the study. Figure 5 below represents the data folders for the ten dyads on NVIVO-14.

Figure 5: Data folders for the 10 dyads on NVIVO-14.



The qualitative analysis was conducted through two distinct cycles, each separated by approximately one month. It commenced after the researcher imported the NNS transcripts into NVIVO-14 and established separate files for each of the ten dyads, based on ten weeks of data collection. A coding scheme, comprising 21 initial codes in NVIVO, was derived from the information presented in Table 14. To gain a more nuanced understanding of the identified patterns, the data segments corresponding to the initial codes were carefully reevaluated and regrouped. A segment in this context refers to a phrase in NNS participants' language production that incorporates the use of an article during online interactions. Notably, the data encompassed 7341 instances of correct article usage and 849 instances of article errors in context, totaling 8190 distinct segments. Excluded from this count were segments categorized as 'ambiguous' and 'ungrammatical'. Figure 6 presents the coding categories on NVIVO-14.

Figure 6: Coding categories housed on NVIVO-14.



The subsequent step involved organizing these segments into various thematic and pattern-based groupings. In the final stage, the first two steps, namely coding, recoding, grouping, and regrouping of themes and patterns, were replicated after an interval of approximately one month following the first cycle. This approach was undertaken to ensure the consistency of coding.

Inter-coder reliability. For the purpose of coder reliability assessment, the same researcher served as coder 1, and coder 2 was also the individual responsible for reading and coding the data for Native Speaker (NS) feedback. After each cycle of analysis, the two coders engaged in comprehensive discussions to address any points of agreement or disagreement until reaching a consensus.

Intra-coder reliability. The intra-coder agreement was computed to determine the reliability of coding, yielding a high reliability coefficient of Cohen's kappa ($k = 0.87$), which was interpreted as indicating strong consistency between the coders' categorization of responses.

The following chapter will present the expected outcomes resulting from the data analysis.

Chapter 4: Results

This chapter reports the results based on the online interaction data in the study and addresses the research questions detailed in Chapter 3 (p.81). Relating to research question one, the chapter begins by presenting descriptive statistics of NS feedback types and their effectiveness during the naturalistic online synchronous text-based and voice-based interactions of ten native-speaker/nonnative-speaker pairs. Results of a TLU analysis relate to research question two, for which NNS linguistic errors that received NS interactional feedback were analyzed. Lastly, to answer research question three, the use overtime of the most common NNS error was explored in terms of proficiency level, topic domain, and type of article. An interpretation of the findings in view of the existing data may be found in Chapter 5. The following subsection describes results of the NS feedback analysis, followed by the results of the most common linguistic error that triggered NS feedback, and the patterns of change in NNS production of the most common linguistic error.

Native Speaker Interactional Feedback Results

A total of 91 feedback moves constituting 98 feedback instances by the L1 speakers (n=10) were identified in the transcriptions of the online interactions. The feedback instances can be grouped into a total of eleven feedback types (e.g., recasts, direct correction). Each voice-based interaction session (n=98) and text-based interaction session (n=99) lasted approximately 15 minutes. Due to technical difficulties and internet issues, three out of the two hundred sessions could not be recorded. The sessions that were not recorded were the ‘session 5 voice-based chat’ for Dyad-1 and ‘session 10 text-based and voice-based chat’ for Dyad-3. In total there were 197 transcripts (99 text-based transcripts and 98 voice-based transcripts). The size of

the text-based and voice-based interaction data was computed to be approximately 49 hours yielding 266,956 words in total.

As a reminder to the reader, the study investigated feedback aimed at linguistic errors rather than content-related feedback. Instances where a NNS makes a statement, and a NS responds with questions or comments about the content were not analyzed. Thus, the focus lies on analyzing feedback that addresses linguistic errors, distinct from content-oriented feedback.

Table 15 below presents the feedback moves, motivated by NNS errors, by the NS participants in type-chat and voice-chat environments.

Table 15: NS error-motivated interactional feedback instances.

	Type-chat	Voice-chat	Total
NS-1	6	19	25
NS-2	2	18	20
NS-3	1	6	7
NS-4	0	5	5
NS-5	2	2	4
NS-6	0	3	3
NS-7	0	24	24
NS-8	1	4	5
NS-9	0	0	0
NS-10	0	5	5
Total	12	86	98

As shown in the table above, the NS in Dyad 1 used the most interactional feedback (n=25), followed closely by the NS in Dyad 7 (n=24) and the NS in Dyad 2 (n=20), whereas the NS in Dyad 6 used the least number of interactional feedback (n=3), and the NS in Dyad 9 did not use any interactional feedback. Since the total number of feedback instances is too low to be used in a statistical test, raw numbers and percentages are provided below.

Overall NS Interactional Feedback Types

Results presented here relate to the L1 speakers' total number of interactional feedback types coded in both text-based and voice-based SCMC data. The feedback types identified in the data were as follows: embedded recast (n=22), specific clarification request (n=16), general clarification request (n=15), declarative recast (n=11), interrogative recast (n=10), repetition (n=7), isolated recast (n=6), incorporated recast (n=5), partial recast (n=4), direct correction (n=1), and full recast (n=1). It is worth mentioning that these results support the findings reported in the previous literature on NS-NNS face-to-face interactions, in that, L1 speakers do not tend to provide linguistic feedback as they interact with L2 speakers in naturalistic settings. Percentages of each of the feedback type were calculated as shown in Table 16 below.

Table 16: Percentage of NS feedback types

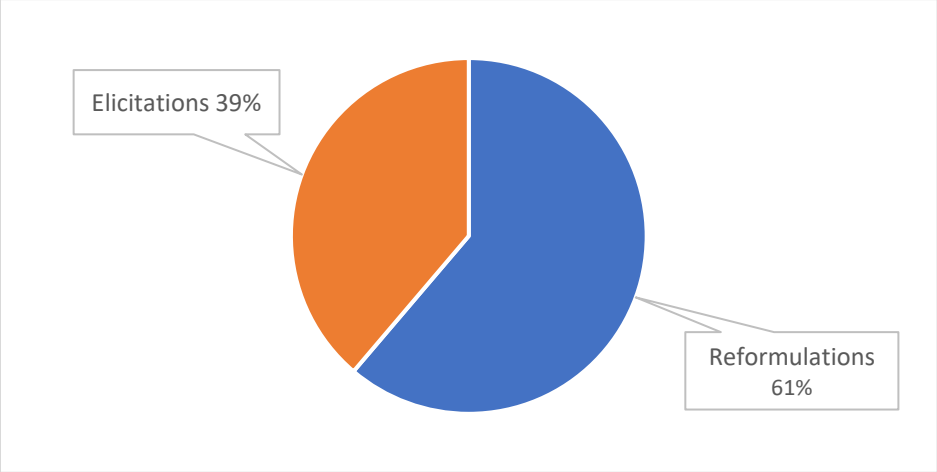
Type of Feedback	Total #	%	Example
Embedded Recast	22	21.6	NNS: *Do you have kneepad?* NS: *I have knee braces.*
Specific Clarification Request	16	15.7	NNS: *Have you seen tigers?* NS: *Have I seen what?*
General Clarification Request	15	14.7	NNS: *Do you like the winter view?* NS: *Uh, say that again?*
Declarative Recast	11	10.8	NNS: *The show is not educated, educate uh* NS: *Educational.*
Interrogative Recast	10	9.9	NNS: *The character in the movie disposable me* NS: *Despicable Me*
Repetition	7	6.9	NNS: I was so sick. I was so sick. NS: Sick?
Isolated Recast	6	5.9	NNS: *She have a big dog* NS: *She has a big dog*
Incorporated Recast	5	4.9	NNS: *I have two sister.* NS: *Oh, you have two sisters. What are their names?*
Partial Recast	4	3.9	NNS: *She looks very kind and feminine, golly, yeah* NS: *girly?*
Direct Correction	1	0.98	NNS: *... in the top of our building* NS: *The top of the building is called the roof*

Full Recast	1	0.98	NNS: I see a elephant in the zoo NS: You saw an elephant in the zoo?

Reformulations and Elicitations by the NSs

The feedback types are categorized into two major categories vis-à-vis input-providing *reformulations* and output-prompting e*licitations*. According to the results, 61% of the feedback instances were reformulations (n=60), while 39% of the feedback instances were characterized as elicitations (n=38). The comparison is shown in the figure below.

Figure 7: Percentage of reformulations and elicitations in the data



From the above, it could be suggested that the L1 speakers preferred reformulating the L2 speakers' utterances in the event of nonunderstanding or misunderstanding of meaning over eliciting more information.

NNS Uptake Instances

Next, the effectiveness of each type of interactional feedback was determined by analyzing immediate and delayed L2 learner uptake. Table 20 below demonstrates the number of learner uptake instances. As shown in the table, about 40 percent of the NS feedback was successful and ended in learner uptake. As a reminder, in the current study, the

operationalization of learner uptake involved identifying any instances of 'repair' in the output of NNS. In this study, 'repair' was defined as either: 1) repeating or accurately reformulating native speaker (NS) feedback within a single NNS turn, 2) a series of turns leading to the accurate reformulation, or 3) the recognition of information conveyed in NS interactional feedback. Table 17 below presents the NNS uptake instances in the data.

Table 17: NNS uptake instances

Type of Feedback	# Total Feedback	Type Chat	Voice Chat	# Uptake Instances	Uptake Percentage
Embedded Recast	22	5	17	**10**	**9.8%**
Specific Cl. Request	16	1	15	**3**	**2.94%**
General Cl. Request	15	2	13	**0**	**0**
Declarative Recast	11	1	10	**8**	**7.84%**
Interrogative Recast	10	1	9	**9**	**8.82%**
Repetition	7		7	**0**	**0**
Isolated Recast	6		6	**6**	**5.88**
Incorporated Recast	5	2	3	**2**	**1.96**
Partial Recast	4		4	**2**	**1.96**
Direct Correction	1		1	**1**	**0.98**
Full Recast	1		1	**0**	**0**
Total	**98**	**12**	**86**	**41**	**40.18%**

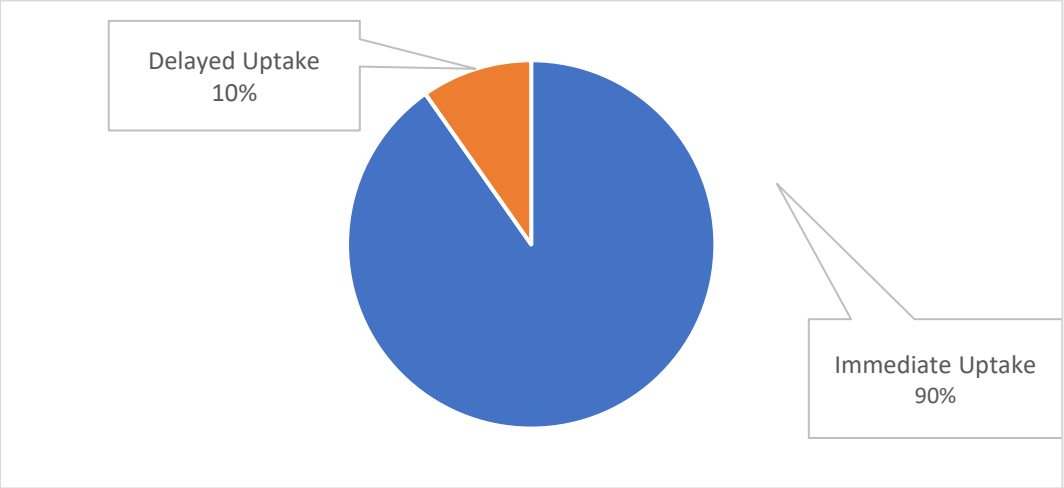
The table above shows overall 40.18% of the total NS feedback resulted in learner uptake, either immediate or delayed uptake. Moreover, embedded recasts (9.8%) and interrogative recasts (8.82%) followed by declarative recasts (7.84%) and isolated recasts (5.88%) were the most successful types of feedback in the data, respectively. Specific clarification request (2.94%), partial recast (1.96%), and incorporated recast (1.96%) were more than 1% successful according to the results. Finally, the single instance of direct correction was successful but full recast, general clarification request, and repetition were not successful at all. In other words, input-providing interactional feedback is more successful than output-prompting

interactional feedback in online interaction. Furthermore, input-providing interactional feedback provided in synchronous voice-chat interactions are more successful than input-providing interactional feedback in synchronous type-chat interactions.

Immediate versus Delayed Uptake by the NNS

The instances of learner uptake (n=41) were further separated into *immediate* uptake (n=37), which formulated 90% of the total learner uptake, and *delayed* uptake (n=4), which formulated 10% of the total learner uptake. Figure 8 below represents this result.

Figure 8: Percentage of immediate uptake versus delayed uptake



Out of the eleven feedback types identified in the data, three types resulted in delayed uptake as defined and operationalized in the study. These three feedback types were: embedded recast, incorporated recast, and specific clarification request. The four instances of delayed uptake were found in the responses of NNS-1 in Week 5/type chat; NNS-2 Week 1/voice chat; NNS-5 Week 3/voice chat; and NNS-6 Week 1/voice chat (See Appendix G for the instances of delayed feedback instances). Embedded and incorporated recasts are input-providing interactional feedback and specific clarification request is output prompting interactional

feedback. This could mean that input-providing feedback results in delayed uptake in naturalistic synchronous interactions compared to output-prompting feedback.

Immediate uptake, on the other hand, constituted 90% of learner uptake. According to the results, almost all of the feedback types that resulted in immediate uptake were input-providing interactional feedback. None of the output-prompting interactional feedback types except specific clarification request (0.82%) resulted in immediate uptake. Among the input-providing feedback types that resulted in immediate uptake, interrogative recast (3.69%), declarative recast (3.28%), embedded recast (3.28%), and isolated recasts (2.46%) were the most successful. Table 18 below shows the breakdown of immediate and delayed uptake instances and percentages.

Table 18: Percentage of immediate uptake and delayed uptake

Type of Feedback	Uptake Instances	Immediate Uptake		Delayed Uptake	
		# Total	Percentage	# Total	Percentage
Direct Correction	1	1	0.41%	0	0
Declarative Recast	8	8	3.28%	0	0
Embedded Recast	10	8	3.28%	2	0.82%
Full Recast	0	0	0%	0	0
Incorporated Recast	2	1	0.41%	1	0.41%
Interrogative Recast	9	9	3.69%	0	0
Partial Recast	2	2	0.82%	0	0
Isolated Recast	6	6	2.46%	0	0
General CR	0	0	0	0	0
Repetition	0	0	0	0	0
Specific CR	3	2	0.82%	1	0.41%
Total	**41**	**37**		**4**	

Text-based and Voice-based Feedback Effectiveness

Then, the percentage effectiveness of NS interactional feedback in the two modes was computed. Of the 86 instances of NS feedback in the voice-based mode, 37 instances were successful (43%). On the other hand, out of the 12 instances of NS feedback in the text-based mode, four instances were successful (33%). Success in the study is operationalized as either immediate uptake or delayed uptake wherein immediate uptake was when the L2 speaker uses the feedback in their utterance immediately following a feedback move (Ellis, 2001a). A delayed uptake was when the L2 speaker uses the feedback within the same mode of communication or across the modes of communication but in a single interaction session. The results of the comparison are shown in Table 19 below:

Table 19: Text-based and voice-based feedback effectiveness

	Text based mode	**Voice-based mode**
# NS interactional feedback	12	86
# learner uptake	4	37
Percentage	33%	43%

In sum, NS interactional feedback in the voice-based mode is effective to a larger extent than NS interactional feedback in the text-based mode. Moreover, faced with nonunderstanding or misunderstanding of meaning in naturalistic interactions, NS tend to reformulate the NNS utterance to a larger extent than eliciting NNS meaning. Furthermore, input-providing interactional feedback was more successful than output-prompting interactional feedback both in text-based and voice-based modes. In terms of interactional modes, the voice-based mode was more conducive to NS interactional feedback compared to the text-based mode, both in relation to immediate and delayed uptake.

Research Question 2

Given the modest number of NS feedback instances in the data, it is valuable to determine what triggers NS interactional feedback. In other words, what kind of NNS erroneous utterances generate NS feedback?

NNS Erroneous Utterances that Triggered NS Feedback

In order to answer this question, the NNS utterances with linguistic errors that received NS feedback were identified and coded as particular errors. There was a total of sixteen linguistic error types identified in the data. Table 20 below presents the erroneous utterances produced by the NNS. The parts of an utterance that contain the error are italicized and an asterisk is added to mark the error. In the following table, Table 20, the number of each error is presented.

Table 20: NNS erroneous utterances that triggered NS feedback in the study

NNS Erroneous Utterance[2]	Error	Required in context
1. "so i was a very i was in a **very hurry*"	Adverb	*hurry*
2. "like *the Zootopia*,and the simpsons"	Article	∅
3. "yeah and they have **the good benefit*"	Article	∅
4. "what do you usually do on **the weekday*?"	Article	∅
5. "what do you usually do on **the weekday*?"	Article	∅
6. "But when I tried to do **the ice skating*"	Article	∅
7. "their mom usually put them in ***a bed* like around 7 7:30"	Article	∅
8. "they will deliver their baby in Tokyo at **hospital*"	Article	*the* or *a*
9. "So you are you are **PhD student*"	Article	*a*
10. "You are **New yorker*"	Article	*a*
11. "her best friend is **cat*"	Article	*a*
12. "you are walking walking with her on **a way*?"	Article	*the*
13. "they will deliver their baby in Tokyo at **hospital*"	Article	*the*
14. "do you have to take **a subway* to go to your work?"	Article	*the*

[2] The error is italicized. The rest of the utterance is presented as produced by the NNS participant.

15. “I used to only take *_a subway_ and then recently I I started doing Uber”	Article	*the*
16. “sometimes I drive sometimes I take *_a subway_”	Article	*the*
17. “but I feel like *_subway_ is”	Article	*the*
18. “a lot of people come into different places to see *_a fireworks”_	Article	*the*
19. *_Original_ casts in Hamilton are amazing!	Article	*the*
20. “I just got *_a vaccine_ yesterday!”	Article	*the*
21. “I got *_a second dose_ on Friday”	Article	*the*
22. “I will have *_a second dose_ next week”	Article	*the*
23. “I just got *_a vaccine_ yesterday!”	Article	*the*
24. “so anytime you can just you know uh hop in *_a subway”_	Article	*the*
25. “sometime I take *_a subway_ sometimes I bike”	Article	*the*
26. “he has been here for more than three years but he still can’t getting used to *_climate_ here”	Article	*the*
27. “uh I already got *_vaccine_ here”	Article	*the*
28. “I think Thailand drive *_lef_”	Article	*on the*
29. “Do you have a *_kneepad_?”	Collocation	knee *braces*
30. “it means the movie is uh *down* uh um *go down*?”	Collocation	*closed* or *not showing* or *not playing*
31. “are you usually get angry or get upset sometime?”	Do-support	*do* you
32. “I am a how you say in English i'm a bird uh *_bird bird person_”"	Idiom	*morning person*
33. “we can go there and put out things on *_top of the building_”	Lexical	*on the roof*
34. “no draf- draft drafting? Drifting?”	Lexical	
35. “Yeah cool for how have you been practicing yoga?”	Lexical	how *long*
36. “i don't know how to say in in in English but like the the movies that you don't talk you just like”	Lexical	*silent films*
37. “yeah they they may they make the the kind of uh how can i say like uh like”	Lexical	*decorated*
38. “they are not like very uh educated educa-”	Morpheme	*educational*
39. “it will be *_funny_ to go”	Morpheme	*fun*
40. “reality and dreams are just like *_fuse- fuse- fusing_ I don’t know if you can say it or uh *_fuse_?”	Morpheme	*fused*
41. “I don't want to suffer because it's a suffer that you can’t control right”	Morpheme	*suffering*
42. “Sometimes I listen to music, I like *_classic_ music”	Morpheme	*classical*
43. “*_man_ in tights?”	Plural	*men*
44. “They have like 180 *_episode_?”	Plural	*episodes*
45. “yeah and they have the good *_benefit_”	Plural	*benefits*
46. “Yes, but was really weird the *_informations_”	Plural	*information*

47. “what time they go *_bed_?”	Preposition	*to*
48. “you can see movie *_in_ TV?”	Preposition	*on*
49. “yeah they will have their children *_hospital_”	Preposition	*at*
50. “our building also *_in_ the top of our building, we can go”	Preposition	*on*
51. “I usually uh go *_bed_”	Preposition	*to*
52. “I have a brother, and we, and my parents had two children, but I think *_we_ are tired but *we are happy with us.”	Pronoun	*they*
53. “I have a brother, and we, and my parents had two children, but I think *we are tired but *_we_ are happy with us.”	Pronoun	*they*
54. “so you don't have any chance to *_leave_ in other country?”	Pronunciation (/liːv/)	/liv/
55. “the *_Joom”_	Pronunciation (/juːm/)	/zuːm/
56. “and uh she changed a lot of *_shoes_”	Pronunciation (/ʃəz/)	/ʃuːz/
57. “yeah yeah always we i have uh *_cals_ yeah everywhere”	Pronunciation (/kɑːlz/)	/kɑːz/
58. “inflation for balo- uh uh for *_boloon_”	Pronunciation (/bɔːluːn/)	/bəˈluːn/)
59. “she looks very um kind and feminine mhm *_golly_, yeah”	Pronunciation (/gɒliː/)	/gɜːliː/
60. “bark-ed barked”	Pronunciation (/bɑːk’əd)	/bɑːkt/
61. “you gotta drink a lot of rum know also an asit”	Pronunciation (/ɑsɪt/)	/æsət/
62. “my hobby is like writing a story like a *_shilden_ story”	Pronunciation (/ʃɪldən/)	/ʧɪldrən/
63. “do you usually go to the *_raibary_?”	Pronunciation (/raɪbəri/)	/laɪbrəri/
64. “uh do you usually go to the *_raibary_?”	Pronunciation (/raɪbəri/)	/laɪbrəri/
65. “I study about *_damati *alt_”	Pronunciation (/dɒmɒtɪ/ /ɑlt/)	/drəˈmætɪk/ /ɑːt/
66. “yeah about *_dirama *diader_”	Pronunciation (/dɪrɒmɒ/ /dɪədər/)	/drɑːmə/ /θiːətə/
67. “did you see the *durian*?”	Pronunciation (/djʊəriːən/)	/duːren/
68. “you used to live in *_Danvee_ [Danville] right?”	Pronunciation (/dənviː/)	/dænvɪl/
69. “look for the tiles for my friend’s *_lesturong_”	Pronunciation (/lestuːrɔ́ŋ/)	/restrɒnt/

70. “**tie* i'm not sure how to spell it it’s T-I-L-E”	Pronunciation (/taɪ/)	/taɪl/
71. “I don't know the name like a leo-part maybe I don't know in English leo-pard”	Pronunciation (/liːəʊpɑːrt/)	/lepəd/
72. “I think it's a **maes* it's not, only **mae mae*”	Pronunciation (/meɪs/ /meɪ/)	/mɑːθ/
73. “I think **TOEFL* class”	Pronunciation (/tuːfəl/)	/təʊfəl/
74. “yeah **shilden* book something like that”	Pronunciation (/ʃɪldən/)	/ʧɪldrən/
75. “yeah depends on um shoes it her knee is different”	Semantic – unclear meaning	
76. “So just just spend by themselves?”	Semantic – unclear meaning	
77. “um how to say it it's like the exam for the international student have to to do it before you get in the university”	Semantic – unclear meaning	
78. “and make people laugh with with the physical joke yeah most of them like hit with the uh tsk I don't know how to say hit the plastic”	Semantic – unclear meaning	
79. “not parasits, as symbiosis??”	Semantic – unclear meaning	
80. “or in the in the movie near my house but t- yesterday i couldn't see maybe it is already how can i speak closed or finished?”	Semantic – unclear meaning	
81. “I think sun in New York is cheating for me”	Semantic – unclear meaning	
82. “Do you like the winter view?”	Semantic – unclear meaning	
83. “maybe it just happened to men”	Semantic – unclear meaning	
84. Yeah but when you met me as gentle person you revealed that you I I think that you are patient	Semantic – unclear meaning	
85. “did you see some lion in the zoo where in some zoo?”	Syntax	
86. “there is also one uh um libraries toys that then they allow it to to play uh play um a- how do you say um play i- it stories like Cinderella or like uh they”	Syntax	
87. “my daughter is just *closing* just **clo- clo- close* the door”	Verb Agreement	*closes*
88. “you have a large family so you **be* happy”	Verb tense	*are*
89. “so you had a pet when you **are* young”	Verb tense	*were*
90. “I **just* thinking”	Verb tense	*am*
91. “Uh today I **get* up a bit earlier”	Verb tense	*got*
92. “**weeks **weeks* day likes Monday to Friday?”	Word formation	*weekday*

93. “I also have um what's called cri:me uh? No, crime law? No”	Word formation	*criminal*
94. “I hope it's right like yeah drilling machine or is it called a drill or drill?”	Word formation	*drill*
95. “like a super super-lat-iv I don't know if that's the word”	Word formation	*superlative*
96. “you are anyway um uh exposed to this kind of uh social net, **social*, what is it, it is a not social network, it's a kind of um electric um don’t know”	Word formation	*app; chatting*
97. “do you know the character of this **disposable dis-dis- disposible* me, what is, I I cannot even”	Word formation	*despicable*
98. “the subs subsi subsi”	Word formation	*subsidize*

Table 20 presents a spectrum of linguistic inaccuracies and their respective contexts. From minor pronunciation nuances to intricate syntactic nuances, each entry is a window into the variety of linguistic hurdles encountered by the NNS participants. Instances range from missing articles altering intended meanings to subtle mispronunciations, from vague semantics to tense disagreements.

Figure 9: NNS errors that triggered NS feedback

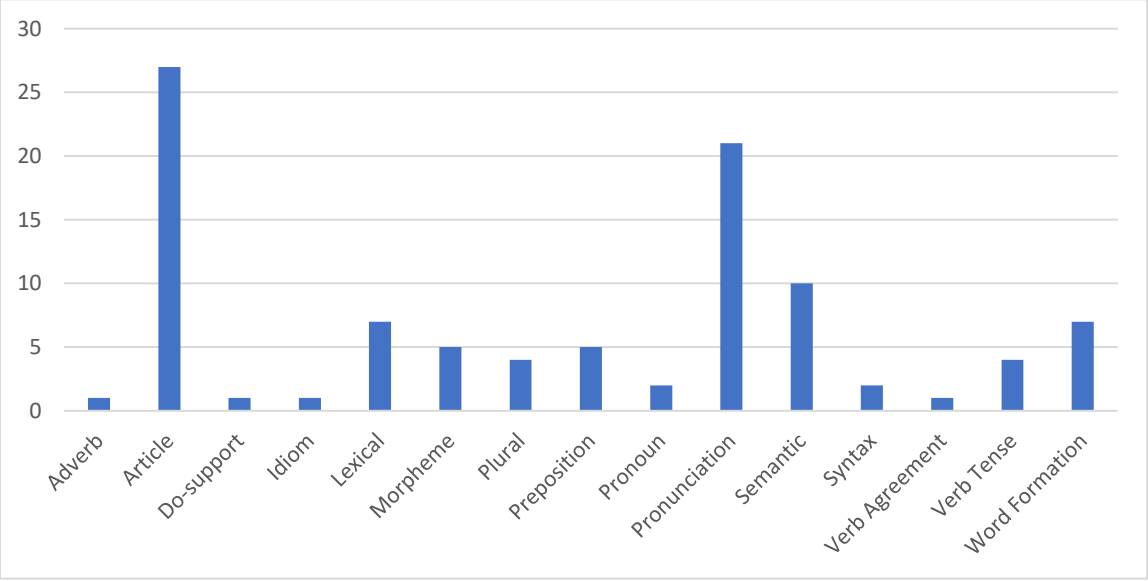


Figure 9 above shows the number and types of errors made by the NNS, that received some kind of NS interactional feedback. There was a total of sixteen types of grammar errors identified in the data. The most frequent type of error is the use of the English article, which occurred 27 times. In fact, the NSs gave the most feedback in response to NNS erroneous use of exactly this feature of their error production (**Ø**, **a**, **an**, **the**). The second most frequent type of error was pronunciation, which occurred 21 times. However, it must be noted that more than half (n=13) of the pronunciation errors were attributed to one NS-NNS pair (Pair 7). Importantly, the pronunciation errors only occurred in one of the two modes of interaction, namely the voice-based mode.

The third most frequent type of error was semantics (n=10). This means that the NS provided feedback to ten instances where the use of words were inappropriate or confusing in the context. The fourth most frequent type of error was word formation (n=7). According to this error type, the NNS used words that were incorrectly formed or modified in context. The fifth error type was lexical errors (n=7), which is basically an error in choosing the right word for a specific meaning. Lexical errors encompass cases where there is a fixed pairing of two words, such that one cannot be substituted for the other without mental rejection by a native speaker. For instance, "*make+decision*" is correct, while "?*create+decision*" is not accepted because the latter is blocked in the NS lexicon due to an established standard form. Another example is "*neighbor+hood*," not "?*neighbor+ity*." Therefore, such instances were referred to as 'lexical collocations' or 'lexical subcategorization frames', as they truly reflect the presence of errors.

The sixth most frequent type of error was related to morpheme and preposition errors, which occurred five times each. A morpheme error (n=5) is the addition or deletion of the smallest units of meaning in a word. A preposition error (n=5) is an error in using the right word

to show the relationship between a noun and another word. The next most frequent type of error is number agreement error on a noun and verb tense, which occurred four times each. A number agreement error on a noun (n=4) is an error in using the correct form of a noun to indicate more than one. A verb tense error (n=4) is in using the correct form of a verb to indicate the time of an action or state.

The least frequent types of error included adverb**,** do-support**,** verb agreement**,** idiom**,** collocation, and syntax, which occurred once each. As a reminder, in the study, an adverb error is identified as such when there's a slip-up in choosing the appropriate word to modify a verb, adjective, or another adverb. An error is a do-support error when the auxiliary verb 'do' is misused, typically seen in forming questions, negatives, or emphatic statements. Moreover, when there was a verb agreement error in the study, it meant that there was a mismatch between the number and person of the subject and the verb. An idiom error indicated a mistake in using a fixed expression that carries a figurative meaning. A collocation error was identified when there was a mistake in using a combination of words that commonly go together. Lastly, a syntax error emerged when there was a misstep in adhering to the rules governing sentence structure.

The above results of the error types that triggered NS feedback led to Part 2 of the study. It was deemed important for the study to further investigate the nature and context of NNS article errors that triggered the overwhelming majority of the NS feedback instances. The NNS produced modified output to 69% of NS feedback on article errors, which is the highest rate of uptake among all NNS linguistic errors in the study.

To summarize, the results presented relate to research questions one and two. It can be suggested that based on the data in the study, voice-based SCMC is more conducive to NS interactional feedback in naturalistic settings. Moreover, of all the interactional feedback types

listed in the feedback literature, reformulations form most of the NS feedback. Additionally, errors in the use of the English articles, are the most common linguistic errors that triggered NS feedback in the study.

While the results above relate to NS feedback types and the NNS errors that receive interactional feedback, the following subsection presents results related only to the analysis of the most common linguistic error in the study, namely, the English articles.

Research Question 3

The study's third research question delved into how the primary grammar error among the NNS participants evolved during the course of the study. More specifically, it sought patterns of use of the primary linguistic/grammar error with regard to proficiency level, topic domain, and types of article in NNS' production. The subsequent analysis outlines the results followed by individual patterns of article use among each of the ten NNS participants.

To address research question 3, an in-depth TLU analysis of the NNS production in the two synchronous modes vis-à-vis type-chat and voice-chat was conducted next. The study investigated how the ten NNS used the English article system throughout the ten weeks of data collection. The article system was the most common linguistic error made by the NNS participants. The entire corpus of 131,689 words generated by the NNS participants in both text-based and voice-based environments was analyzed, building upon the findings from research question 2.

The TLU analysis was conducted by dividing the number of correct suppliance of articles in context by the number of obligatory contexts plus the number of suppliance in non-obligatory contexts and then multiplying the quotient by 100 to obtain the percent accuracy. Following that,

the percentage correct for the articles was plotted on a line graph to illustrate trends of use. The results are reported below.

Total number of article occurrences and total percentage of article errors per chat session. Descriptive statistics for the number of article occurrences and total percentage of article errors per chat session were first computed to present a general picture of the participants' production at each data collection point. Then, descriptive statistics comparing the percent of article errors for each chat session were reorganized into discrete bar graphs to illustrate the participants' correct and incorrect use of the English articles more clearly.

As discussed in the Literature Review, contemporary research emphasizes that becoming proficient in a second language goes beyond merely grasping the correct linguistic structures. A more complex aspect is acquiring a precise understanding of how language relates to conveying thoughts and ideas in real-time spontaneous communication (Loewen, 2021). This is especially pertinent when it comes to English articles, encompassing the definite article "the", the indefinite articles "a" and "an", and the absence of an article (symbolized as Ø).

For individuals in the process of learning English, it's not sufficient to solely grasp the forms and meanings of English articles. Equally important is comprehending when to use them appropriately in various conversational contexts. To delve deeper into the participants' acquisition of articles and look for patterns in the use of articles, the data underwent a further round of examination based on a classification of the English articles presented in Table 14 in Chapter 3 (p.113).

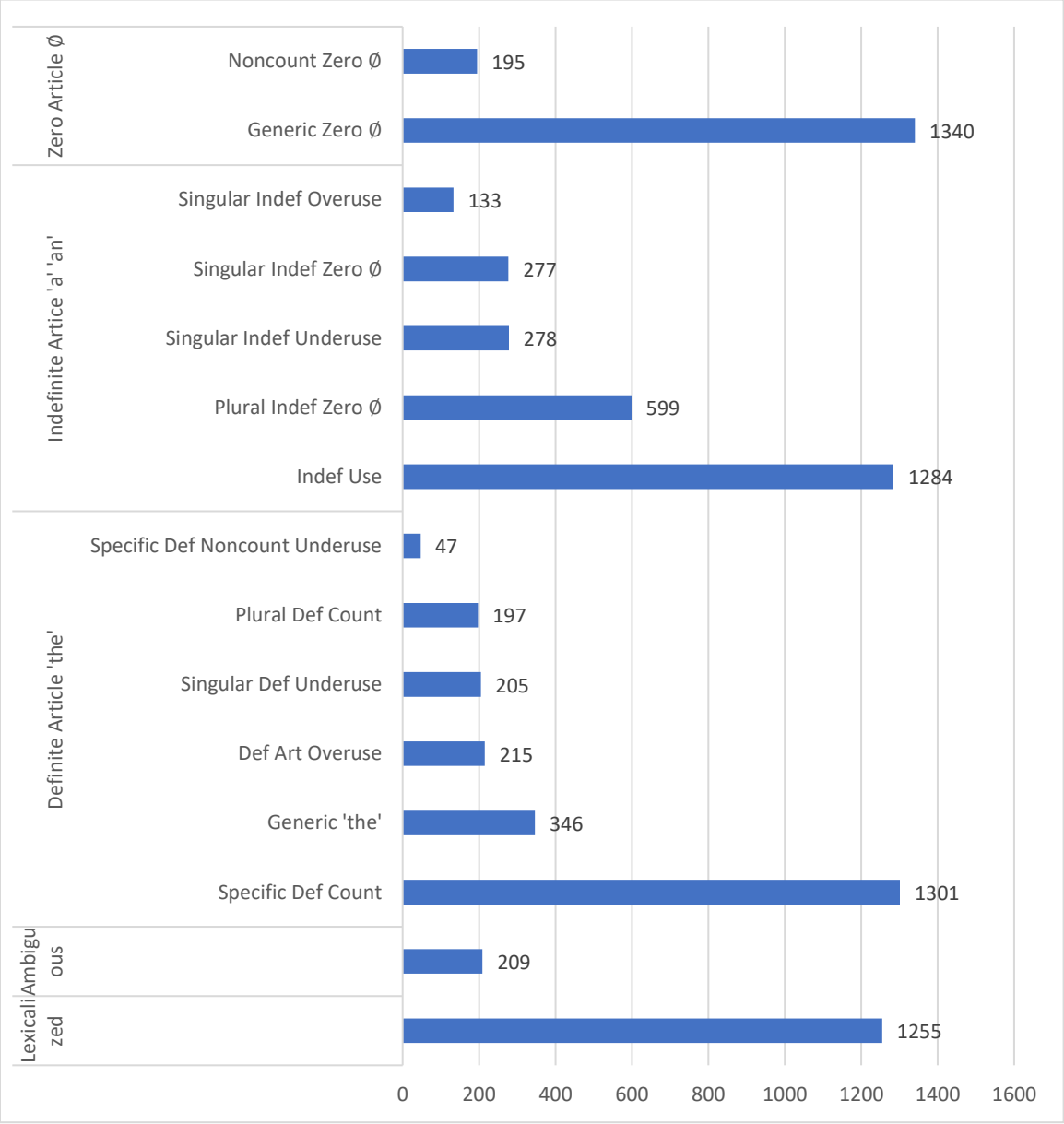
A two-part TLU analysis was conducted of the chat transcripts in the data. The first round of analysis looked at the proficiency level, topic domain, and type of article to see how the

target-like use of the English articles changed overtime. The results of TLU analysis in terms of proficiency level for the ten NNS participants are presented next.

Target-Like Use of Articles by language proficiency

According to the language program placement results, the NNS participants were placed in three proficiency levels: Lower Intermediate (n=3), Upper intermediate (n=3), and Advanced (n=4). Based on the data analysis, a grand total of 6,693 articles were employed. The figure below displays the varieties of articles and their respective usage frequencies by the NNS participants:

Figure 10: Article types used by the NNS participants



As depicted in Figure 10, the definite article 'the' serves various purposes, including functioning as a generic 'the,' a singular and plural definite count, and a singular definite noncount 'the.' The data showed instances where the use of the definite article was excessive or insufficient. Regarding its role as a specific definite article in count contexts, 'the' was employed 1301 times, indicating appropriate specification of particular nouns or noun phrases. When used

generically, 'the' appeared 346 times, implying a more general, non-specific reference. Excessive usage of the definite article 'the' occurred 215 times, while there were 205 instances of its underuse, signifying a deficiency in employing 'the' in singular contexts where it was expected. Instances for the use of the plural definite count was 197 in the data. Lastly, in specific definite article noncount situations, 'the' was underutilized 47 times.

The use of the indefinite articles ‘a’ and ‘an’ was effective in various contexts 1248 times, indicating a good grasp of the rules for choosing between them. The zero article ‘∅’, which is used for plural indefinite nouns, was correctly applied 599 times. However, there were some errors with the singular indefinite nouns, which require either ‘a’, ‘an’, or ‘∅’ depending on the context. The singular indefinite article was used unnecessarily in 133 contexts, and it was missing in 278 contexts where it was expected. These errors suggest that the zero article is more challenging to use than the plural one.

The zero article ∅ was also used in many contexts, especially when the nouns were generic or non-specific. The generic use of the zero article occurred 1340 times, indicating that the nouns referred to a whole class or category of things. For example, “∅ Dogs are loyal animals” means that dogs in general are loyal. The noncountable use of the zero article was correct 195 times, indicating that the nouns referred to uncountable substances or concepts. For example, “∅ Water is essential for life” means that water as a substance is essential for life.

In summary, the following trends were observed in the data:

1. The definite article ‘the’ was used correctly in most cases, but there were some problems with its excessive or insufficient use. The excessive use of ‘the’ occurred when it was not needed for generic or noncountable nouns, while the insufficient use of ‘the’ occurred when it was needed for specific or singular nouns.

2. The indefinite articles ‘a’ and ‘an’ were also used correctly in most cases, but there were some errors with the singular indefinite nouns. The errors involved either using an indefinite article when a zero article was required, or omitting an indefinite article when one was required. These errors indicate a difficulty in determining the specificity and countability of singular nouns.
3. The zero article ∅ was used effectively in many contexts, especially when the nouns were generic or noncountable. The generic use of the zero article implied a general reference to a class or category of things, while the noncountable use of the zero article implied a reference to a substance or concept.

The first trend is exemplified below, where NNS-6, Nabi, overuses ‘the’ with the word *transportation* when ‘the’ was not needed because *transportation* is an uncountable noun.

1.

Time	**Participant**	
30:43	**Nabi**	that’s uh yeah that's that’s part of *a same problem**
	Alex	yeah
30:52	**Nabi**	um what about *<u>the transportation</u>**? do you have to take *a subway** to go to your work?
	Alex	yeah take the subway I take the subway.

(Dyad 6/Week 1/Voice chat/May 31, 2021)

On the other hand, the instance below exemplifies underuse of ‘the’ when it was needed for specific or singular nouns. The NNS-5, Hazel, misses ‘the’ with *chicken* when she discusses a particular chicken dish that her grandmother made for her.

2.

Time	**Participant**	
23:50	Ana	Do you have favorite things that she makes?
23:54	Hazel	uh everything she is very good at cooking uh yesterday she uh prepared *a chicken** for me
	Ana	mhm
24:06	Hazel	used *a red wine** and stewed *<u>chicken</u>** with wine

(Dyad 5/Week 7/Voice chat/June 18, 2021)

In terms of the second trend, the usage of indefinite articles ‘a’ and ‘an’, the indefinite article used when a zero article was required. For example, in the following example, Skye, NNS-3, uses ‘a’ with *photos* when the context did not require an indefinite article.

3.

Time	**Participant**	
12:00	**Skye**	even say hi to people and then my mom was like please Skye just talk or or actually say hi i mean to your uncle you know
12:05	Ivy	yeah
12:08	**Skye**	all these family meetings and stuff but yeah i i have *a photos** that I’m trying to hide you know myself

(Dyad 3/Week 2/Voice chat/November 26, 2021)

Similarly, there are instances in the data where an indefinite article was not used when one was required by the context. For instance, in the following example, Sally, NNS-1, shares her experience as a child and makes an error by not using the indefinite article ‘a’ with the word *child*.

4.

Time	**Participant**	
034	**Sally**	So what they watch I watch
035	Olivia	Ahh, you watch
036	**Sally**	Yes, so when I am *child** I watch so many family stories about very may be not suitable for kids such as some not
037	Olivia	Yeah not appropriate

(Dyad 1/Week 2/Voice chat/October 24, 2021)

The third trend related to the use of the zero article ∅, which was used effectively in many contexts, especially when the nouns were generic or noncountable. For example, NNS- in the following exchange, Tiana, NNS-7, correctly uses the zero article ∅ with *water* and *flowers*.

5.

Time	**Participant**	
0:58	**Tiana**	In Thai New year, we have *a activity** like putting *water* with *flowers* on parents hands and you can say apologize or let them bliss [bless] a great wish to you.
12:04	Hudson	I see.

(Dyad 7/Week 9/Type chat/October 24, 2021)

Moreover, the employment of the zero article ∅ in a generic context signified a broad reference to a class or category of entities in the data. Conversely, the utilization of the zero article in a noncountable context denoted a reference to a substance or abstract concept. The example below shows Demi, NNS-9, correctly using the zero article with the word *sense.*

6.

Time	**Participant**	
34:50	Sam	… but it comes out like the tone of voice or your attitude towards what you're saying it doesn't really seem genuine and I think that's what people get the you know kind of misconception
35:00	**Demi**	Yes, like yeah like what you're saying it it makes total *sense* like for me that was like *a really big deal* because
	Sam	yeah
35:12	**Demi**	I was like like you said

(Dyad 9/Week 10/Voice chat/July 21, 2021)

The TLU analyses representing the percent correct for these proficiency levels in each chat session are shared in Table 21. The percentages are rounded up to the nearest hundredth.

Table 21: Percent target-like article use by language proficiency over ten weeks

Lower Intermediate

Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
NNS-1	72%	48%	68%	87%	81%	96%	63%	82%	74%	97%
NNS-2	56%	89%	79%	84%	85%	75%	88%	81%	83%	85%
NNS-7	75%	100%	75%	71%	83%	89%	85%	73%	82%	81%

Upper Intermediate

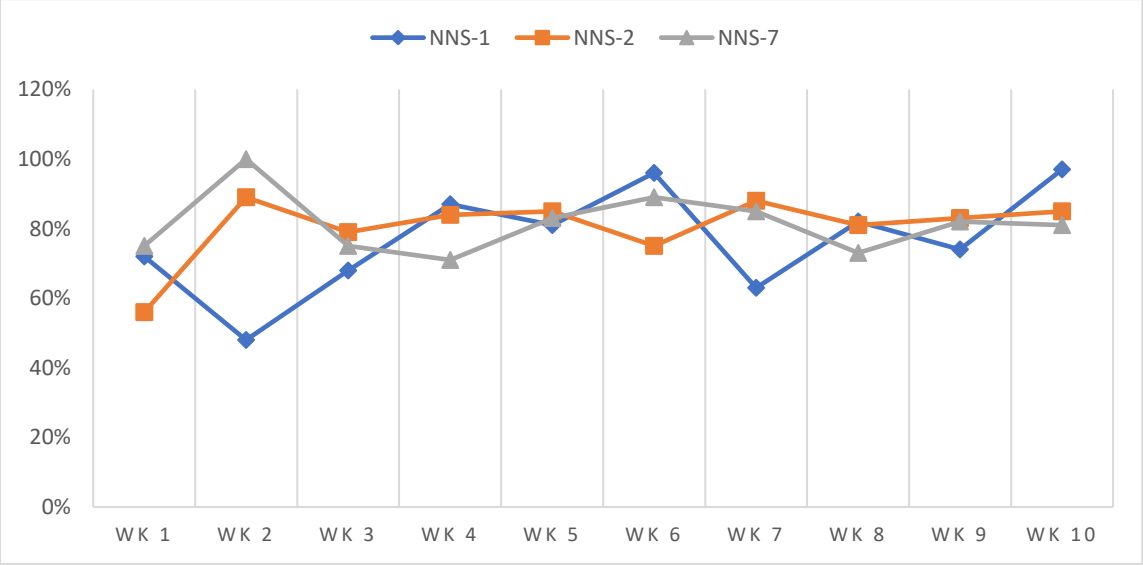
Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
NNS-8	88%	92%	95%	94%	85%	74%	84%	86%	89%	82%
NNS-9	93%	100%	100%	98%	97%	99%	100%	99%	98%	100%
NNS-10	93%	96%	88%	84%	94%	88%	85%	98%	89%	98%

Advanced

Weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
NNS-3	83%	92%	93%	88%	95%	94%	81%	87%	94%	86%
NNS-4	98%	100%	100%	100%	100%	99%	93%	94%	100%	95%
NNS-5	87%	90%	90%	89%	84%	91%	95%	94%	92%	83%
NNS-6	68%	94%	86%	87%	88%	81%	88%	94%	86%	88%

In the Lower Intermediate level, as illustrated by Table 21, NNS-1 started at 72% in Week 1, experienced a dip in Week 2, and then demonstrated a consistent upward trend, reaching 97% in Week 10. There is an overall upward trend, indicating improved performance overtime. The second participant, NNS-2, showed fluctuations between 56% and 89% without a clear trend. There is no clear upward or downward trend in NNS-2's output suggesting an inconsistent performance throughout the ten weeks. Similarly, NNS-7's performance was characterized by fluctuations with no clear upward or downward trend. The proficiency levels varied between 71% and 100%. Figure 11 below presents a visual presentation of the variable performance found in the Lower Intermediate proficiency level.

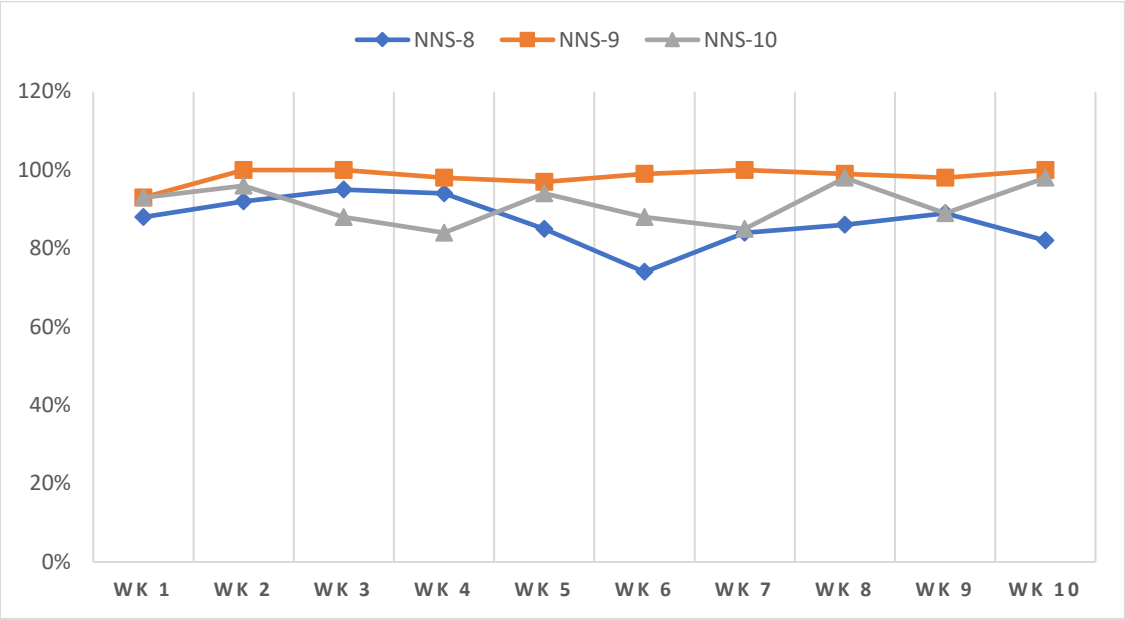
Figure 11: Percent correct use of Articles in Lower Intermediate proficiency level



In the Upper Intermediate level, NNS-8 consistently maintained performance above 80% throughout the ten weeks. The proficiency levels ranged from 74% to 95%, indicating stable performance. NNS-9 also consistently performed at or near 100% throughout the ten weeks, with proficiency levels consistently at or near the maximum. Lastly, NNS-10's performance showed

fluctuations with no clear trend, ranging from 84% to 98%. Figure 12 below shows a more detailed visual comparison of the Upper Intermediate NNS participants:

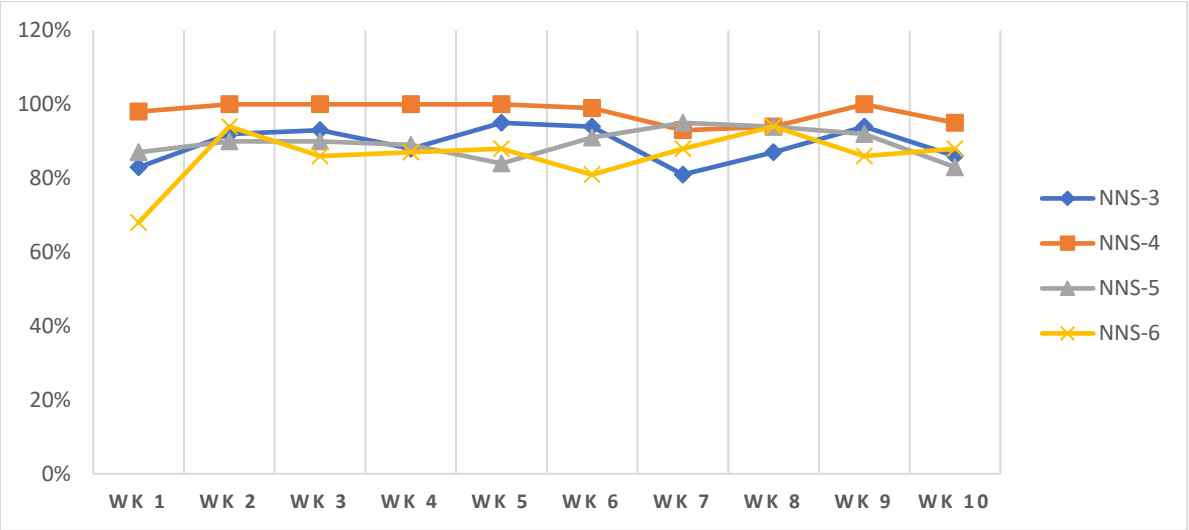
Figure 12: Percent correct use of Articles in Upper Intermediate proficiency level



The stable performance of NNS-9 can be seen in above Figure 12 who scored higher in her target-like use of articles than her counterparts. In the upper intermediate level, NNS-8 and NNS-10 began in a similar fashion at the outset of the study until the second week. However, from Week 2 to Week 10, noticeable differences can be seen in their progress.

In the Advanced proficiency level, NNS-3 consistently performed above 80% but did not exhibit a clear trend. The proficiency levels ranged from 81% to 95%, indicating a relatively stable level of proficiency. NNS-4 consistently maintained very high performance, with minor fluctuations, mostly at or near 100%. While there was a dip to 93% in Week 7, the performance quickly returned to a high level. Whereas NNS-5's performance fluctuated between 83% and 90% without a clear trend, ending at 83% in Week 10. A visual comparison of the NNS participants' output is illustrated in Figure 13 below:

Figure 13: Percent correct use of Articles in Advanced proficiency level



In the advanced proficiency level, NNS-3, NNS-5, and NNS-6 exhibited performance that was similar to each other throughout the duration of data collection. In that level, NNS-4 performed above than the other three NNS participants overtime. Indeed, the longitudinal data reveal a variation in target-like use of the English articles from one week to the next week by all NNS participants, however, based on these comparisons the following four general trajectory trends were identified:

1) In the Lower Intermediate group, proficiency levels varied with some NNS participants showing improvement overtime while others had fluctuating performance.
2) In the Upper Intermediate group, NNS participants consistently maintained or improved their proficiency levels with fewer fluctuations, and two NNS participants consistently achieved high proficiency levels throughout the ten weeks.
3) In the Advanced group, NNS participants generally maintained stable or high proficiency levels with some minor fluctuations, and two participants consistently achieved very high

proficiency levels, particularly NNS-4, throughout the ten weeks compared to the Lower Intermediate and Upper Intermediate groups.

4) NNS-9 in the Upper Intermediate group and NNS-4 in the Advanced proficiency group achieved consistently high levels of proficiency throughout the ten weeks. This suggests that certain NNS participants surpassed their counterparts and performed beyond their proficiency levels. Moreover, the data does not indicate that any of the NNS' production regressed during the study.

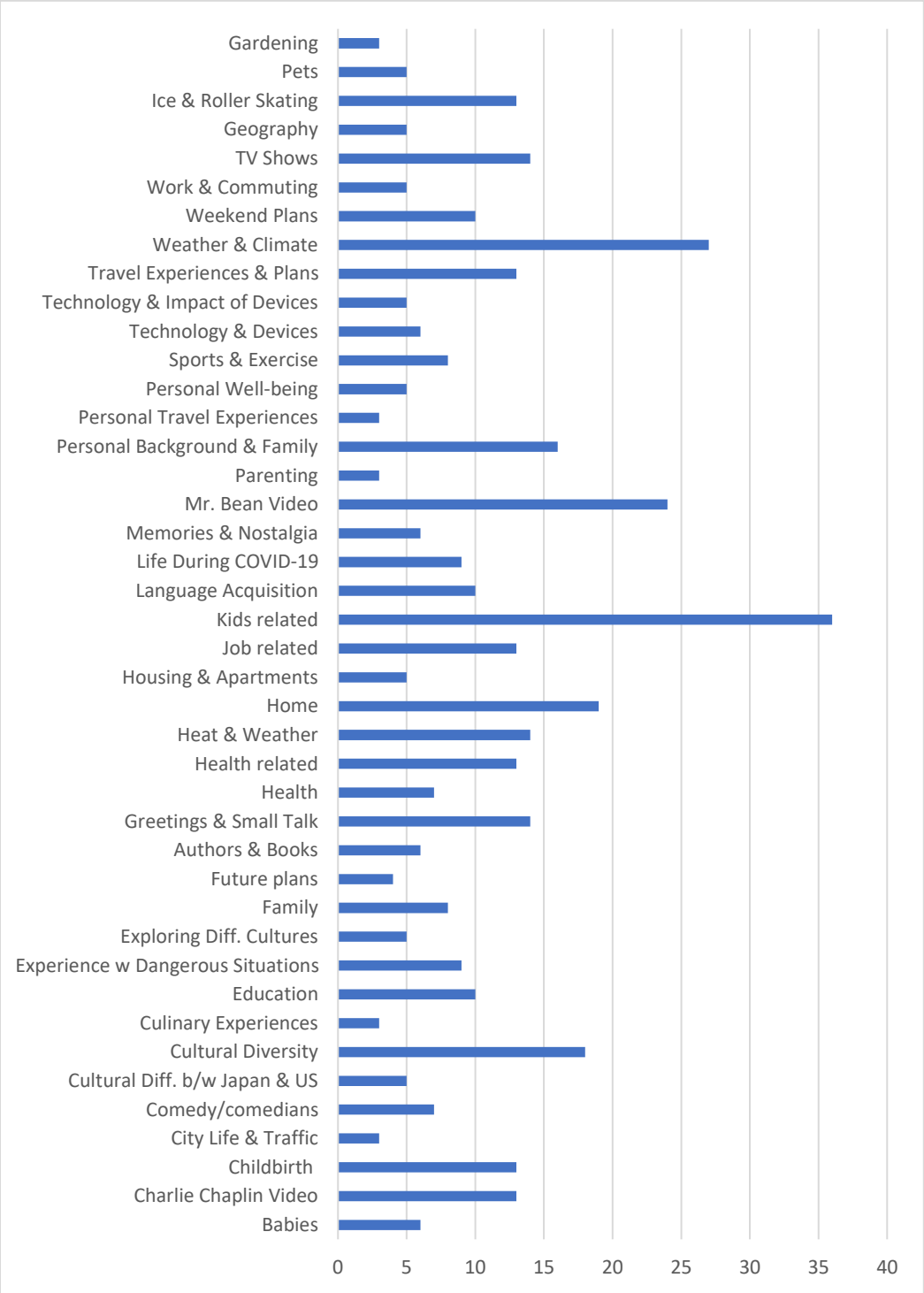
In summary, the Advanced and Upper Intermediate groups generally exhibited a more consistent performance in the correct use of the English articles. In contrast, the Lower Intermediate group showed a mix of improving and fluctuating trends. Fluctuations in performance were more pronounced in the Lower Intermediate group. NNS-1 showed a notable improvement trend, while NNS-2 and NNS-7 had varying proficiency levels from week to week. This indicates that within the Lower Intermediate group, there was a mix of individual performance trends.

In order to examine the variations more closely and track the usage patterns, both the topic domain and the type(s) of articles were analyzed using TLU analysis. The results are presented below.

TLU Analysis of Topic Domain and Article Type.

NVIVO-14 was employed to code and conduct an analysis of the data pertaining to topic domains. This analysis provided insights into how NNS participants utilized various types of articles in connection with specific subjects. Within the 10-week interaction data, a total of 42 topic domains were recognized. Figure 14 below provides a summary of these identified topic domains and the frequency with which these topics were referenced in the study.

Figure 14: Topic domains identified in the study



As illustrated by Figure 14, one of the most striking findings of the topic domain analysis is the prevailing trend of the participants' predominant focus on personal subjects during their

interactions. For instance, subjects like 'kids,' 'personal background and family,' 'home,' 'weather and climate,' and 'cultural diversity' received more attention in discussions compared to topics such as 'technology and devices,' 'education,' and 'culinary experiences,' which were discussed to a lesser extent. The silent video clips employed to initiate interactions also garnered interest. Nevertheless, the dyads engaged in conversations about a wide range of topics, all initiated by themselves without any external instructions.

NNS patterns of TLU Analysis by proficiency level

After conducting general and group analyses, a more detailed examination of the data at the proficiency level was pursued, providing a detailed perspective on group trajectories due to the diverse backgrounds of the NNS participants. In the study, the accuracy of NNS participants' use of articles was assessed through TLU analysis, a methodology pioneered by Pica (1983) and further expounded by Tarone and Swierzbin (2009). TLU analysis involves calculating the ratio of correct article use in obligatory contexts to the total number of obligatory contexts, including both correct and incorrect uses, thereby also addressing overuse and underuse of linguistic structures in non-obligatory contexts. This allows for a more comprehensive evaluation of language learners' proficiency, specifically addressing errors such as those observed in article usage among NNS participants. Additionally, in order to minimize the potential impact of practice effects in this round of analysis, data from the first session was not included in the analysis. Thus, the statistical analysis was conducted on data from nine out of the ten weeks collected.

To delve deeper into the patterns of article usage among NNS participants, a dynamic coding paradigm inspired by Huebner's (1983) model was employed. As a first step, statistical analyses, including the Friedman test, were conducted to discern significant changes in article

usage over the course of nine weeks. Then, based on the results of the Friedman test, post hoc analyses were conducted for each NNS participant at all levels to gain a more nuanced understanding of article usage.

The choice of the Friedman test was driven by the qualitative nature of the data and the need to analyze changes across multiple time points without assuming normality. Subsequent post hoc analyses, utilizing pairwise comparisons and adjustment techniques like the Bonferroni correction, allowed for the identification of specific weeks with significant variations in article production. These methodological approaches offer a nuanced understanding of temporal dynamics in article usage, contributing valuable insights to the study of linguistic behaviors among NNS participants in the study. The results of the Friedman test and the post hoc analysis are grouped according to proficiency levels: Lower Intermediate, Upper Intermediate, and Advanced.

Lower Intermediate

The participants in the Lower Intermediate Level were NNS-1 (Sally), NNS-2 (Jade), and NNS-7 (Tiana). To remind the reader, NNS-1 (Sally) was a 24-year-old homemaker from China, who primarily spoke Cantonese as her native language and had been residing in the U.S. for three months at the time of data collection. She relocated to the U.S. to join her husband and was enrolled in an Intermediate-1 language program. Sally did not have many opportunities to interact with native speakers of English. NNS-2 (Jade) was a 53 year-old homemaker from Korea who lived with her husband and daughter in NYC. She had been in the US for almost 5 years at the time of data collection. Jade was well-travelled and had an active social life that included interacting with native speakers of English due to her husband's job. She spoke Korean

as her L1 and knew Chinese and English as additional languages. Jade had an M.A. from Korea and was enrolled in the Intermediate pronunciation course at the language program. She also attended language classes offered at her local NYPL. Lastly, NNS-7 (Tiana), a 23-year-old Thai-speaking female from Thailand, had been living in the U.S. for two years before returning to her country, where she worked as a Thai-English translator. Tiana frequently interacted with native speakers of English in her role as a translator in her country and stayed connected with native-speaker friends and host-family.

The following tables 22, 23, and 24 present the results of the Friedman test for the usage of the definite article 'the', indefinite article ‘a’ and ‘an’, and the zero article Ø with a significance level set at 0.05 ($\alpha = 0.05$). It includes the Q-statistic, degrees of freedom, p-value, and the corresponding significance levels.

Table 22: Friedman Test – Definite Article ‘the’ usage by Lower Intermediate NNS

		Q-statistic	df	p-value	Significance
Lower Intermediate	NNS-1 (Sally)	15.75	3	0.0012	*** (high)
	NNS-2 (Jade)	15.75	2	0.0004	*** (high)
	NNS-7 (Tiana)	9.6	2	0.0082	** (moderate)

The Friedman test results revealed statistically significant differences in the use of the definite article 'the' among the NNS participants at the Lower Intermediate proficiency level. Specifically, for NNS-1 (Sally) and NNS-2 (Jade), the Friedman statistic was 15.75 with 3 and 2 degrees of freedom respectively, yielding p-values of 0.0012 and 0.0004 respectively. These p-values fall well below the typical significance threshold of 0.05, indicating highly significant differences in the use of the definite article 'the' for both participants. Thus, the null hypothesis

that there are no differences in the use of 'the' among different contexts is rejected for Sally and Jade. Conversely, for Tiana, the Friedman statistic was 9.6 with 2 degrees of freedom, resulting in a p-value of 0.0082. While this p-value is significant, it falls within a lower range of significance compared to NNS-1 and NNS-2, suggesting a comparatively weaker level of significance. Nonetheless, the null hypothesis is still rejected for NNS-7, indicating that there are indeed differences in the use of 'the' among different contexts for this participant as well.

The table below presents the Friedman test results for the usage of the indefinite articles 'a' and 'an' for the same participants.

Table 23: Friedman Test – Indefinite Articles 'a' 'an' usage by Lower Intermediate NNS

		Q	df	p-value	Significance
Lower Intermediate	NNS-1 (Sally)	9.6	1	0.0019	*** (high)
	NNS-2 (Jade)	*Friedman test not possible*			-
	NNS-7 (Tiana)	36.67	1	0.0001	*** (high)

For Sally, the test yielded a Friedman statistic of 9.6 with 1 degree of freedom, resulting in a p-value of 0.0019. This indicates a statistically significant difference in the use of indefinite articles, suggesting that Sally's usage patterns differ significantly across contexts. A Friedman test was not possible for NNS-2 Jade because of the lack of variation in the use of indefinite articles. For NNS-7 (Tiana), the Friedman statistic was notably higher at 36.67 with 1 degree of freedom, and the corresponding p-value was 0.0001. This suggests a particularly pronounced difference in the use of indefinite articles for Tiana, underscoring substantial variability in her usage patterns across different contexts. Overall, these results underscore the complexity and

variability in the use of indefinite articles among Sally, Jade, and Tiana at the lower intermediate proficiency level.

For the zero article 'Ø' usage, the Friedman test results including the Q-statistic, degree of freedom, p-value, and significance of the results are reported in Table 24 below:

Table 24: Friedman Test – Zero Article 'Ø' usage by Lower Intermediate NNS

		Q-statistic	df	p-value	Significance
Lower Intermediate	NNS-1 (Sally)	143.389	5	<0.001	*** (high)
	NNS-2 (Jade)	36.38	5	<0.0001	*** (high)
	NNS-7 (Tiana)	28.8	4	<0.0001	*** (high)

The Friedman test results indicate statistically significant differences in the use of the zero definite article 'Ø' among Sally, Jade, and Tiana at the lower intermediate proficiency level. For Sally, the Friedman statistic was 143.389 with 5 degrees of freedom, yielding a p-value of less than 0.001, indicating high significance. Similarly, for Jade, the Friedman statistic was 36.38 with 5 degrees of freedom, resulting in a p-value of <0.0001, also indicating high significance. Additionally, for Tiana, the Friedman statistic was 28.8 with 4 degrees of freedom, yielding a p-value of less than 0.0001, further indicating high significance. These findings suggest substantial variability in the use of the zero definite article 'Ø' among the participants, warranting further investigation into the factors influencing their individual usage patterns. Individual post hoc analyses and patterns of us will be presented later in this section.

Upper Intermediate

There were three NNS participants in the Upper Intermediate level: NNS-8 (Luna), NNS-9 (Demi), and NNS-10 (Bella). Luna was young female who joined the study from Brazil. She was

in the Intermediate-3 ESL level in the language program, and she was also proficient in French. Demi was young au pair from Mexico who was enrolled in an online ESL Grammar and Writing-2 course. She had extensive exposure to native English speakers through her work. Lastly, Bella was a 42-year-old female lawyer from Brazil, enrolled in an upper-intermediate-2 ESL level program in the U.S. and had exposure to native English speakers through her profession.

Tables 25 and 26 display the findings of the Friedman test conducted on the use of the definite article 'the', indefinite articles 'a' and 'an', and the zero article Ø by Luna, Demi, and Bella at the Upper Intermediate level. With the significance level set at 0.05 ($\alpha = 0.05$), the corresponding Q-statistic, degrees of freedom, p-value, and associated significance levels are presented below:

Table 25: Friedman Test – Definite Article 'the' usage by Upper Intermediate NNS

		Q-statistic	df	p-value	Significance
Upper Intermediate	NNS-8 (Luna)	9.72	3	0.021	* (low)
	NNS-9 (Demi)	7.2	3	0.065	(Not significant)
	NNS-10 (Bella)	19.66	3	0.001	*** (high)

The results revealed varying patterns across the three NNS participants. Luna demonstrated a statistically significant difference in article usage, albeit at a relatively lower level of significance ($p = 0.021$), suggesting some variability in her usage patterns. Conversely, Demi (NNS-9) did not exhibit statistically significant differences in article usage ($p = 0.065$), indicating a lack of substantial variation. In contrast, Bella (NNS-10) displayed highly significant differences in article usage ($p = 0.001$), emphasizing considerable variability across different

contexts. These findings underscore the nuanced nature of article usage among Luna, Demi, and Bella, highlighting individual differences at the upper intermediate proficiency level.

In the analysis of indefinite article usage among these participants, the Friedman test was not applicable to any of the NNS participants in this level. This was due to the presence of only one type of indefinite article (Indef. Singular 'a'/ 'an') in the dataset. As the Friedman Test requires a minimum of two groups to yield meaningful results, it was not viable to conduct the test for Luna, Bella, and Demi.

The table below presents the Friedman test results for the usage of the zero article 'Ø'.

Table 26: Friedman Test – Zero 'Ø' usage by Upper Intermediate NNS

		Q-statistic	df	p-value	Significance
Upper Intermediate	NNS-8 (Luna)	26.67	7	<0.0001	*** (high)
	NNS-9 (Demi)	30.67	7	<0.0001	*** (high)
	NNS-10 (Bella)	8.67	2	0.0132	** (moderate)

The Friedman test was conducted to examine the usage of the zero article 'Ø' among the NNS participants at the upper intermediate proficiency level. The results revealed significant differences among the participants. Both Luna and Demi displayed notably high Friedman statistics of 26.67 and 30.67, respectively, with 7 degrees of freedom, resulting in p-values of less than 0.0001, indicating high statistical significance. This suggests substantial variability in the usage patterns of the zero article among Luna and Demi. Conversely, Bella exhibited a lower Friedman statistic of 8.666 with 2 degrees of freedom, yielding a p-value of 0.0132, indicating moderate statistical significance. While Bella's usage patterns also showed variability, it was of a slightly lesser magnitude compared to Luna and Demi. These findings underscore the nuanced

nature of article usage among the three participants at the upper intermediate proficiency level, highlighting individual differences influencing language usage patterns.

Advanced

The NNS participants at the Advanced Level included NNS-3 (Skye), NNS-4 (Zara), NNS-5 (Hazel), and NNS-6 (Nabi). Specifically, Skye was a young female from Brazil who had been living in the U.S. for almost three years at the time of data collection. She was enrolled in the ESL Grammar & Writing-2 course. The next participant, Zara, known as NNS-4, was a 22-year-old Law student who joined the study from Germany. She had spent 14 months in the U.S. as an au pair before returning to Germany due to the COVID-19 pandemic. The next participant was Hazel who was a 31-year-old homemaker from Japan living in NYC with her husband. She had an M.A. in English Literature and completed two ESL courses to improve her English communication skills. Hazel had reported limited opportunities of interacting with native English speakers in her daily life. Lastly, Nabi, a 35-year-old engineer from Mauritania, had been residing in the U.S. for almost three years, working as an Uber driver and using English daily in his professional interactions. Despite ten years of English study in Mauritania, he continued learning in the US, engaging with native speakers in his daily activities.

Tables 27, 28, and 29 display the findings of the Friedman test conducted on Skye, Zara, Hazel, and Nabi's usage of the English articles 'the', 'a', 'an', and the zero article 'Ø'. The significance level was set at 0.05 ($\alpha = 0.05$), presenting the Q-statistic, degrees of freedom, p-value, and associated significance levels.

Table 27: Friedman Test – Definite Article 'the' usage by Advanced NNS

		Q-statistic	df	p-value	Significance
Upper Intermediate	NNS-8 (Skye)	20.71	2	<0.001	*** (high)
	NNS-9 (Zara)	18.33	3	<0.001	*** (high)
	NNS-10 (Hazel)	24	3	<0.001	*** (high)
	NNS-6 (Nabi)	36	3	<0.001	*** (high)

The Friedman test was conducted to analyze the usage of the definite article 'the' among nonnative speakers at the Advanced proficiency level, yielding significant results across all participants. NNS-8 (Skye) demonstrated a Q-statistic of 20.71 with 2 degrees of freedom, resulting in a p-value of less than 0.001, indicating high statistical significance. Similarly, NNS-9 (Zara) displayed a Q-statistic of 18.33 with 3 degrees of freedom, as well as NNS-10 (Hazel) with a Q-statistic of 24 and NNS-6 (Nabi) with a Q-statistic of 36, all yielding p-values less than 0.001, signifying high significance. These findings underscore substantial variability in the usage patterns of the definite article 'the' among nonnative speakers at the Advanced proficiency level, highlighting the importance of further investigation into language acquisition and usage at this proficiency level.

The table below presents the Friedman test results for the usage of the indefinite articles 'a' and 'an'.

Table 28: Friedman Test – Indefinite Articles 'a' 'an' usage by Upper Intermediate NNS

		Q-statistic	df	p-value	Significance
Upper Intermediate	NNS-3 (Skye)	0.889	1	0.346	Not Significant
	NNS-4 (Zara)	0.444	2	0.801	Not Significant

NNS-5 (Hazel)	0.666	1	0.014	Not Significant
NNS-6 (Nabi)	0.888	1	0.346	Not Significant

The Friedman test was employed to investigate the usage of the indefinite articles 'a' and 'an' among nonnative speakers at the Advanced proficiency level, yielding results that did not reach statistical significance for any of the participants. Specifically, NNS-3 (Skye) displayed an index of 0.889 with 1 degree of freedom, resulting in a p-value of 0.346, indicating no significant differences in article usage. Similarly, NNS-4 (Zara) exhibited an index of 0.444 with 2 degrees of freedom, yielding a p-value of 0.801, while NNS-5 (Hazel) and NNS-6 (Nabi) showed indices of 0.666 and 0.888, respectively, each with 1 degree of freedom and p-values of 0.014 and 0.346, respectively. These findings suggest a lack of discernible differences in the usage patterns of the indefinite articles 'a' and 'an' among nonnative speakers at the Advanced proficiency level, highlighting the need for further exploration into factors influencing article usage in this context.

The table below presents the Friedman test results for the usage of the Zero article 'Ø'.

Table 29: Friedman Test – Zero Article 'Ø' usage by Advanced NNS

		Q-statistic	**df**	**p-value**	**Significance**
Upper Intermediate	NNS-3 (Skye)	18	3	0.0004	* (low)
	NNS-4 (Zara)	48.667	8	<0.0001	*** (high)
	NNS-5 (Hazel)	36.667	6	<0.0001	*** (high)
	NNS-6 (Nabi)	36.667	7	<0.0001	*** (high)

The Friedman test was conducted to examine the usage of the zero article among the NNS participants at the Advanced proficiency level, revealing notable findings across the participants. Skye demonstrated a statistic of 18 with 3 degrees of freedom, resulting in a p-value

of 0.0004, indicating statistically significant differences, albeit at a lower significance level. Conversely, Zara displayed a statistic of 48.667 with 8 degrees of freedom. Similarly, Hazel and Nabi with statistics of 36.667 and 36.667, respectively, each yielding p-values of less than 0.0001, showed high statistical significance. These results underscore substantial variability in the usage patterns of the zero article among the four Advanced proficiency level participants, highlighting the need for further investigation into the factors influencing article usage.

Given that the results of the Friedman tests indicated significance in analyzing the use of English article types among low intermediate, upper intermediate, and advanced proficiency levels, the study proceeded to conduct a post hoc analysis. This additional examination was carried out using Wilcoxon pair-wise comparisons with a Bonferroni correction. Such a post hoc analysis was essential for discerning the specific differences among the article types that contributed to the observed significance in the Friedman test.

The Wilcoxon pair-wise comparison (Woodrow, 2014) is a nonparametric test that compares two paired groups of observations. It is used when the data are not normally distributed or when the sample size is small. The test statistic is the sum of the ranks of the differences between the pairs, and the p-value is the probability of obtaining a test statistic as extreme or more extreme than the observed one under the null hypothesis of no difference. The Bonferroni correction (Smith & Cribbie, 2013) is a method to adjust the significance level for multiple comparisons. It divides the original alpha level by the number of tests performed and rejects the null hypothesis for each comparison if the p-value is less than or equal to the adjusted alpha level. The goal is to control the family-wise error rate, which is the probability of making at least one type I error among all the tests.

By employing this methodological approach, the study aimed to provide a comprehensive understanding of the nuanced variations in article usage across proficiency levels among nonnative speakers of English. The results of the post hoc analysis are presented according to proficiency levels starting with Lower Intermediate, Upper Intermediate, and Advanced respectively. Since each of the ten NNS in these levels produced varied types of definite, indefinite, and zero articles, each NNS's use of the articles were analyzed individually. This yielded 30 post hoc analyses overall which are reported as follows:

Lower Intermediate

The three participants in this level were: NNS-1 (Sally), NNS-2 (Jade), and NNS-7 (Tiana).

NNS-1 (Sally)

The table below presents the results of the Wilcoxon pair-wise comparison, which was conducted as a post hoc analysis with Bonferroni correction, examining the usage of definite articles by Sally. Each row in the table represents a comparison between different types of definite articles used by Sally, with Article Type 1 and Article Type 2 indicating the pairs being compared. The "p-value" column displays the p-values resulting from the Wilcoxon test, indicating the probability of obtaining the observed results by chance alone. Additionally, the "Adjusted p-value" column presents the adjusted p-values after applying the Bonferroni correction to account for multiple comparisons.

Table 30: Post hoc analysis with Bonferroni correction of Sally's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Article	***Definite Article***			
Def. plural 'the'	Def. Sing. 'the'	<0.0125	0.0394	Not Significant
Def. plural 'the	Def. Abstract 'the'	>0.0125	0.0394	Not Significant
Def. plural 'the'	Def. Noncount	>0.0125	0.0394	Not Significant
Def. Sing. 'the'	Def. Abstract 'the'	<0.0125	0.0394	Not Significant
Def. Sing. 'the'	Def. Noncount	<0.0125	0.0394	Not Significant
Def. Abstract 'the'	Def. Noncount	>0.0125	0.0705	Not Significant
Indefinite Article	***Indefinite Article***			
Noncount	Singular	<0.0125	0.0705	Not Significant
Noncount	Singular	<0.0125	0.0705	Not Significant
Noncount	Plural	<0.0125	0.0705	Not Significant
Singular	Singular	<0.0125	0.0705	Not Significant
Singular	Plural	<0.0125	0.0705	Not Significant
Singular	Plural	>0.0125	0.0705	Not Significant
Zero Article	***Zero Article***			
Generic Plural Ø	Generic Noncount Ø	<0.0125	0.0047	** (moderate)
Generic Plural Ø	Mass Ø	<0.0125	0.0047	** (moderate)
Generic Plural Ø	Singular Ø	<0.0125	0.0047	** (moderate)
Generic Plural Ø	Plural Ø	<0.0125	0.0047	** (moderate)
Generic Noncount	Mass Ø	<0.0125	0.0047	** (moderate)
Generic Noncount Ø	Singular Ø	<0.0125	0.0047	** (moderate)
Generic Noncount Ø	Plural Ø	<0.0125	0.0047	** (moderate)
Mass Ø	Singular Ø	<0.0125	0.0047	** (moderate)
Mass Ø	Plural Ø	<0.0125	0.0047	** (moderate)
Singular Ø	Plural Ø	<0.0125	0.0047	** (moderate)

Twenty-one pair-wise comparisons of different types of articles used by Sally were performed. The findings suggest that Sally's usage of various types of definite articles 'the' – including plural, singular, and abstract – did not exhibit statistically significant differences.

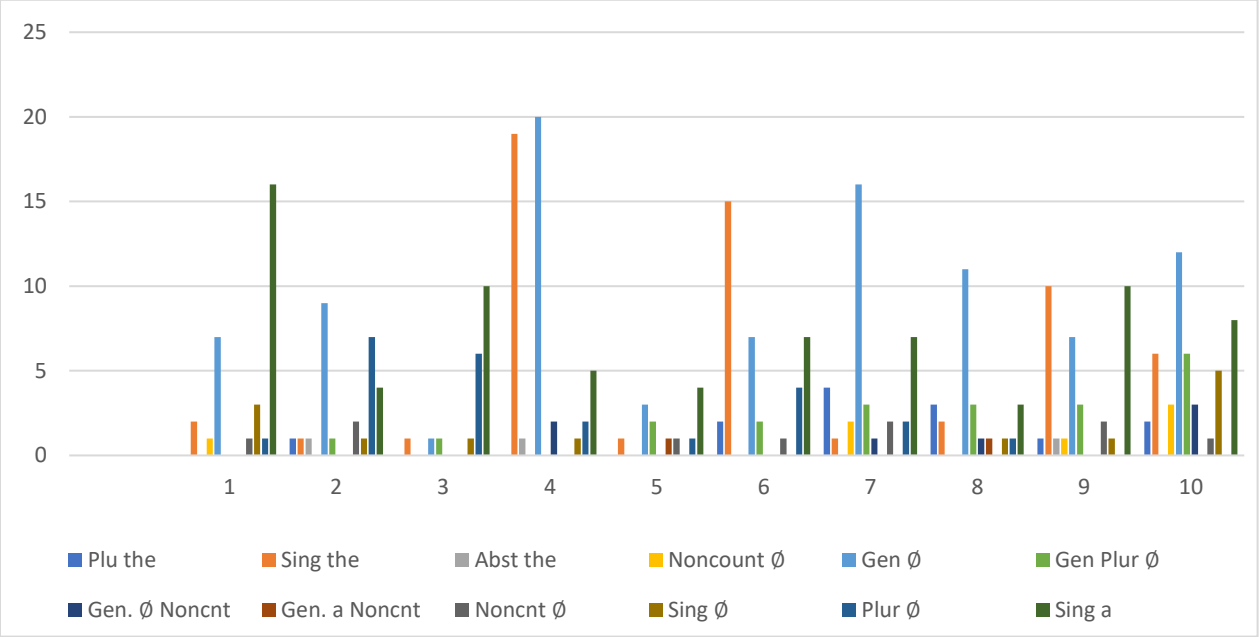
In examining the utilization of definite articles by Sally, a comprehensive analysis integrating both quantitative and qualitative dimensions is imperative to grasp the nuances of her

linguistic performance. The Friedman Test, utilized to discern any significant variations in Sally's use of definite articles across the study period, indicates that there were indeed fluctuations in her utilization patterns. However, the subsequent Wilcoxon pair-wise comparisons, adjusted for multiple comparisons through Bonferroni correction, did not reveal statistically significant differences between specific pairs of definite article types, underscoring the consistency in Sally's deployment of definite articles over the study period.

Upon delving into Sally’s production data (Appendix I), a qualitative examination unveils a discernible trend in Sally's utilization of definite articles. Across the nine-week period, Sally predominantly favored the use of singular definite articles ('the') over plural definite articles ('the'), particularly notable in Weeks 3, 4, 6, 7, and 9. Interestingly, there appears to be a substantial increase in the utilization of singular definite articles from Week 2 onwards, peaking notably in Week 6 and Week 9.

Moreover, the distribution of Sally's definite article usage extends to abstract and noncount nouns. It is apparent that Sally demonstrates a preference for singular definite articles ('the') in conjunction with both abstract and noncount nouns, as evidenced by the consistent usage across the study weeks. However, it is noteworthy that there is a sporadic utilization of plural definite articles ('the') with abstract nouns, particularly evident in Weeks 2, 4, and 7.

Figure 15: Sally's correct target-like use of articles



With 419 being the total number of articles used by Sally, the least number of occurrences was in week 3 (22), and the most was in week 4 (67). In week 3, the topics that the dyad discussed included *Kids, Charlie Chaplin video clip, House, Husband, House chores, Pets.* In week 4, the dyad discussed topics including *Spring cleaning, Mr. Bean video clip, The table, Dyslexia, Language mistakes, NYC Buildings, The sky/The roof,* and *Scheduling*. The percentage of correct usages ranged from 48% (week 2) to 97% (week 10), while the percentage of incorrect usages ranged from 4% (week 6) to 53% (week 2). The overall percentage of correct usages was 79%, and the overall percentage of incorrect usages was 21%. This suggests a significant improvement in Sally's usage of English articles over the course of the study.

Sally struggles with the correct use of the definite article 'the' in singular and plural contexts. She makes multiple errors in Weeks 1, 4, 7, and 10, suggesting a recurring issue with this article form. Sally demonstrates difficulty in using definite articles 'the' with abstract and

noncount nouns. For example, in the following sentence produced by Sally in Week 1 voice chat, the noun ‘life’ is represented as an abstract when the context required it was a specific. The dyad was talking about life here in NYC and Sally said:

7. Yeah. It took a long time for me to get used to **life*
[*the* life]

(Week #1/Voice chat)

While the errors are not as frequent as with singular and plural articles, these incorrect usages appear in Weeks 1 and 4. The zero article (Ø) is used incorrectly in various contexts, including abstract and noncount nouns. This indicates that Sally often omits articles when they are needed, as seen in Weeks 1, 2, 5, 6, 8, and 9. For example, in the sentence below:

8. But I can take my schedule class I do **meeting* with you, do my homework
[*the* meeting]

(Week #2/Voice chat)

In essence, while the statistical analyses may not yield significant differences in Sally's deployment of definite articles, a qualitative inspection reveals notable trends in her usage patterns. Sally's tendency to favor singular definite articles, especially in conjunction with abstract and noncount nouns, suggests a nuanced understanding and application of English grammatical conventions.

Similarly, when considering indefinite articles 'a', 'an', and zero articles, no notable discrepancies were observed across singular, plural, or noncount noun categories. Commencing with the statistical examination, the Friedman Test followed by the Wilcoxon pair-wise post hoc analysis with Bonferroni correction indicates no statistically significant differences in Sally's use of indefinite articles across different types. The p-values obtained for all comparisons exceed the significance threshold after adjusting for multiple comparisons, signifying the absence of significant variations in her utilization patterns.

However, a qualitative inspection offers insights into Sally's deployment of indefinite articles throughout the ten-week study period. Notably, Sally predominantly employs singular indefinite articles ('a') across the duration of the study, with sporadic instances of utilization of plural indefinite articles. Specifically, Sally's utilization of singular indefinite articles ('a') exhibits consistency, with a substantial majority of instances recorded across the study weeks. Conversely, her utilization of plural indefinite articles remains relatively minimal, as evidenced by the consistently low counts throughout the observation period.

Moreover, the distribution of Sally's indefinite article usage extends to noncount nouns. It is apparent that Sally demonstrates a preference for singular indefinite articles ('a') in conjunction with noncount nouns, as evidenced by the consistent usage across the study weeks. However, it is noteworthy that there is a variability in her utilization of plural indefinite articles with noncount nouns, with some weeks registering no usage and others indicating a minor presence. In the use of the indefinite plural Ø, Sally also encounters difficulties with indefinite plural articles, primarily omitting them when they should be used, as observed in Weeks 3 and 7. The following sentence is an example of Sally's underuse of the indefinite plural Ø. In the utterance Sally refers to doctors in general but treats the plural noun as specific:

1. **the doctors* said you eat every time you eat…
[*doctors*]

(Week 7/Voice chat)

Sally makes errors with the usage of indefinite articles 'a' and 'an' in singular contexts. These errors are particularly evident in Weeks 2, 3, 4, 7, and 9. For example, in Week 4, Sally refers to 'a place' of work in general but does not use the indefinite 'a':

2. So you don't have to go to **normal work pace* [place] to do work?
[*a* normal workplace]

(Week 4/Voice chat)

Although most comparisons did not yield significant differences, the statistical significance detected post-Bonferroni correction highlights a distinct trend in Sally's language usage, particularly concerning generic plural zero articles. This suggests that while overall usage patterns may not markedly differ, specific linguistic elements like generic plural zero articles merit further investigation due to their heightened significance in Sally's discourse. However, a significant difference was observed between all zero article types and other article types, except for the comparison between generic plural zero and generic noncount zero. This indicates differential usage of zero articles compared to other articles but not between generic plural and generic noncount forms. Such observations may imply a potential lack of proficiency or knowledge in utilizing zero articles in English or a transfer effect from Sally's native language.

Qualitative inspection of the raw numerical data further delineates Sally's deployment of zero articles. Across the ten-week observation period, Sally demonstrates a varied pattern of usage, with fluctuations evident in her utilization across different contexts. Initially, Sally's usage predominantly involves the absence of the zero article ('Ø'), particularly with generic plural contexts. However, as the study progresses, there is a discernible increase in the utilization of zero articles across various contexts, including generic noncount, indefinite mass/noncount, singular indefinite, and plural indefinite contexts.

Moreover, there is variability in Sally's utilization of zero articles with respect to specific linguistic contexts. For instance, while her usage of zero articles remains relatively consistent in generic plural contexts throughout the study, there are fluctuations observed in her usage with other contexts, such as generic noncount and indefinite singular/plural.

This analysis underscores Sally's evolving usage of zero articles overtime, with notable fluctuations and variations across different linguistic contexts. While statistical analyses indicate significant differences in her article usage patterns, qualitative examination provides an understanding of the specific contexts and factors influencing her linguistic choices.

NNS-2 (Jade)

Jade, the second NNS participant, spoke Korean as her L1. The post hoc analysis with a Bonferroni correction of Jade's use of article use reveals intriguing insights into the nuances of article usage within the dataset. Beginning with definite articles, comparisons between plural 'the' and singular 'the', as well as between singular 'the' and abstract 'the', demonstrate statistically significant differences. The test statistics for these comparisons indicate no discernible variance, but the p-values fall below the threshold of 0.0167, leading to the rejection of the null hypothesis and confirming the significance of these differences. This suggests that Jade employs different strategies when utilizing definite articles, particularly when distinguishing between plural and singular forms, as well as between singular forms and abstract contexts.

Table 31: Post hoc analysis with Bonferroni correction of Jade's article use

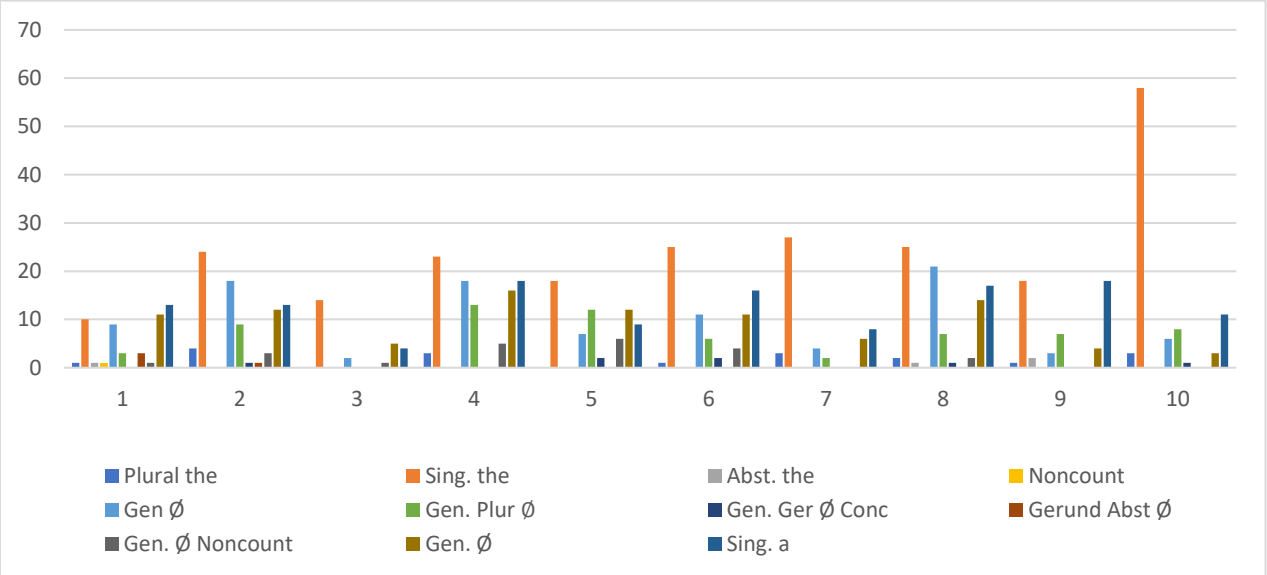
Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Articles	***Definite Articles***			
Def. Plural 'the'	Def. Singular 'the'	<0.0167	< 0.001	*** (high)
Def. Plural 'the'	Def. Abstract 'the'	>0.0167	< 0.001	Not significant
Def. Singular 'the'	Def. Abstract 'the'	<0.0167	< 0.001	*** (high)
Indefinite Articles	***Indefinite Articles***			
Not applicable	-	-	-	-
Zero Article	***Zero Article***			
Generic Ø	Generic Plural Ø	<0.001	<0.002	* (low)
Generic Ø	Generic Noncount Ø	<0.001	<0.002	* (low)
Generic Plural Ø	Generic Noncount Ø	0.109	0.327	Not significant

As seen in the table above, there is a significant difference in the use of definite articles between definite plural 'the' and definite singular 'the', with a p-value of less than 0.0167 and an adjusted p-value of less than 0.001. This significant difference suggests that Jade's usage of definite articles varies significantly between plural and singular forms. Jade's inconsistency of use of the English articles is evidenced by the number of incorrect occurrences across all weeks (Appendix I). In week 1, Jade had a total of 23 incorrect occurrences, which accounted for 17.5% of all occurrences. By week 10, the number of incorrect occurrences had decreased to 11.5%, accounting for only 5% of all occurrences. Across all weeks, Jade had a total of 131 incorrect occurrences and 685 correct occurrences, resulting in an overall error rate of 19% and an accuracy rate of 81%. The highest error rate was achieved in week 1, where Jade had a 17.5% error rate. The lowest error rate was achieved in week 7, where Jade had a 5% error rate.

The qualitative analysis of Jade's overall performance in using English articles indicated that her proficiency remained elevated and consistent throughout the ten-week period. She maintained an average accuracy rate of 82% and an average error rate of 18%. The qualitative analysis of Jade's overall performance in using English articles showed consistent improvement over the course of ten weeks. She has an average accuracy rate of 82% and an average error rate of 18%. Her accuracy rate ranges from 56% to 89% across the ten weeks. The highest accuracy rate is achieved in week 2, while the lowest accuracy rate is achieved in week 1. The topics discussed in week 2 ranged from Halloween to Mr. Bean video clip, Comedy, TV Shows, Movies, K-Pop, Disney Channel, NYC & culture, Artists, and Japanese painters. On the other hand, in week 1, the dyad engaged in discussions that included a range of topics for instance, Introductions, Family, Home country, Kids, English class, Job, Vietnam War, Korea, Military

Draft, Trauma, Social network, Phones, Zoom experience, psychotherapy, Doctors & Patients, and Jade's English proficiency. The average error rate ranges from 11% to 44% across the ten weeks. The highest error rate is in week 1, while the lowest error rate is in week 7.

Figure 16: Jade's correct target-like use of articles



There is also a significant difference in usage between definite singular 'the' and definite abstract 'the', with a p-value of less than 0.0167 and an adjusted p-value of less than 0.001. This finding implies that Jade's usage of definite articles differs significantly between singular and abstract contexts.

Jade underused the definite article 'the' with singular nouns frequently, with a total of 42 occurrences across all weeks. The following sentence represents this type of incorrect use in which the dyad is discussing the first 2020 presidential debate and wanted to ask her NS interlocutor about a particular presidential candidate. In her question, Jade treated the word 'debate' as a generic noun while the context called for the specific use:

3. You saw him in **debate*?
[*the* debate]

(Week 10/Voice chat)

Significant differences were also observed in the usage of the zero article between generic ‘Ø’ and generic plural zero ‘Ø’, as well as between generic ‘Ø’ and generic noncount ‘Ø’. Both comparisons yielded p-values of less than 0.001 and adjusted p-values of less than 0.002, signifying a significant variation in Jade's use of the zero article across different contexts. It implies that Jade employs varied approaches when omitting articles, particularly in distinguishing between generic contexts and plural or noncount contexts. For example, in the following sentence, Jade refers to her experience in general to being exposed to different cultures as she learns English.

4. It is also **good experience* to exposed to other…
[*a* good experience]

(Week 1/Voice chat)

The comparison between generic plural zero ‘Ø’ and generic noncount ‘Ø’ did not yield a significant difference, with a p-value of 0.109 and an adjusted p-value of 0.327. Thus, the analysis suggests that Jade's usage of the zero article does not significantly differ between plural and non-count contexts. A post hoc analysis of the indefinite articles ‘a’ and ‘an’ was not possible because Jade only used one type of indefinite articles implying a potential uniformity in their usage across the dataset.

NNS-7 (Tiana)

The post hoc analysis with Bonferroni correction for Tiana, an L1 Thai speaker, reveals significant differences in the use of definite and indefinite articles, while low to no significant difference is observed in the use of zero articles.

In the case of definite articles, comparisons between plural and singular forms of 'the' as well as between singular 'the' and noncount 'the' yield statistically significant results.

Specifically, the utilization of plural versus singular 'the' demonstrates a rejection of the null hypothesis, indicating that there is indeed a difference in Tiana's usage patterns between these two forms. Similarly, the comparison between singular 'the' and noncount 'the' also leads to the rejection of the null hypothesis, signifying a significant distinction in usage.

Table 32: Post hoc analysis with Bonferroni correction of Tiana's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Articles				
Def. plural 'the'	Def. Singular 'the'	<0.0167	<0.001	* * * (high)
Def. plural 'the'	Def. Noncount	>0.0167	0.001	Not significant
Def. Singular 'the'	Def. Noncount	<0.0167	<0.001	* * * (high)
Indefinite Articles				
Singular 'a'	Generic Noncount	<0.0167	<0.001	* * * (high)
Zero Articles				
Generic Ø	Generic Plural Ø	<0 .001	<0.002	* (low)
Generic Ø	Generic Noncount Ø	<0 .001	<0.002	* (low)
Generic Plural Ø	Generic Noncount Ø	0.109	0.327	Not significant

Over the ten weeks, Tiana's use of English articles shows a clear pattern. She uses the definite article 'the' more frequently with singular nouns, peaking at 32 times in the seventh week (Appendix I). In the following sentence, for instance, Tiana refers to the hard shell of a fruit called 'durian' and correctly uses the definite singular 'the'.

5. it's the 'pelu̱xk' uh *the shell* is very hard to open

(Week 3/Voice chat)

For plural nouns, her usage of 'the' is less, with a maximum of five times in weeks one and seven. Tiana uses zero articles often, especially with generic nouns, with a maximum of 19 times in the third week. An example of Tiana's use of the zero article with generic nouns is the following utterance in which she uses correctly uses the zero article with the generic noun 'people'.

6. She always *take care of every cat that *people* give

(Week 7/Voice chat)

Tiana's incorrect usage in the definite article 'the' is more frequent with singular nouns, reaching a maximum of eleven times in the fourth week. For plural nouns, her incorrect usage of 'the' is less, with a maximum of two times in the first week. In the example below, Tiana talks about why most houses in Thailand have tile floors and, in her sentence, she overuses the definite article 'the' with a generic noun 'tile'.

7. When you have a house with **the tile*, It *make you feel cool.

[*tile(s)*]

(Week 4/Type chat)

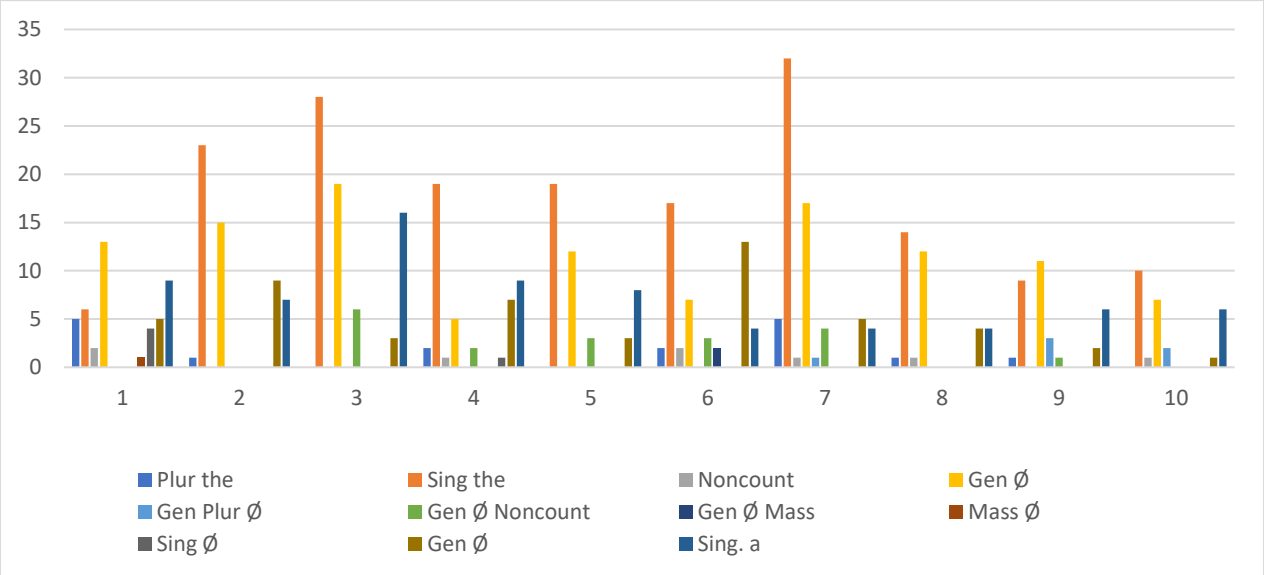
Regarding indefinite articles, the analysis contrasts the singular indefinite article 'a' with generic noncount indefinite articles, with the results showing a significant difference between these two types. This implies that Tiana employs these two forms differently in her discourse which is expected at her proficiency level.

However, Tiana's use of zero articles with indefinite singular nouns is less frequent, with a maximum of nine times in the second week. The indefinite articles 'a' and 'an' are mostly used with singular nouns, with a maximum of 16 times in the third week. But their use with indefinite mass or noncount nouns is less frequent, with a maximum of two times in the sixth week. For indefinite generic nouns, Tiana uses zero articles up to 13 times in the sixth week. An example of her use of the zero article with a generic noun is as follows.

8. I used to *doing back stage in *college*

(Week 2/Type chat)

Figure 17: Tiana's correct target-like use of articles



The indefinite articles 'a' and 'an' are incorrectly used by Tiana mainly with singular nouns, reaching a high of five times in the third week. For indefinite generic nouns, Tiana's incorrect usage of zero articles reaches a peak of four times in the third, fifth, and eighth weeks. In week 6, Tiana refers to her family dog but incorrectly uses zero article with the generic noun 'dog' instead of a definite 'the'.

9. Right right **dog* always happy to see me
[*the* dog]

(Week 6/Voice chat)

Conversely, when examining zero articles, the comparison between generic zero and both generic plural zero and generic noncount zero does not yield statistically significant differences. However, her incorrect usage of zero articles is noticeable, especially with generic nouns, with a maximum of four times in the ninth week. This suggests that Tiana's use of zero articles across these categories is consistent and does not vary significantly. The incorrect use of the zero article

is exemplified in the example below in which the word ‘state’ is a singular count noun that needs an article to show if it refers to any state or a specific state.

10. I mean like Philadelphia is just **state* right?
[*a state*]

(Week 9/Voice chat)

Overall, the post hoc analysis underscores nuances in Tiana's language usage, particularly in the realm of definite and indefinite articles, shedding light on her linguistic preferences and patterns.

Upper Intermediate

The three participants in this level were: NNS-8 (Luna), NNS-9 (Demi), and NNS-10 (Bella).

NNS-8 (Luna)

Luna, who is a native Portuguese speaker, was a participant from Brazil. The table below presents the outcomes of a Wilcoxon pair-wise comparison as a post hoc analysis with Bonferroni correction on Luna's usage of definite articles, indefinite articles, and zero articles.

Table 33: Post hoc analysis with Bonferroni correction of Luna’s article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Articles				
Def. Plural 'the'	Def. Sing. 'the'	<0.0167	<0.001	*** (high)
Def. Plural 'the'	Def. Noncount	>0.0167	>0.001	Not significant
Def. Sing. 'the'	Def. Noncount	<0.0167	<0.001	*** (high)
Indefinite Articles				
Not applicable	-	-	-	-
Zero Article				
Generic Noncount Ø	Singular Ø	0.654	1	Not significant
Generic Noncount	Plural Ø	0.654	1	Not significant
Generic Noncount Ø	Generic Ø	0.654	1	Not significant
Generic Noncount Ø	Gen Ø	0.654	1	Not significant
Generic Noncount Ø	Generic Plural Ø	0.654	1	Not significant
Singular Ø	Plural Ø	0.654	1	Not significant

Singular Ø	Generic Ø	0.654	1	Not significant
Singular Ø	Generic Ø	0.654	1	Not significant
Singular Ø	Generic Plural Ø	0.654	1	Not significant
Plural Ø	Generic Ø	0.654	1	Not significant
Plural Ø	Generic Ø	0.654	1	Not significant
Plural Ø	Generic Plural Ø	0.654	1	Not significant
Generic Ø	Generic Ø	0.654	1	Not significant
Generic Ø	Generic Plural Ø	0.654	1	Not significant
Generic Ø	Generic Plural Ø	0.654	1	Not significant

Specifically, when comparing the usage of plural 'the' with singular 'the', the results indicate a statistically significant difference. The test statistic of 0, coupled with a p-value below the adjusted significance threshold of 0.0167, leads to the rejection of the null hypothesis. This suggests that Luna employs plural and singular definite articles in distinct ways. However, when contrasting plural 'the' with noncount definite articles, and singular 'the' with noncount definite articles, no significant differences emerge, as the p-values surpass the adjusted significance threshold.

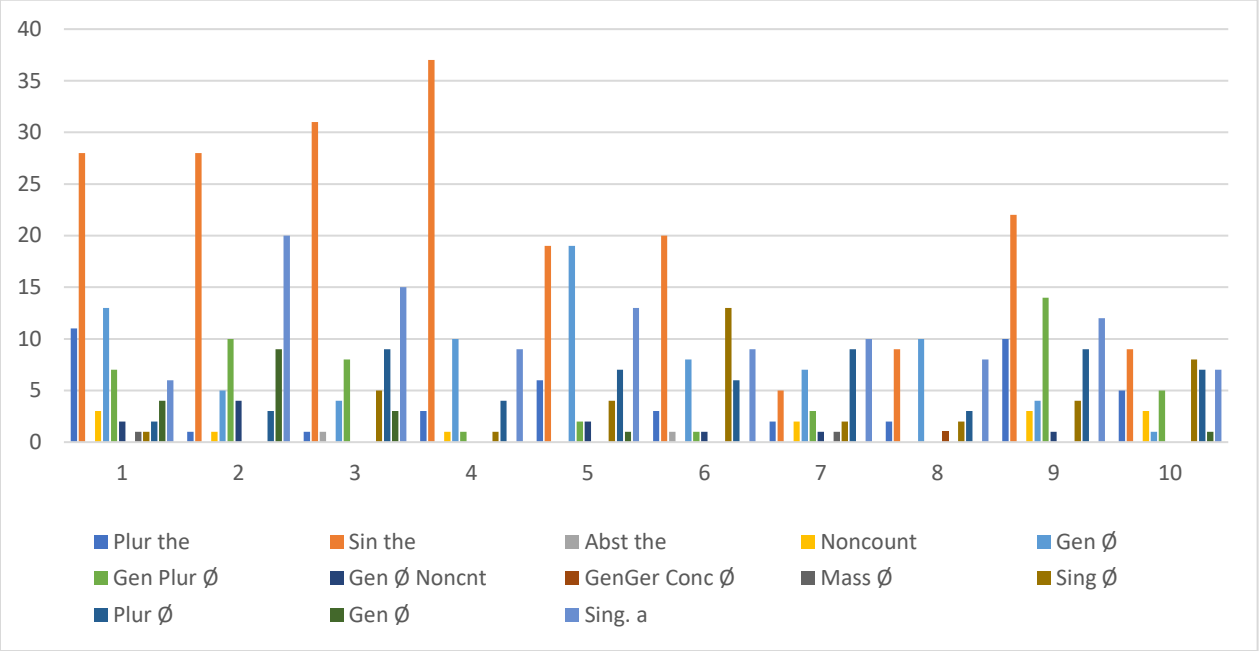
As shown in the table above, the definite singular ‘the’ is the most frequently used article type by Luna. She consistently used this type of article across all weeks, with the highest usage in Week 4 (37 times). The topics that she used this article type in included Greetings, Cleaning rituals & habits, Roommates, Family dynamics, and Vaccinations.

11. okay he might find problems with *the cooker* because if he puts *the table* *in *the other* side maybe he has a problem with *the table* and *the cooker* together

(Week 4/Voice chat)

In terms of the least used article types, a few instances stand out. These instances include the ‘generic indefinite gerund with a concrete Zero Ø’ (1 time), definite abstract ‘the’ (1 time), definite noncount ‘the’ (2 times). Moreover, definite noncount ‘the’ is also infrequently used, appearing only twice in the data. As for observable of patterns, Luna’s usage of the definite singular ‘the’ shows a steady trend, remaining relatively high throughout the ten weeks.

Figure 18: Luna's correct target-like use of articles



The analysis for indefinite article 'a' and 'an' was not applicable because Luna uses the same type of indefinite article throughout the study. This was supported by the qualitative analysis that also showed consistency in the usage of indefinite singular, with a noticeable peak in Week 2 (20 times). For example, in the sentence below, Luna asks her NS interlocutor, who makes documentaries, about the time she spends on making one documentary. In her question, Luna correctly uses the indefinite article 'a' with singular noun 'documentary'.

12. And how much time you spend to do *a documentary*?

(Week 2/Type chat)

There are noticeable fluctuations in the usage of some other article types. For example, the usage of definite plural 'the' fluctuates, peaking in Week 9 (10 instances) after dipping to its lowest in Week 2 (1 instance) and Week 3 (1 instance). The following utterance is from Week 9, when Luna and her NS counterpart were talking about zoos and how people can visit these zoos

to listen to animals sounds and songs. Luna correctly uses the definite article ‘the’ with plural nouns *songs* and *animals.*

13. You can listen to all *the songs* from *the animals*

(Week 9/Voice chat)

Moving to the analysis of zero articles, Luna's usage is subjected to multiple comparisons across various types. However, all comparisons yield p-values equal to or above 0.654, significantly higher than the adjusted significance threshold of 0.0167. Consequently, the null hypothesis cannot be refuted in any of these comparisons, indicating a lack of significant differences in Luna's utilization of different types of zero articles.

A qualitative analysis of the zero article, however, showed a significant increase in the use of the generic ‘Ø’ in Week 5 (19 times) , followed by a decrease in the subsequent weeks. The use of the indefinite singular zero ‘Ø’ is used incorrectly the most by Luna, as revealed by the qualitative analysis. She consistently used this type of article incorrectly across all weeks, with the highest incorrect usage in Week 6 (7 times). An example of Luna’s incorrect use in context is as follows. Luna incorrectly underuses the indefinite article ‘a’ with the noun *child.*

14. Did you travel a lot when you *was **child*?
[*a* child]

(Week 6/Voice chat)

On the other hand, the least incorrect article types used by Luna are the definite plural ‘the’ and indefinite abstract zero Ø. Luna used these types incorrectly only once in Week 1 and Week 5 respectively and did not use them incorrectly in any other week. In terms of trends, Luna’s incorrect usage of the indefinite singular Ø shows a steady trend, remaining relatively high throughout the ten weeks. The incorrect usage of definite singular ‘the’ also remains consistent, with a noticeable peak in Week 5 (7 instances). In the example below, Luna shares

with her NS chat partner that she usually bikes in Rio de Janeiro but not in the South. She misses the definite article ‘the’ with South and instead treats the word *South* as a generic noun with zero article.

15. In **s*outh* almost never, but in Rio I used to bike most frequently
[*the* South]

(Week 5/Type chat)

Lastly, a post hoc analysis of Luna's employment of indefinite articles was not possible because of a lack of applicable comparisons. This suggests a uniformity in Luna's usage of indefinite articles across the dataset, where no statistically significant distinctions are observed.

Lastly, there are noticeable fluctuations in the incorrect usage of some article types. For example, the incorrect usage of indefinite plural *Ø* fluctuates, peaking in Week 6 (7 instances) and reaching its lowest in Week 4 (0 instance). Similarly, the incorrect usage of generic zero *Ø* shows a significant increase in Week 3 (4 instances), followed by a decrease in the subsequent weeks. The data suggests that Luna’s proficiency in using English articles improves overtime.

In summary, the analysis uncovers nuanced variations in Luna's use of definite articles, particularly between the definite singular ‘the’ and indefinite noncount ‘Ø’, while other article types show room for improvement. Additionally, the examination suggests a lack of significant distinctions in Luna's utilization of different types of zero articles. The analysis showed a slight upward change in Luna’s proficiency in English articles overtime.

NNS-9 (Demi)

Demi, a native Spanish speaker from Mexico, was one of the participants in the three upper intermediate proficiency level. The table below presents the post hoc analysis of her use of articles in the data.

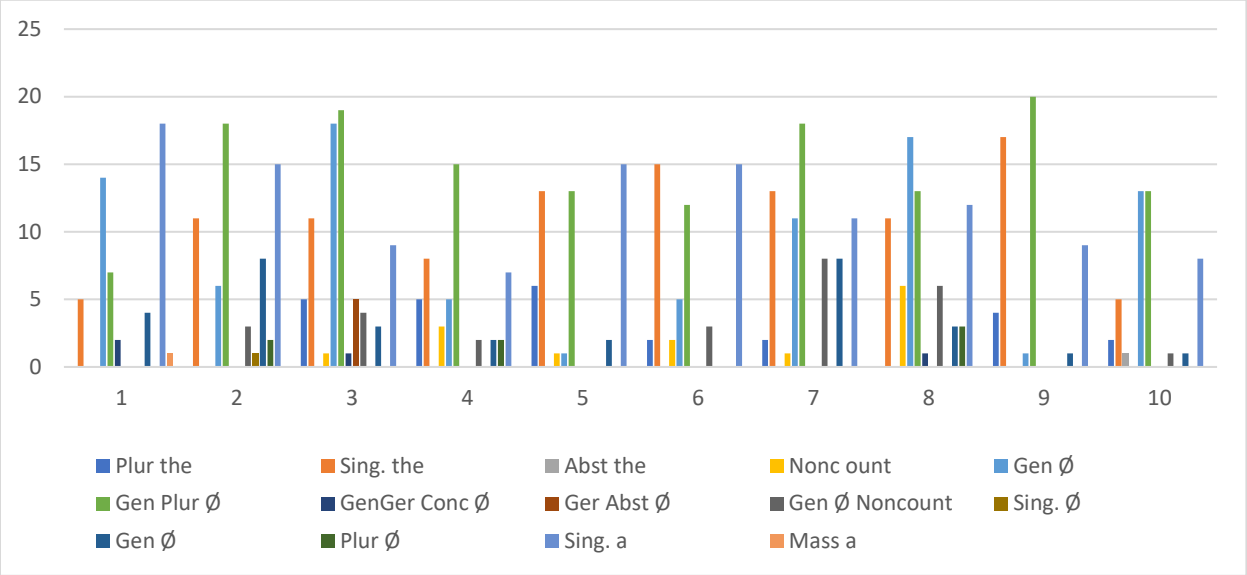
Table 34: Post hoc analysis with Bonferroni correction of Demi's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Article				
Def. Plural 'the'	Def. Sing. 'the'	0.001	0.0006	** (moderate)
Def. Plural 'the'	Def. Abstract 'the'	0.001	0.0006	** (moderate)
Def. Plural 'the'	Def. Noncount 'the'	0.001	0.0006	** (moderate)
Def. Sing. 'the'	Def. Abstract 'the'	0.001	0.0006	** (moderate)
Def. Sing. 'the'	Def. Noncount	0.001	0.0006	** (moderate)
Def. Abstract 'the'	Def. Noncount	0.001	0.0006	** (moderate)
Indefinite Article				
Not applicable				
Zero Article				
Generic Gerund Concrete Ø	Gerund Abstract	0.0002	0.0012	** (moderate)
Generic Gerund Concrete Ø	Generic Noncount Ø	0.8002	0.0012	** (moderate)
Generic Gerund Concrete Ø	Singular Ø	0.0002	0.0012	** (moderate)
Gen. Gerund Concrete Ø	Plural Ø	0.0002	0.0012	** (moderate)
Gen. Gerund Concrete Ø	Generic Ø	0.0002	0.0012	** (moderate)
Gen. Gerund Concrete Ø	Generic Ø	0.8002	0.0012	** (moderate)
Gen. Gerund Concrete Ø	Generic Plural Ø	0.0002	0.0012	** (moderate)
Gerund Abstract Ø	Generic Noncount Ø	0.0002	0.0012	** (moderate)
Gerund Abstract Ø	Singular Ø	0.0002	0.0012	** (moderate)
Gerund Abstract Ø	Plural Ø	0.8002	0.0012	** (moderate)
Gerund Abstract Ø	Generic Ø	0.0002	0.0012	** (moderate)
Gerund Abstract Ø	Generic Ø	0.0002	0.0012	** (moderate)
Gerund Abstract Ø	Generic Plural Ø	0.0002	0.0012	** (moderate)
Generic Noncount Ø	Singular Ø	0.8002	0.0012	** (moderate)
Generic Noncount Ø	Plural Ø	0.0002	0.0012	** (moderate)
Generic Noncount Ø	Generic Ø	0.0002	0.0012	** (moderate)
Generic Noncount Ø	Generic Ø	0.0002	0.0012	** (moderate)
Generic Noncount Ø	Generic Plural Ø	0.8002	0.0012	** (moderate)
Singular Ø	Plural Ø	0.0002	0.0012	** (moderate)
Singular Ø	Generic Ø	0.0002	0.0012	** (moderate)
Singular Ø	Generic Ø	0.0002	0.0012	** (moderate)
Singular Ø	Generic Plural Ø	0.8002	0.0012	** (moderate)
Plural Ø	Generic Ø	0.0002	0.0012	** (moderate)
Plural Ø	Generic Ø	0.0002	0.0012	** (moderate)
Plural Ø	Generic Plural Ø	0.0002	0.0012	** (moderate)
Generic Ø	Generic Ø	0.8002	0.0012	** (moderate)
Generic Ø	Generic Plural Ø	0.0002	0.0012	** (moderate)
Generic Ø	Generic Plural Ø	0.0002	0.0012	** (moderate)

In line with the analysis of data by the previous participants, the analysis of Demi's target-like usage began with an evaluation of her proficiency in English articles. This involved determining the ratio of correct to incorrect usage of articles in each chat session. This was achieved by dividing the number of times she used articles correctly and incorrectly by the total number of times articles were used in the session. The results are arranged by session, indicating the percentage of correct and incorrect usage for each session (Appendix I).

Across all comparisons of definite articles, the p-values were consistently low, with each comparison yielding a p-value of 0.001, indicating a high level of significance in the differences observed between the compared pairs of definite articles. After applying the Bonferroni correction, the adjusted p-values remained highly significant, all reported as 0.0006, which is important in controlling the increased likelihood of Type I errors due to multiple comparisons, ensuring the reliability of the findings. In terms of significance, each comparison between different types of definite articles resulted in a rejection of the null hypothesis, signifying a moderate level of significance, and implying that there are indeed statistically significant differences in the usage of definite articles by Demi. These findings suggest that Demi's usage of definite articles varied significantly across different types, indicating potential nuances in language usage or comprehension.

Figure 19: Demi's correct target-like use of articles



In the first session, Demi used 57 articles out of 1392 words, with 93% correct usage and 7% incorrect. This indicates a strong start, but with room for improvement. From the second to the third session, Demi showed remarkable improvement, achieving 100% correct usage of articles. The total number of occurrences increased from 73 to 88, even though the number of words per session decreased slightly. In the fourth session, there was a slight dip in performance with 98% correct usage. However, the participant quickly recovered in the fifth session, maintaining a high correctness rate of 97%. The sixth session saw the highest number of words per session at 1637, with 71 occurrences of articles. Demi maintained an impressive 99% correctness rate. From the seventh to the tenth session, Demi consistently achieved a near-perfect or perfect score, with correctness rates ranging from 98% to 100%. The number of words per session and the total occurrences of articles varied, but the high correctness rate remained consistent. In total, out of 13673 words and 707 occurrences of articles, the participant achieved a 99% correctness rate, with only 1% incorrect. This data shows a clear trend of improvement and consistency in Demi's proficiency in using English articles.

Over the period of ten weeks, Demi's usage of the definite article 'the' in its plural form seems to be relatively consistent. In Week 5, for example, Demi correctly uses the definite article 'the' with plural nouns *books* and *movies* as she talks about one of her favorite books.

16. l really enjoyed *the books* but I don't like *the movies*

(Week 5/Voice chat)

The singular form of 'the' shows more variability, with the highest usage in Week 6 and the lowest in Week 10. In the example below, Demi uses the definite 'the' correctly with singular noun *video.*

17. At **the beginning* of of **the video* like he was standing on his um hands

(Week 7/Voice chat)

The abstract form of 'the' is used least frequently, with no usage at all in several weeks.

Across various comparisons, including generic indefinite gerund concrete zero Ø, indefinite zero gerund abstract, and generic noncount zero, no significant differences were observed, as indicated by consistent test statistics of 0 and p-values below the adjusted significance threshold of 0.0012. These results led to the rejection of the null hypothesis, denoting a moderate level of significance in the observed similarities. Whether comparing indefinite singular zero, indefinite plural zero, indefinite generic zero, or generic zero with other article types, the findings consistently revealed uniform usage patterns, signifying a degree of consistency in Demi's linguistic choices. Additionally, comparisons involving indefinite plural articles displayed similar results, reinforcing the notion of uniformity in article usage within Demi's dataset. Overall, these findings shed light on Demi's nuanced linguistic patterns, emphasizing a moderate level of significance in the observed similarities across various types of articles.

The second type of articles in Table 34 above is the zero article Ø in which the generic form of the zero article shows a steady increase from Week 1 to Week 3, followed by a decrease in Week 4 and a steady usage from Week 5 onwards. Demi uses the zero article with generic nouns like *sand* and *water* correctly as shown in the example below where she is referring to the beaches in Florida.

18. White *sand* and beautiful blue *water*

(Week 6/Type chat)

The generic plural form of the zero article is used most frequently in Week 3 and least frequently in Week 1 and Week 4. The indefinite gerund form of the zero article shows a peak in Week 2 and a trough in Week 1 and Week 4.

For the use of indefinite articles by Demi, there was only one type of article used by Demi, which is why a post hoc analysis was not appropriate. However, a qualitative analysis of the indefinite articles reveal that the usage of the indefinite article 'a' in its mass form is relatively low, with a slight increase in Week 2 and Week 3. The singular form of 'a' shows a peak in Week 2 and a trough in Week 1, Week 4, and Week 10. The plural form of the indefinite zero article Ø is used most frequently in Week 5 and least frequently in Week 1, Week 4, and Week 10. In Week 4, one of the topics that the dyad talked about was actors and actresses during which Demi used the indefinite zero article correctly multiple times, for example, in the utterance below, she uses the zero article correctly with the indefinite plural noun *actors.*

19. I think there are *actors* that are very good.

(Week 4/Voice chat)

The table above shows very few errors made in the use of the articles by Demi over the course of ten weeks. The incorrect usage of the singular form of the definite article 'the' is low,

with only two instances in Week 1 and Week 4. The incorrect usage of the generic form of the zero article shows a bit more frequency, with one instance each in Week 6, Week 8, and Week 9, and three instances in Week 1. In the following example, the dyad was discussing personal preferences in organizing one's room, and Demi misses the indefinite article 'a' in *a matter of* in her utterance.

20. So I think it really is uh tsk **matter* of what um it um tsk you know like uh what is best for you [*a* matter]

(Week 1/ Voice chat)

Overall, it appears that Demi uses the zero article in its generic form most frequently, followed by the definite article 'the' in its singular form, and the indefinite article 'a' in its singular form. The usage of the other forms of articles varies from week to week. The following table presents Demi's incorrect use of articles throughout the ten weeks.

NNS-10 (Bella)

As shown in the table above, Bella's usage of definite articles is scrutinized across different forms, including plural 'the', singular 'the', abstract 'the', and noncount definite articles. The analysis reveals no significant differences between these forms, as indicated by consistent test statistics of 0 across all comparisons. Despite the uniformity in test statistics, the p-values of 0.001, coupled with adjusted p-values of 0.006, suggest a low level of significance in the observed differences. This implies that while Bella's usage of different forms of definite articles exhibits some variation, it does not reach a substantial level of distinction.

Table 35: Post hoc analysis with Bonferroni correction of Bella's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Articles				

Def. plural 'the'	Def. Sing. 'the'	0.001	0.006	* (low)
Def. plural 'the'	Def. Abstract 'the'	0.001	0.006	* (low)
Def. plural 'the'	Def. Noncount	0.001	0.006	* (low)
Def. Sing. 'the'	Def. Abstract 'the	0.001	0.006	* (low)
Def. Sing. 'the'	Def. Noncount	0.001	0.006	* (low)
Def. Abstract 'the'	Def. Noncount	0.001	0.006	* (low)
Indefinite Articles				
Not applicable	-	-	-	-
Zero Articles Ø				
Mass Ø	Plural Ø		0.35	Not significant
Mass Ø	Generic Ø	0.01	0.01	* (low)
Plural Ø	Generic Ø	0.01	0.01	* (low)

Bella's incorrect use of the definite article 'the' in its singular form is minimal, with instances only appearing in Week 3, Week 4, and Week 8 (Appendix I). The incorrect use of 'the' with abstract nouns is also minimal, only appearing in Week 3. Bella's incorrect use of the zero article is sporadic, with instances appearing in Week 1, Week 2, Week 4, Week 5, Week 7, Week 9, and Week 10. There seems to be incorrect usage of the zero article throughout the ten weeks except weeks 6 and 8. For example, in Week 9 below, Bella incorrectly uses the zero article with the noun *day* instead of using the definite article 'the' specifying a particular day.

21. I was discussing this **other day* with my husband

[*the* other day] (Week 9/Voice chat)

Bella's use of the definite article 'the' in its singular form is consistent throughout the weeks, with a slight increase in Week 4. The use of 'the' in its plural form is relatively low, with a noticeable increase in Week 3 and Week 10. The use of 'the' with abstract nouns is minimal, only appearing in Week 10. The following example illustrates Bella's correct use of 'the' with abstract noun *sessions.*

22. I was saying that all the clips that we saw here during *the sessions* uh he didn't talk
(Week 10/Voice chat)

The use of 'the' with noncount nouns is sporadic, peaking in Week 1 and Week 9.

As for indefinite articles, a post hoc analysis was not possible because Bella used only one type of indefinite article that was indefinite singular ‘a’, which likely indicates a stable linguistic preference or style. Qualitatively, the use of the indefinite articles ‘a’ ‘an’ in its singular form is consistent, with a noticeable increase in Week 3. The use of ‘a’ in its plural form is minimal, only appearing in Week 2 and Week 4. The use of the indefinite article in general is sporadic, peaking in Week 3 and Week 9. The following is an example of Bella’s expert use of the indefinite article with singular common concrete noun *child* and abstract single noun *opportunity.*

23. this is something that I didn't have when I was *a child*, so I think that this is *an opportunity* for him

(Week 2. Voice chat)

Furthermore, Bella’s incorrect use of the indefinite article ‘a’ in its singular form is minimal, with instances only appearing in Week 6, Week 7, and Week 9. The incorrect use of the indefinite article with a generic noun shows a slight increase in Week 3 (7 instances), with other instances appearing in Week 4, Week 5, Week 6, Week 7, and Week 9. One of the incorrect uses in Week 3 is the following in which Bella refers to police powers to take down a fraudulent social media post in Brazil.

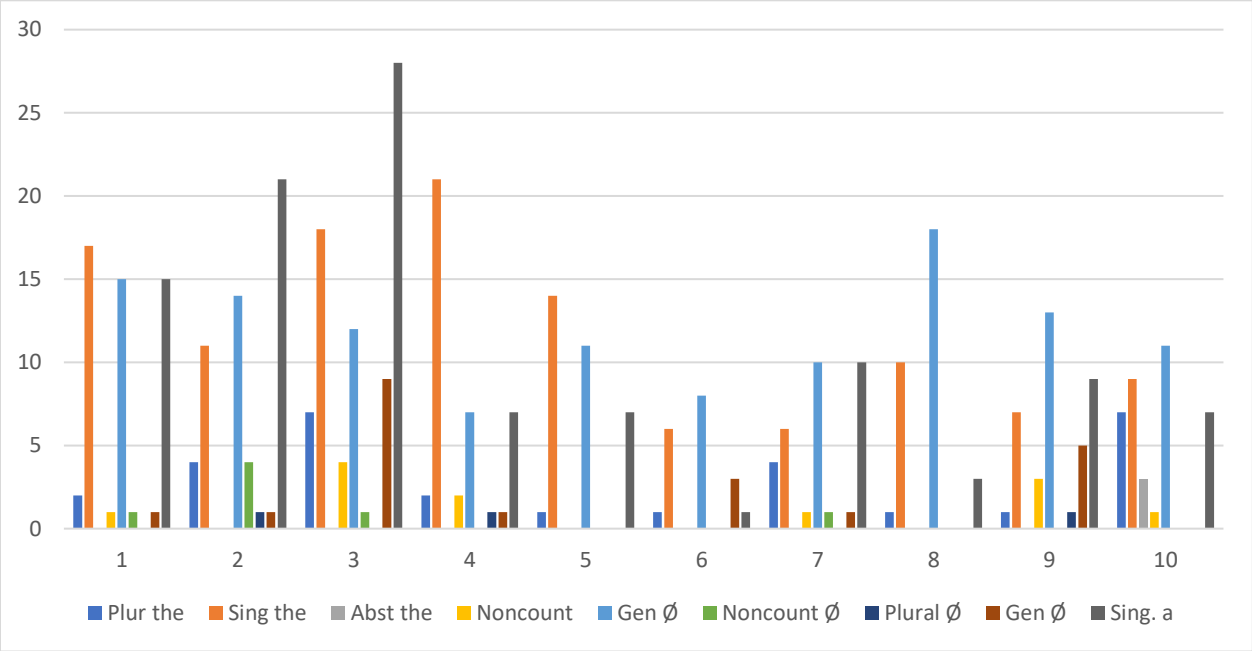
24. But the police do not have the powers to ask for **the takedown*
[*a* takedown]

(Week 3/Type chat)

It is worth noting that the incorrect use of the articles decreases as the weeks progress. From this analysis, it appears that Bella has the least instances of incorrect use with the definite article as well as the indefinite article ‘a’ in its singular form. These forms only have a few instances of incorrect use throughout the ten weeks. On the other hand, Bella has the most instances of incorrect use with the zero article. This form has the most instances of incorrect use

across the weeks, suggesting that Bella may need to focus on improving her understanding and usage of the zero article.

Figure 20: Bella's correct target-like use of articles



Bella's usage of zero articles is examined through comparisons between indefinite mass/noncount and indefinite plural forms, as well as between indefinite plural and indefinite generic forms. While the comparison between indefinite mass/noncount and indefinite plural forms yields a non-significant result with a test statistic of 0.35, the comparisons involving indefinite generic forms demonstrate statistically significant differences. Both comparisons yield test statistics of 0.01 and p-values of 0.01, falling below the adjusted significance threshold of 0.01 after Bonferroni correction. This indicates a low level of significance in the observed differences, suggesting nuanced variations in Bella's utilization of these linguistic elements. Her use of the generic Ø is consistent, with a slight increase in Week 2. The use of the zero article with noncount nouns shows an upward trend, peaking in Week 3. An example of Bella's use of

the zero article with noncount noun *compliance* in the utterance below where she was referring to her specialization as a lawyer.

25. I was tired of litigation and I changed it to *compliance*

(Week 1/Voice chat)

In summary, the analysis unveils notable patterns in Bella's usage of definite articles, indicating some variation across different forms but with low levels of significance. Conversely, the absence of applicable comparisons for indefinite articles suggests a consistent usage pattern. Regarding zero articles, while some differences are observed, they are characterized by low levels of significance, hinting at subtle variations in Bella's linguistic choices. These findings provide valuable insights into Bella's language usage tendencies and underscore the complexities inherent in natural language processing tasks.

Overall, Bella's use of articles shows an ebb and flow, with certain forms being used more consistently than others. The data suggests that Bella is more comfortable using the definite article 'the' in its singular form and the zero article in general, as these forms are used most frequently across the weeks. The use of the definite article 'the' with abstract and noncount nouns, as well as the indefinite article 'a' in its plural form are used less frequently in this context.

Advanced

There were four NNS participants in the advanced level that included NNS-3 (Skye), NNS-4 (Zara), NNS-5 (Hazel), and NNS-6 (Nabi).

NNS-3 (Skye)

The table below presents a post hoc analysis with Bonferroni correction of Skye's, who spoke Portuguese as her first language, usage patterns of definite articles, indefinite articles, and zero articles.

Table 36: Post hoc analysis with Bonferroni correction of Skye's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Article				
Def. plural 'the'	Def. Sing. 'the'	<0.0001	<0.0167	** (moderate)
Def. plural 'the'	Def. Abstract 'the'	1	>0.0167	Not significant
Def. Sing. 'the'	Def. Abstract 'the'	1	>0.0167	** (moderate)
Indefinite Article				
Not applicable	-	-	-	-
Zero Article				
Gerund Abstract Ø	Generic Ø	0.35	0.35	Not significant
Generic Ø	Generic Ø	0.35	0.35	Not significant
Generic Ø	Gerund Abstract Ø	0.01	0.01	* (low)

Regarding definite articles, Skye's usage across various forms, including plural 'the', singular 'the', and abstract 'the', is meticulously examined. The comparison between plural and singular 'the' demonstrates a highly significant difference, with an adjusted p-value of <0.0167 falling well below the adjusted significance threshold. This suggests distinct patterns in Skye's usage between these two forms. However, comparisons involving abstract 'the' yield p-values of >0.0167, indicating no significant differences compared to other forms.

According to the TLU analysis, Skye used the English articles 897 times in total. She used the English articles correctly 884 times and incorrectly 91 times, with an overall accuracy of 90% and an error rate of 10%. Skye's accuracy improved from 83% in week 1 to 86% in

week 10. The topics that dyad-3 covered in week 1 included Introductions, Home, Jobs, Family, Kids, NYC, Art, Movies, Photography, Fashion, Writing, Boys & Girls, Studies, Workout, and Meditation. In week 10, the dyad engaged in discussions based on Greetings and Small Talk, Health and Weather, New Job and Babysitting, Children and Activities, Living Arrangements, Housing & Location. As an advanced speaker of L2 English, Skye's accuracy in using the English articles is quite good, with an overall accuracy of 90%.

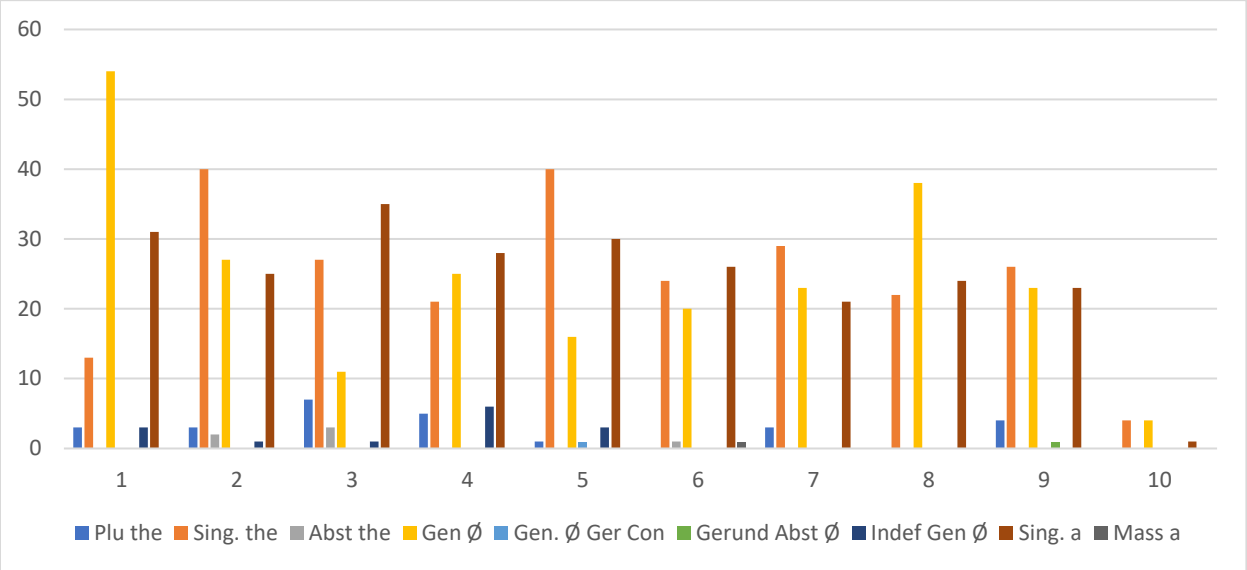
Over the course of ten weeks, Skye's journey with English articles unfolded in the first week. Skye used the definite plural article 'the' three times in week 1, the definite singular 'the' 13 times, and the indefinite singular 'a' 31 times. The general zero article was used 54 times, indicating a strong preference for this form. As the weeks progressed, Skye's usage of the definite singular 'the' increased, peaking at 40 times in the second and fifth weeks. For example, in the utterance below, Skye wanted to go back to the topic that they had started earlier and correctly used the definite singular 'the':

26. okay so uh back to *the movie*…

(Week 2/Voice chat)

As the weeks progressed, Skye's incorrect usage of the definite singular 'the' and the general zero article saw a decline, indicating improvement in these areas.

Figure 21: Skye's correct target-like use of articles



As the weeks progressed, Skye's incorrect usage of the definite singular 'the' and the general zero article saw a decline, indicating improvement in these areas. The incorrect usage of the indefinite singular 'a' and the indefinite general Ø varied throughout the weeks, with a slight increase in the eighth week. Interestingly, the definite noncount 'the' was only incorrectly used once in the tenth week. The results suggest that Skye has made progress in correctly using the definite singular 'the' and the general zero article.

Overall, Skye used the definite plural 'the' correctly three times in week 1, but there were no instances of incorrect usage, resulting in an error rate of 0% and an accuracy rate of 100%. The definite singular 'the' was used correctly 13 times, but incorrectly two times, resulting in an error rate of 13.3% and an accuracy rate of 86.7%. The general zero article was used correctly 54 times and incorrectly ten times, resulting in an error rate of 15.6% and an accuracy rate of 84.4%. The indefinite singular 'a' was used correctly three times and incorrectly one time, resulting in an error rate of 25% and an accuracy rate of 75%. As the weeks progressed, Skye's

usage of the definite singular ‘the’ increased, peaking at 40 times in the second and fifth weeks. However, the error rate for this article type also increased in the second week to 4.8%, before decreasing again to 2.4% in the fifth week. This suggests that while Skye was using ‘the’ more frequently, she was also becoming more accurate in its usage.

In the case of indefinite articles, the post hoc analysis was not applicable as there was only one article type utilized by Skye. This uniformity suggests a stable linguistic preference or style in Skye's utilization of indefinite articles. However, the qualitative analysis revealed that the indefinite singular ‘a’ saw a steady usage throughout, with a slight increase to six times in the fourth week. The usage of the indefinite count ‘a’ was consistent, hovering around 30 times, except for the tenth week when it dropped to 1. Interestingly, the definite abstract ‘the’, indefinite zero gerund abstract Ø, and indefinite general Ø were used sparingly, with only a few instances throughout the ten weeks. The analysis shows that Skye has a good grasp of the definite singular ‘the’, general zero article, and indefinite singular ‘a’. The following table, Table 30, presents a detailed account of the types of nouns and articles that Sally has used incorrectly.

The first week, Skye incorrectly used the definite singular ‘the’ two times, the generic zero article ten times, the indefinite singular ‘a’ one time, and the indefinite generic ‘Ø’ four times. Her incorrect use of the generic zero is exemplified in the following sentence in which Skye is talking about her yoga practice and overuses ‘the’ when the context required a zero article.

27. but like with **the practices* I [am] getting getting getting getting very better
[*practice*]

(Week 1/Voice chat)

Moving on to zero articles, Skye's usage is examined in comparisons such as indefinite zero gerund abstract versus generic zero. Here, most comparisons yield p-values of 0.35, suggesting no significant differences in usage. However, a notable exception arises in the comparison between generic zero and indefinite zero gerund abstract, where a p-value of 0.01 falls below the adjusted significance threshold, indicating a significant difference in usage between these two forms.

Week 3, with 11 instances, saw a decline in the use of the general zero article but it took off again from Week 4 and remained steady to the end. Her use of zero articles with generic nouns were correct 85.46% of the time. An example of her expert use is as follows, in which Skye is referring to some health issues she was experiencing:

28. Yeah, I, I have always had this um *stomach* and *intestine* like uh issue

(Week 6/Voice chat)

The error rate in using zero article remained relatively stable, ranging from 10% to 20%. This indicates that while Skye was using the general zero article less frequently, her accuracy in its usage did not significantly improve. The indefinite singular ‘a’ saw a steady usage throughout the ten weeks, with a slight increase to six times in the fourth week. However, the error rate for this article type varied greatly, ranging from 14.3% to 33.3%. This suggests that Skye may need to focus on improving her accuracy in using the indefinite singular ‘a’ and ‘an’. For example, in the sentence below, Skye underuses the indefinite article ‘an’ before the noun ‘exhibition’:

29. there was **exhibition* about art form from Ghana
[*an* exhibition]

(Week 1/Voice chat)

In summary, the analysis provides nuanced insights into Skye's language usage tendencies. Significant differences are observed in the usage of certain definite article forms,

particularly between plural and singular 'the'. Moreover, while most comparisons of zero article usage show no significant differences, an exception is noted in the comparison between generic zero and indefinite zero gerund abstract.

NNS-4 (Zara)

Zara, who spoke German as her first language, was also in the advanced proficiency level.

Table 37: Post hoc analysis with Bonferroni correction of Zara's article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Articles				
Def. plural 'the	Def. Sing. 'the'	0.01	0.03	* (low)
Def. plural 'the'	Def. Abstract 'the'	0.35	1	Not significant
Def. plural 'the'	Def. Non Count	0.35	1	Not significant
Def. Sing. 'the'	Def. Abstract 'the	0.01	0.03	* (low)
Def. Sing. 'the'	Def. Noncount	0.01	0.03	* (low)
Def. Abstract 'the'	Def. Noncount	0.35	1	Not significant
Indefinite Articles				
Not applicable	-	-	-	-
Zero Articles				
Mass Noncount Ø	Singular Ø	0.35	1	Not significant
Mass Noncount Ø	Plural Ø	0.35	1	Not significant
Mass Noncount Ø	Generic Ø	0.35	1	Not significant
Mass Noncount Ø	Gen. Gerund Concrete Ø	0.35	1	Not significant
Mass Noncount Ø	Gerund Abstract Ø	0.35	1	Not significant
Mass Noncount Ø	Generic Gerund	0.35	1	Not significant
Mass Noncount Ø	Generic Ø	0.01	0.03	* (low)
Singular Ø	Plural Ø	0.35	1	Not significant
Singular Ø	Generic Ø	0.35	1	Not significant
Singular Ø	Gen. Gerund Concrete Ø	0.35	1	Not significant
Singular Ø	Gerund Abstract Ø	0.35	1	Not significant
Singular Ø	Generic Gerund	0.35	1	Not significant
Singular Ø	Generic Ø	0.01	0.03	* (low)
Plural Ø	Generic Ø	0.35	1	Not significant
Plural Ø	Gen. Gerund Concrete Ø	0.35	1	Not significant
Plural Ø	Gerund Abstract Ø	0.35	1	Not significant

Plural Ø	Generic Gerund Ø	0.35	1	Not significant
Plural Ø	Generic Ø	0.01	0.03	* (low)
Generic Ø	Gen. Gerund Concrete Ø	0.35	1	Not significant
Generic Ø	Gerund Abstract Ø	0.35	1	Not significant
Generic Ø	Generic Gerund	0.35	1	Not significant
Generic Ø	Generic Ø	0.01	0.03	* (low)
Gen. Gerund Concrete Ø	Gerund Abstract Ø	0.35	1	Not significant
Gen. Gerund Concrete Ø	Generic Gerund	0.35	1	Not significant
Gen. Gerund Concrete Ø	Generic Ø	0.01	0.03	* (low)
Gerund Abstract Ø	Generic Gerund	0.35	1	Not significant
Gerund Abstract Ø	Generic Ø	0.01	0.03	* (low)
Generic Gerund	Generic Ø	0.01	0.03	* (low)

In the category of definite articles, the comparison between the use of the definite plural 'the' and the definite singular 'the' shows a significant difference, with a p-value of 0.01, which remains significant even after the Bonferroni adjustment to 0.03. This suggests that Zara's usage of these two forms of the definite article 'the' is statistically different. However, when comparing the definite plural 'the' with both the definite abstract 'the' and the definite noncount, the results are not significant, with p-values of 0.35. After the Bonferroni correction, these values are adjusted to 1.00, indicating that there is no statistical evidence to suggest a difference in Zara's use of these article forms. A similar pattern is observed when comparing the definite singular 'the' with the definite abstract 'the' and the definite noncount. The comparisons show significant differences with a p-value of 0.01, which remains significant after adjustment (0.03).

Over the course of ten sessions, Zara has shown a remarkable command of English articles. The sessions varied in length, with the shortest session containing 953 words and the longest session containing 2994 words. In total, Zara used 14196 words across all sessions. Zara’s use of articles was quite frequent, with a total of 658 occurrences noted. The number of occurrences per session ranged from a low of 37 to a high of 108. Despite the frequency of use,

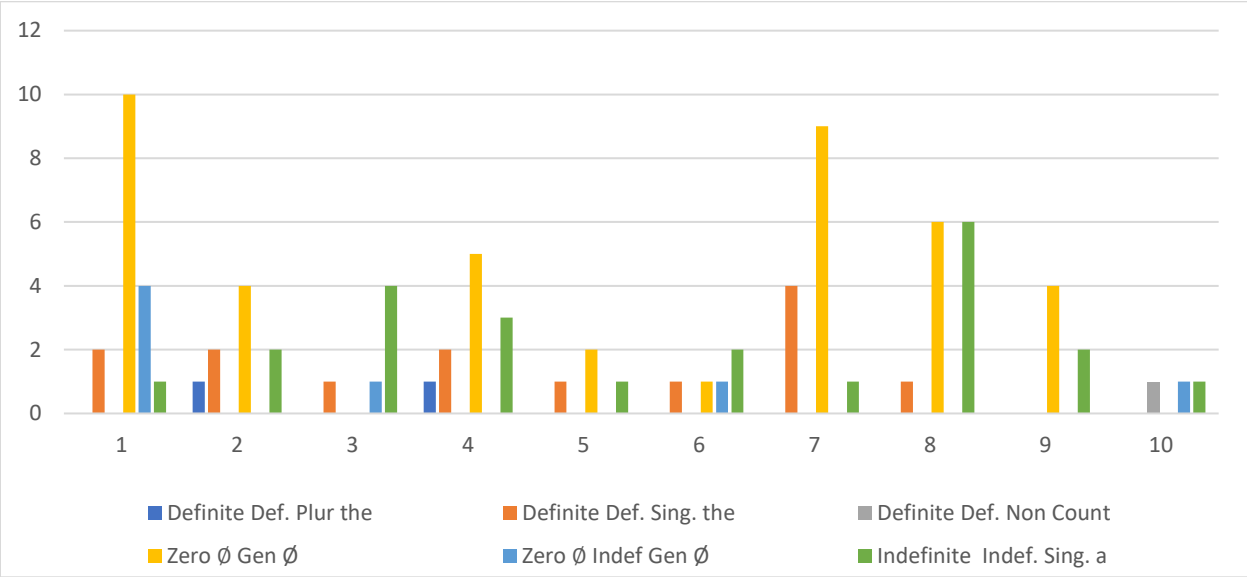
Zara's accuracy was impressive. Out of the 674 total instances of article use, only 12 were incorrect. This translates to an overall accuracy rate of 98%, indicating a strong grasp of English articles. There were a few sessions where Zara's performance was flawless, with 100% correct usage of articles. These were sessions 2, 3, 4, and 9. In other sessions, the accuracy rate varied from 93% to 99%. The sessions with the most errors were in Weeks 7 and 10, with 7% and 5% incorrect usage respectively.

The data shows a breakdown of the usage of different types of articles with various kinds of nouns. Zara used the definite article 'the' 124 times in total. This includes 21 instances with plural nouns, 85 instances with singular nouns, and 18 instances with abstract nouns. Additionally, 'the' was used eight times with noncount nouns.

Moving to zero articles, the comparisons involving the indefinite mass noncount with various other article types (indefinite singular, indefinite plural, indefinite generic, generic indefinite gerund concrete, indefinite zero gerund abstract, and generic gerund) all yield non-significant results with p-values of 0.35, which become 1.00 after adjustment. This indicates no statistical difference in Zara's use of these article types. However, the comparison between the indefinite mass noncount and the generic zero Ø is significant, with a p-value of 0.01, which remains significant after adjustment (0.03). This suggests a statistical difference in the usage of these articles. The zero article was used extensively, with a total of 183 instances. This includes 171 instances with generic nouns, eight instances with indefinite gerunds, three instances with concrete nouns, and one instance with an abstract noun. The indefinite articles 'a' and 'an' were used a total of 206 times. This includes 140 instances with singular nouns, 23 instances with

singular nouns in zero form, 32 instances with plural nouns in zero forms, ten instances with generic nouns in the zero form, and one instance with an abstract noun in the zero form.

Figure 22: Zara's correct target-like use of articles



Over the course of ten weeks, Zara made very few mistakes in the use of English articles, indicating a strong understanding of their usage. The errors were spread across different types of articles and nouns. In week 1 and week 6, Zara made a mistake with the zero article when used with generic nouns. In the following sentence, Zara used a specific class (retired) of the generic noun 'people' but did not use the definite article 'the' instead she incorrectly used the generic zero.

30. I think like umm **retired people* could got got like a certain amount of masks for free
[*the* retired people]

(Week 6/Voice chat)

This suggests a slight confusion in the use of the zero article in generic contexts. In week 7, Zara made two mistakes with the indefinite singular article 'a' and one mistake with the zero form of the indefinite singular article. This indicates a minor difficulty in distinguishing when to

use ‘a’ and when to omit it. In week 8, Zara made one mistake each with the definite abstract article ‘the’, the definite noncount article, and the zero form of the indefinite singular article. In week 10, Zara made one mistake each with the indefinite singular article ‘a’ and its zero form. This again points to a slight confusion in the use of ‘a’ and its omission.

Despite these few errors, Zara’s overall performance in the use of English articles is commendable. The mistakes are few and spread out, suggesting that they are more likely occasional slips rather than consistent misunderstandings. In conclusion, Zara’s use of English articles is highly accurate and varied, demonstrating a strong understanding and application of this aspect of the English language.

In summary, the analysis reveals that Zara's use of definite and zero articles varies significantly in certain comparisons, while in others, no significant difference is found. The significant results suggest areas where Zara's article usage is distinct, whereas the non-significant results indicate consistency in usage across different article types. The application of the Bonferroni correction ensures that the significance levels are adjusted for multiple comparisons, reducing the likelihood of type I errors. Lastly, for indefinite articles, a post hoc analysis is not applicable because the Friedman test did not yield any significant result.

NNS-5 (Hazel)

Hazel, a native Japanese speaker who joined the study from Japan, articles showed a consistent pattern of improvement

Table 38: Post hoc analysis with Bonferroni correction of Hazel’s article use

Article Type 1	Article Type 2	p-value	Adjusted p-value	Significance
Definite Article				
Def. plural 'the'	Def. Sing. 'the'	0.01	0.03	* (low)

Def. plural 'the	Def. Noncount	0.35	1	Not significant
Def. Sing. 'the'	Def. Noncount	0.01	0.03	* (low)
Indefinite Article				
Not applicable	-	-	-	-
Zero Article				
Gen. Gerund Concrete Ø	Gerund Abstract Ø	0.35	1	Not significant
Gen. Gerund Concrete Ø	Sing. Ø	0.35	1	Not significant
Gen. Gerund Concrete Ø	Plural Ø	0.35	1	Not significant
Gen. Gerund Concrete Ø	Generic Ø	0.35	1	Not significant
Gen. Gerund Concrete Ø	Generic Ø	0.01	0.06	* (low)
Gen. Gerund Concrete Ø	Generic Noncount Ø	0.35	1	Not significant

Hazel's usage of definite articles is examined across various forms, including plural 'the', singular 'the', and noncount 'the'. The comparison between plural and singular 'the' reveals a significant difference, with a p-value of 0.01 falling below the adjusted significance threshold of 0.03. Conversely, comparisons involving noncount 'the' yield p-values of 0.35, indicating no significant differences compared to other forms. This suggests a nuanced variation in Hazel's usage of definite articles, with a notable distinction between plural and singular forms.

Throughout the nine week data, Hazel demonstrated a consistent use of the zero article Ø, particularly in its generic form, with the highest usage recorded in week 8 with 30 occurrences. This suggests that Hazel has a good grasp of situations where no article is needed. An example of her mastery of use is as follows in which Hazel talks about her grandparents' vegetable garden in Japan:

31. they grow *vegetables* like *cucumbers*

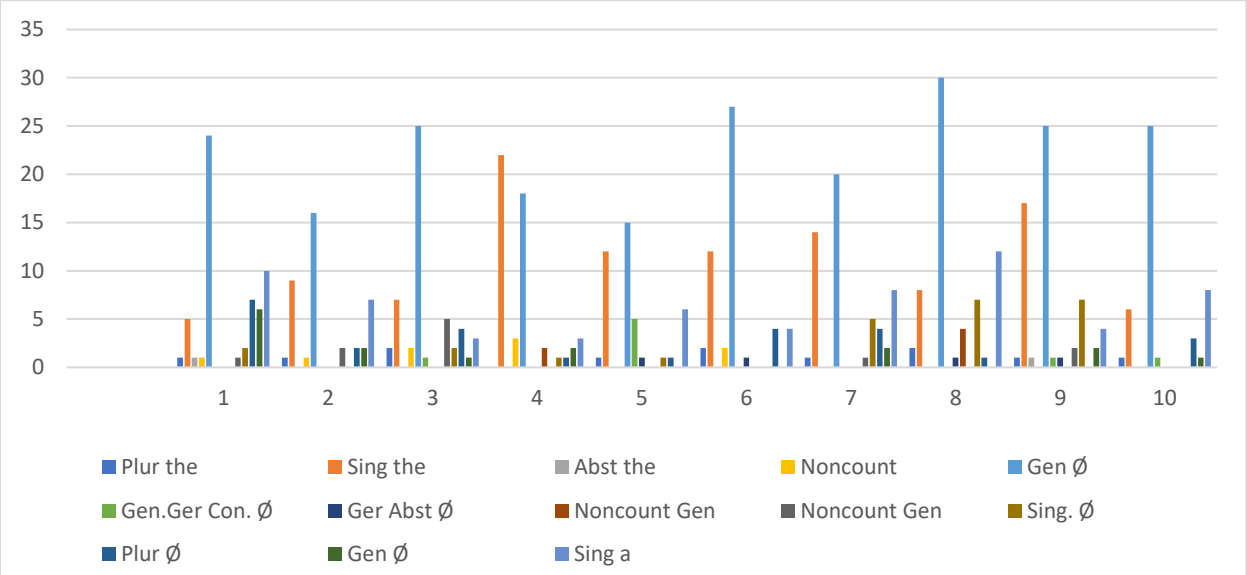
(Week 10/Voice chat)

Starting with 1171 words in the first week, Hazel's word count per session fluctuated, reaching a low of 654 words in the third week before rising again. Despite these fluctuations, the total number of words used across all sessions was a substantial 8467. In terms of the usage of English articles, Hazel demonstrated a steady increase in accuracy. The total number of occurrences of article usage was 602, with the number of correct uses outweighing the incorrect ones by a large margin. Hazel started with an 87% accuracy rate in the first week, which increased to a peak of 95% in the seventh week. Hazel and her NS interlocutor discussed various topics. In week 1, the dyad discussed Foods & Desserts, Personal background & family, Favorite authors & books, Travel experiences & plans, Cultural differences between Japan & US, Life during COVID-19, Postal systems, Stamps & stamp collection, Weather, and Hazel's Travel plans to Japan. By week 7, the dyad engaged in discussions including Circus performances, Injuries and bone fractures, Surgeries and recoveries, Gardening vegetables and fruits, and Childhood memories and Friends. Despite a slight dip to 83% in the tenth week, Hazel maintained an overall accuracy rate of 90% throughout the ten weeks. The use of the definite article 'the' varied across its different forms. The singular definite article 'the' was used more frequently than the plural form, with the highest usage in week 4 with 22 occurrences. The abstract form of the definite article 'the' and the noncount form were used less frequently, with only a few occurrences throughout the ten weeks.

For the post hoc analysis, the analysis indicates no applicable comparisons for indefinite articles. This implies a consistent pattern in Hazel's usage of indefinite articles across the dataset, suggesting a stable linguistic preference or style. The qualitative analysis of the indefinite articles reveals that 'a' and 'an' were also used correctly by Hazel. The singular form 'a' was used more frequently, with the highest usage in week 8 with 12 occurrences. The usage of the zero form of

the indefinite article with plural nouns was less consistent, with a peak in week 1 with seven occurrences. That is that week in which the dyad discusses *stamps, boxes, cards,* and *letters* owing to Hazel's interest in collecting stamps and posting them to her family and friends in Japan.

Figure 23: Hazel's correct target-like use of articles



Hazel used the definite article 'the' in its singular form was relatively low, with only a few instances across the weeks. The highest number of incorrect uses the definite article 'the' in its singular form of occurred in weeks 4 and 7, with two instances each. Hazel's incorrect use is exemplified in the sentence below in which she is talking about how children are good at keeping their 'balance'. She overuses the definite article 'the':

32. They are good at keeping **the balance*.
[balance]

(Week 7/Type chat)

Hazel's usage of zero articles is examined across various forms, including generic indefinite gerund concrete, indefinite zero gerund abstract, singular, plural, generic, and generic

non-count. The comparisons predominantly yield p-values of 0.35, indicating no significant differences in usage. However, an exception arises in the comparison involving generic zero, where a p-value of 0.01 falls below the adjusted significance threshold of 0.06. This indicates a low level of significance in the observed difference between generic zero and other forms, suggesting a nuanced variation in Hazel's usage.

This echoes in the qualitative analysis which reveals that the most noticeable incorrect use is that of the generic zero article. The highest number of incorrect uses was in week 1, with four instances. However, the number of incorrect uses in this area decreased overtime, suggesting Hazel's improving grasp of when to use the zero article. In terms of indefinite articles 'a' and 'an', Hazel made a few errors with the singular form 'a', with the highest number of incorrect uses in week 6 and week 10, with two instances each. The incorrect usage of the zero form of the indefinite article was also noted, with the highest number of mistakes in week 1, with five instances. Interestingly, Hazel made a few mistakes with the indefinite abstract zero article only in the first few weeks (weeks 1, 2, and 3). For instance, in the sentence below, Hazel uses the indefinite article 'a' with *lunch* which is an abstract noun.

33. She prepared **a lunch* for me every day.
[*lunch*]

(Week 3/Voice chat)

Hazel's usage of zero articles includes generic indefinite gerund concrete, indefinite zero gerund abstract, singular, plural, generic, and generic noncount. The comparisons predominantly yield p-values of 0.35, indicating no significant differences in usage. However, an exception arises in the comparison involving generic zero, where a p-value of 0.01 falls below the adjusted significance threshold of 0.06. This indicates a low level of significance in the observed difference between generic zero and other forms, suggesting a nuanced variation in Hazel's

usage. A post hoc analysis of the indefinite articles is not possible because there was only one article type used by Hazel in the study. This implies a consistent pattern in Hazel's usage of indefinite articles across the dataset, suggesting a stable linguistic preference or style.

When comparing Hazel's correct and incorrect usage of English articles, it's clear that Hazel has a strong understanding of English articles, with a significantly higher number of correct uses compared to incorrect ones. In summary, the analysis provides insights into Hazel's article usage tendencies. While significant differences are observed in the usage of certain definite article forms, particularly between plural and singular 'the'. Moreover, while most comparisons of zero article usage show no significant differences, an exception exists, indicating nuanced variations in Hazel's linguistic choices. These findings highlight the complexities inherent in Hazel's language usage and offer valuable insights into her linguistic patterns.

NNS-6 (Nabi)

The post hoc analysis with Bonferroni correction for Nabi, an L1-Arabic speaker, was conducted to examine the usage of definite, indefinite, and zero articles.

Table 39: Post hoc analysis with Bonferroni correction of Nabi's article use

Article Type	Article Type	Adjusted p-value	Significance
Definite Article			
Def. Plural 'the'	Def. Sing. 'the'	1	Not significant
Def. Plural 'the'	Def. Abstract 'the'	1	Not significant
Def. Plural 'the'	Def. Noncount 'the'	1	Not significant
Def. Sing. 'the'	Def. Abstract 'the'	1	Not significant
Def. Sing. 'the'	Def. Noncount 'the'	1	Not significant
Def. Abstract 'the'	Def. Noncount 'the'	1	Not significant
Indefinite Article			
Not applicable	-	-	-
Zero Article			
Mass Ø	Sing. Ø	0.025	** (moderate)

Mass Ø	Plural Ø	0.008	*** (high)
Mass Ø	Generic Ø	0.079	Not significant
Mass Ø	Generic Gerund Ø	0.025	** (moderate)
Mass Ø	Generic Ø	0.79	Not significant
Mass Ø	Generic Plural Zero Ø	0.25	Not significant
Mass Ø	Generic Noncount Ø	0.025	** (moderate)
Sing. Ø	Plural Ø	0.25	Not significant
Sing. Ø	Generic Ø	0.79	Not significant
Sing. Ø	Generic Gerund Ø	0.25	Not significant
Sing. Ø	Generic Ø	0.79	Not significant
Sing. Ø	Generic Ø	1	Not significant
Sing. Ø	Generic Noncount Ø	0.25	Not significant
Plural Ø	Generic Ø	1	Not significant
Plural Ø	Generic Gerund Ø	0.25	Not significant
Plural Ø	Generic Ø	1	Not significant
Plural Ø	Generic Plural Ø	0.25	Not significant
Plural Ø	Generic Noncount Ø	1	Not significant
Generic Ø	Generic Gerund Ø	0.79	Not significant
Generic Ø	Generic Ø	1	Not significant
Generic Ø	Generic Plural Ø	1	Not significant
Generic Ø	Generic Noncount Ø	0.79	Not significant
Generic Gerund Ø	Generic Ø	1	Not significant
Generic Gerund Ø	Generic Plural Ø	0.25	Not significant
Generic Gerund Ø	Generic Noncount Ø	0.79	Not significant
Generic Ø	Generic Plural Ø	1	Not significant
Generic Ø	Generic Noncount Ø	0.79	Not significant
Generic Plural Ø	Generic Noncount Ø	1	Not significant

For definite articles, comparisons between different types ('the') – plural, singular, abstract, and noncount – revealed no statistically significant differences, as indicated by adjusted p-values of 1 across all comparisons. This suggests that Nabi's use of definite articles did not vary significantly across these different contexts.

The qualitative analysis of Nabi’s overall use of English articles over ten sessions reveals Nabi’s has shown a strong command of English articles. In each session, the number of words per session ranged from 1,399 to 2,330, with a total of 19,995 words across all sessions. The total

number of article occurrences was 1,365. The number of correct uses of articles was consistently high across all sessions, with the percentage of correct usage ranging from 81% to 94%. The highest accuracy was achieved in sessions 2 and 8, where Nabi used articles correctly 94% of the time. The topics discussed in these two weeks included Mr. Bean video clip, TV shows, Cooking & Food, Health & remedies, Herbal remedies, and Natural Medicine in week 2; while in week 8, the dyad discussed topics based on Heat & weather, Health issues, Recent activities & catching up, Summer plans, Travel, the COVID-19 pandemic, City life and traffic.

The use of the definite article ‘the’ with singular nouns remains consistently high throughout the period, peaking in the 9th week with 54 instances. The usage with plural nouns and abstract nouns is relatively low and fluctuates from week to week. For abstract nouns, the following sentence is an example of correct use of the abstract noun ‘information’.

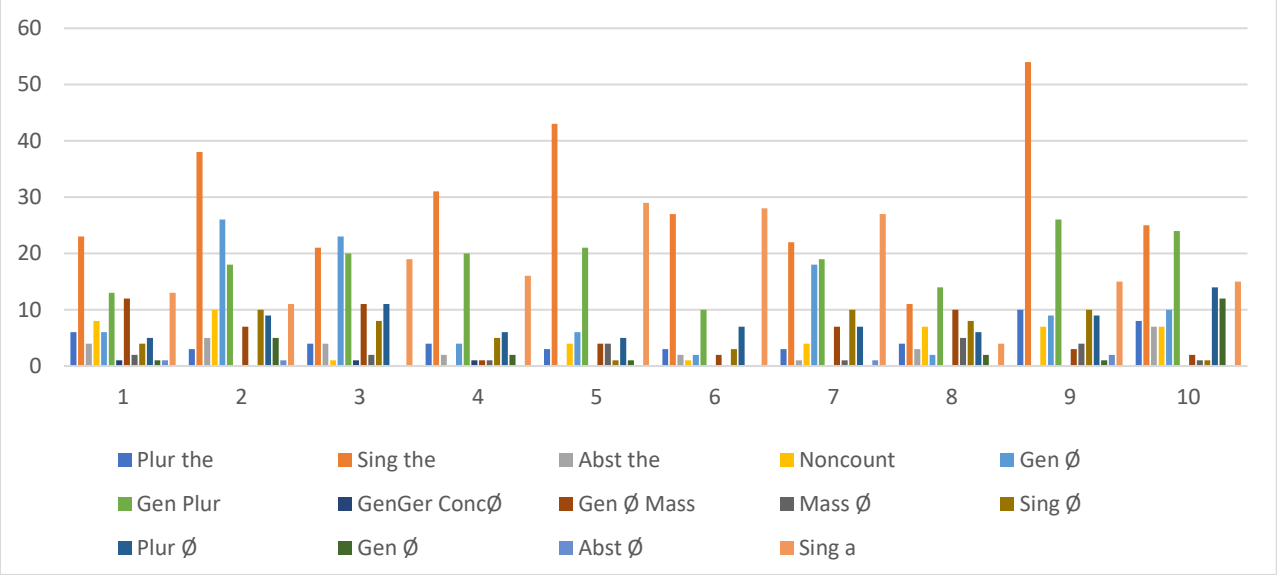
34. it isn't uh *impredictable, because we feed them a lot of *information*.
(Week 5/Voice chat)

On the other hand, the number of incorrect uses was relatively low, with the percentage of incorrect usage ranging from 6% to 19%. The highest error rate was observed in session 1, where 31% of the articles used were incorrect. Overall, Nabi achieved an average accuracy of 86% in the use of English articles, indicating a high level of proficiency. The error rate was relatively low at 14%, showing that Nabi has a good grasp of English article usage.

For zero articles, comparisons were made across various contexts, including mass, singular, plural, generic, gerund, and noncount. The results indicated differing levels of significance. Notably, Nabi's usage of zero articles showed moderate significance when comparing 'Indef. Mass Ø' to 'Indef. Sing. Ø' (adjusted p-value = 0.025), 'Indef. Mass Ø' to 'Indef. Generic Gerund Ø' (adjusted p-value = 0.025), and 'Indef. Mass Ø' to 'Indef. Generic

Noncount Ø' (adjusted p-value = 0.025). However, when comparing 'Indef. Mass Ø' to 'Indef. Plural Ø', the significance was notably higher (adjusted p-value = 0.008), indicating a high level of significance.

Figure 24: Nabi's correct target-like use of articles



The use of zero articles shows a consistent pattern, with a noticeable increase in the use of generic zero Ø in the second week. The topic in the second week that provided the most context for using the generic zero was natural health solutions and homeopathy. For example, in the following sentence, Nabi shares what he prefers to use in place of medicine.

35. I personally use *Honey*, *Olive oil*, and *Ginger*

(Week 2/Type chat)

In the case of indefinite articles, the analysis found that Nabi's usage did not allow for direct comparisons because of the use of just one type of indefinite article. The qualitative analysis of, however, reveals incorrect usage of indefinite articles 'a' and 'an' that vary throughout the nine-week period. The incorrect usage of indefinite singular *a* is relatively low and inconsistent, while the incorrect usage of indefinite singular Ø and indefinite plural Ø shows

a significant increase in the 9th week (16 instances). The following sentence showcases underuse of the indefinite article ‘an’ with singular (adjective +) noun ‘old building’.

36. I was thinking it’s **old building* like World War One
[*an* old building]

(Week 9/Voice chat)

For zero articles, comparisons were made across various contexts, including mass, singular, plural, generic, gerund, and noncount. The results indicated differing levels of significance. Notably, Nabi's usage of zero articles showed moderate significance when comparing 'Indef. Mass Ø' to 'Indef. Sing. Ø' (adjusted p-value = 0.025), 'Indef. Mass Ø' to 'Indef. Generic Gerund Ø' (adjusted p-value = 0.025), and 'Indef. Mass Ø' to 'Indef. Generic Noncount Ø' (adjusted p-value = 0.025). However, when comparing 'Indef. Mass Ø' to 'Indef. Plural Ø', the significance was notably higher (adjusted p-value = 0.008), indicating a high level of significance. Conversely, comparisons with adjusted p-values of 0.79 for the rest of the pair-wise comparisons indicate a lack of statistical significance. Lastly, in the case of indefinite articles, post hoc analysis was not possible due to the lack of variation.

Overall, these results suggest that while Nabi's use of definite articles did not vary significantly across different types, her use of zero articles showed some significant differences, particularly in comparisons involving 'Indef. Mass Ø' and 'Indef. Plural Ø'. Analyzing Nabi’s incorrect usage of English articles in the study, a few trends can be observed. Nabi’s incorrect usage of the definite article ‘the’ with singular nouns fluctuates throughout the period, with the highest number of errors occurring in the 4th week (4 instances). However, the incorrect use of the definite article ‘the’ was 6.6%. The incorrect usage of ‘the’ with plural nouns and abstract

nouns is relatively low and inconsistent. The incorrect usage of zero articles is also inconsistent, with a noticeable increase in the incorrect use of generic zero Ø in the 1st week (5 instances).

To summarize, the quantitative analyses that included the Friedman test followed by post hoc analyses with Bonferroni corrections, paired with qualitative analyses in this part of the chapter revealed distinct patterns in the use of English articles by NNS. The analyses showcased a selective and unique approach within various contexts. This exploration addressed the study's second and third research questions. Initially, an analysis by language proficiency and article type was presented, and the topic domains were noted. Subsequently, a comprehensive examination of each NNS participant's utilization of English articles in diverse linguistic settings, specific contexts, and noun types was conducted as a post hoc. This scrutiny allowed for an understanding, offering micro-level insights into the differential use of the target language by the NNS participants in the study.

To conclude, this chapter encompassed descriptive statistics and outcomes from an analysis of NSs' selection of interactional feedback types. It delved into the ten NS participants' use of interactional feedback within distinct interactional environments – type chats and voice chats. It then presented a quantitative, including the Friedman Test, post hoc tests with Bonferroni correction, and qualitative analyses scrutinizing NNS errors that prompted NS interactional feedback and the use of definite ('the'), indefinite ('a' and 'an'), and zero articles. These findings substantiated the impact of NS online interactional feedback types, identified common errors in NNS production within proficiency levels, and highlighted the intra- and inter-differential use of these common linguistic errors alongside individual linguistic elements. In the subsequent chapter, these results will be contextualized in relation to the research questions and the interaction hypothesis, leading to the dissertation's conclusion.

Chapter 5: Discussion

This dissertation aimed to examine how interactional feedback from NSs impacts text-based and voice-based natural online communication involving ten pairs of L1-English NS and L2-English NNS across a ten-week period. The study focused on identifying the most consistent linguistic error made by L2 learners that received the most feedback from NSs and explored potential patterns related to proficiency level, topic domain, and the prevalence of these specific grammatical errors. Once the most common error (the English articles) was identified in the data, an analysis for target-like language use was conducted of all ten non-native speaker participants.

This chapter reviews the main results from the previous chapter and addresses each research question in turn. The discussion follows the order of the research questions that guided this study, as presented below, and then presents limitations, future directions, and conclusions of the study.

RQ1. To what extent is NS interactional feedback (IF) effective in naturalistic text-based compared to naturalistic voice-based synchronous computer-mediated communication (SCMC) between NS and NNS of English?

RQ2. What is the most common linguistic error, produced by L2 learners, that receives the greatest amount of NS feedback in naturalistic text-based and voice-based SCMC interactions?

RQ3. Does L2 learners' production of the most common linguistic error change throughout the course of online naturalistic interactions? If so, can any patterns be detected regarding proficiency level, topic domain, and article type?

RQ1: Native Speaker Interactional Feedback

The first research question aimed to investigate the extent to which native speaker interactional feedback was effective in naturalistic text-based and voice-based synchronous computer-mediated communication between NSs and NNSs of English. Effectiveness is defined and operationalized in the study as 'visible uptake'. In other words, in light of the considerable delay and the limited access to NNS complete reactions during NS feedback provision, it is essential to consider alternative forms of NNS uptake. When an NS appears to be offering corrections during a feedback turn, it is plausible that the NNS might be silently repeating the correction orally (though inaudibly to others), engaging in silent lip movement, or expressing internal acknowledgment (e.g., saying 'Aha!'). These subtle behaviors, which would typically be interpreted as uptake or acknowledgment of feedback, remain inaccessible to us in this study.

The results showed that the NS provided more feedback in voice-based than in text-based communication, and that they mostly used reformulations rather than elicitations to address the NNS' errors. The most common feedback type was embedded recast, followed by specific and general clarification requests. These findings suggest that the NSs were more concerned with facilitating communication and comprehension than with explicitly correcting the NNS.

Types of Interactional Feedback

The results of this study are consistent with the previous literature on interactional feedback in face-to-face communications and CMC, which has shown that NSs tend to use implicit and positive feedback rather than explicit and negative feedback when interacting with NNS (e.g., Lyster & Ranta, 1997; Mackey, 2006; Iwashita, 2003; Oliver, 2000). However, the results also reveal some differences between text-based and voice-based communication, which

have not been extensively explored in previous research. For instance, the NSs provided more feedback in voice-based than in text-based communication, which could be attributed to the different modalities and affordances of the two modes. Voice-based communication may allow for more natural and spontaneous interaction, whereas text-based communication may require more cognitive and linguistic effort and reduce the saliency and immediacy of feedback (e.g., Blake, 2000; Payne & Whitney, 2002; Smith, 2003).

Moreover, the NSs used different types of feedback in the two modes, with embedded recasts being more prevalent in voice-based communication and clarification requests being more prevalent in text-based communication. This could be explained by the different functions and effects of these feedback types in the two modes. Embedded recasts may be more suitable for voice-based communication, as they can provide implicit correction without interrupting the flow of conversation, whereas clarification requests may be more suitable for text-based communication, as they can elicit more output and negotiation of meaning from the NNS (e.g., Gass & Varonis, 1994; Long, 1996; Lyster, 1998).

The results of the frequency of feedback instances by native speaker participants reveal some variation and inconsistency in the amount and type of feedback provided by different NSs in text-based and voice-based communication. The results show that some NSs provided more feedback than others, and that some NSs did not provide any feedback at all. The results also show that the feedback types used by different NSs varied widely, ranging from explicit correction to implicit recast.

These findings suggest that the NSs may have different beliefs, attitudes, and strategies regarding interactional feedback, and that they may have adapted their feedback to the specific characteristics and needs of their non-native speaker partners. These findings are consistent with

some previous studies that have found that NSs are not a homogeneous group, and that they may vary in their feedback behavior depending on various factors, such as their interlocutor's proficiency level, error type, personality, and motivation (e.g., Carroll, 2001; Mackey et al., 2003; Sheen, 2004).

Text-based versus Voice-based Feedback Effectiveness

The results of the comparison between text-based and voice-based feedback effectiveness provide some evidence for the relative advantages and disadvantages of the two modes of communication for interactional feedback and L2 acquisition. The results indicate that the voice-based mode was slightly more effective than the text-based mode in eliciting learner uptake, both immediate and delayed, which is consistent with some previous studies that have found positive effects of voice-based communication on learners' comprehension, production, and noticing of feedback (e.g., Blake, 2000; Payne & Whitney, 2002; Smith, 2003).

However, the results also suggest that the text-based mode was not significantly less effective than the voice-based mode, and that both modes offered similar opportunities and challenges for interactional feedback and second language learning. This is in line with some other studies that have found no significant differences between text-based and voice-based communication in terms of learners' interaction, feedback, and learning outcomes (e.g., Pellettieri, 2000; Sauro, 2009; Yilmaz, 2012). Therefore, the results of this study support the view that the mode of communication may not be a decisive factor in determining the effectiveness of interactional feedback, but rather one of the many factors that interact with each other in complex and dynamic ways (e.g., Chapelle, 2001; Warschauer, 1997).

Immediate versus delayed uptake

The results of the immediate versus delayed uptake by the NNS reveal some interesting patterns and insights regarding the effectiveness and timing of interactional feedback in text-based and voice-based communication. The results show that the majority of the learner uptake was immediate (90%), which indicates that the NNS were able to notice and use the feedback provided by the NS in their subsequent utterances. This supports the claim that interactional feedback can facilitate the learners' noticing of the gap between their interlanguage and the target language, and thus promote their interlanguage development (e.g., Schmidt, 1990; 1995).

The results of the study show that feedback types resulting in immediate uptake were primarily input-providing reformulations, such as recasts, while feedback types leading to delayed uptake were mostly output-prompting elicitations, like clarification requests. This aligns with findings from Long (2007), who emphasized the role of recasts in providing immediate corrective feedback that learners can process without interrupting the flow of communication. This suggests that learners may have different cognitive and affective responses to various types of feedback, with reformulations potentially being more effective in triggering immediate uptake. This challenges the assumption that elicitations are more beneficial for learners' output production and negotiation of meaning, as previously proposed by Lyster & Ranta (1997) and Lyster (1998). One of the potential benefits of reformulations over elicitations might be rooted in how SLA researchers have historically been somewhat reticent to explore the mental processes and motivations of learners in interaction. This hesitation may have contributed to an oversimplified view of these processes, potentially overlooking the fact that learners' cognitive and motivational states are not as opaque as often portrayed. Reformulations could, therefore, be more beneficial because they might directly engage these underlying factors, offering immediate

corrective feedback that learners can process more readily. This perspective is supported by recent studies in applied linguistics, which highlight the importance of considering learners' cognitive and affective states in feedback effectiveness (Hyland & Hyland, 2019).

In terms of the mode of communication, the results indicate that the mode may have an impact on the timing and frequency of uptake, as the voice-based mode yielded more uptake instances than the text-based mode, both in terms of immediate and delayed uptake. This implies that the voice-based mode may create more opportunities and incentives for the learners to process and use the feedback, as it may enhance the salience, immediacy, and naturalness of the feedback (e.g., Blake, 2000; Payne & Whitney, 2002; Smith, 2003).

The results of the first research question showed that voice-based SCMC was more conducive for NS interactional feedback in naturalistic settings, and that reformulations were the most common type of feedback provided by NS. However, the results of the second research question revealed that not all types of errors received equal amounts of feedback, and that article errors were the most common and prevalent errors that triggered NS feedback.

RQ2: Most common NNS error

The second research question aimed to identify the most common linguistic error, produced by L2 learners, that receives the greatest amount of NS feedback in naturalistic text-based and voice-based SCMC interactions. The results showed that the most frequent type of error was related to the use of articles, followed by pronunciation, semantics, word formation, and lexical, morpheme, and preposition errors. In the context of the study, these findings seem to suggest that NS feedback is more likely to occur when the NNS utterances contain errors that affect the comprehensibility or *meaning* encoded in the message, rather than formal or stylistic errors. This is consistent with previous research that found that NS feedback tends to focus on

errors that hinder communication or convey incorrect information (Ellis, 2009; Mackey, 2007; Sheen, 2004).

The results also revealed that the distribution of error types varied across the two modes of interaction, with pronunciation errors being exclusive to the voice-based mode and article errors being more prevalent in the text-based mode. The study has shown that in the voice-based mode, pronunciation errors surpass any other type of error. This indicates that the mode of interaction influences the type and frequency of errors that NNSs produce and receive feedback on. One possible explanation for this is that the voice-based mode provides more opportunities for NNS to practice their oral skills and receive feedback on their pronunciation, whereas the text-based mode allows NNS to pay more attention to their written accuracy and receive feedback on their grammatical errors.

Another possible explanation is that the voice-based mode imposes more cognitive demands on NNS, as they have to process the auditory input and output simultaneously, whereas the text-based mode gives NNS more time to plan and revise their written output. These explanations are supported by previous studies that compared text-based and voice-based SCMC and found that the mode of interaction affects the amount and quality of L2 output and feedback (Abrams, 2003; Blake, 2000; Payne & Whitney, 2002; Satar & Özdener, 2008).

The results of the second research question have important implications for the design and implementation of SCMC tasks for L2 learning. They suggest that both text-based and voice-based SCMC can provide valuable opportunities for NNS to receive NS feedback on different aspects of their interlanguage. However, they also imply that the mode of interaction should be carefully selected and matched with the learning objectives and the learners' needs and preferences. For example, if the goal is to improve the learners' oral fluency and pronunciation,

then voice-based SCMC might be more suitable and effective. On the other hand, if the goal is to enhance the learners' written accuracy and grammar, then text-based SCMC might be more appropriate and beneficial.

Furthermore, the results indicate that NS feedback is not equally distributed across all types of errors, and that some errors might be more salient or noticeable than others. Therefore, it might be useful to provide NS with some guidance or training on how to provide effective and comprehensive feedback to NNS, and to encourage NNS to ask for clarification or confirmation when they are unsure or confused about the feedback they receive.

The above results of the error types that triggered NS feedback led to a further investigation of the nature and context of NNS article errors that received the most NS feedback. The results showed that the NNS produced modified output to 69% of NS feedback on article errors, which is the highest rate of uptake among all NNS grammatical errors in the study. This suggests that the NS feedback on article errors was effective in eliciting NNS self-correction and improvement. However, it also raises the question of whether the prevalence of articles (not article *errors*) would have been the same no matter who was speaking or writing. In other words, various types of articles and noun types were used and/or misused because the discourse contexts for them existed regardless of the *participants*, both NS and NNS, in the study. The following subsection presents the results of the analysis of the NNS article errors in relation to their proficiency level, topic domain, and article type.

RQ3: Patterns of NNS article use

The third research question aimed to examine how the production of the most common linguistic error, namely the use of articles, changed throughout the course of online naturalistic interactions between NS and NNS of English. The results showed that the NNS participants

exhibited different trends and variations in their target-like use of articles, depending on their proficiency level, topic domain, and article type. The results also revealed that some NNS participants performed beyond their proficiency level and achieved consistently high levels of accuracy in their use of articles. The discussion follows the order of the constructs, vis-à-vis proficiency level, topic domain, and individual trends, that were analyzed in relation to the NNS production of articles. Then, the pedagogical implications, limitations, and conclusions of the study are presented.

NNS Proficiency level

The results of the TLU analysis and the Friedman Test, followed by a post hoc analysis, by proficiency level showed that the NNS participants in the Lower Intermediate group had the most fluctuating performance, with some showing improvement overtime and others showing inconsistent performance. This suggests that the Lower Intermediate group had the most difficulty in using articles correctly and consistently, and that their performance was influenced by other factors, such as the mode of interaction, the type of feedback, and the individual differences overtime. The results of the TLU analysis by proficiency level also showed that the NNS participants in the Upper Intermediate and Advanced groups had more stable and high performance, with fewer fluctuations and errors. This indicates that the Upper Intermediate and Advanced groups had a better grasp of the rules and contexts of using articles, and that their performance was more consistent and accurate across the ten weeks.

The results of the TLU analysis by proficiency level also revealed that two NNS participants, NNS-9 in the Upper Intermediate level and NNS-4 in the Advanced level, achieved consistently high levels of proficiency throughout the ten weeks, surpassing their counterparts

and performing beyond their proficiency level. This implies that these two NNS participants had a more advanced and nuanced understanding of the article system, and that they were able to apply it effectively in various conversational contexts. NNS-9 (upper intermediate) and NNS-4 (advanced) demonstrated superior performance relative to their peers within corresponding proficiency tiers, exhibiting competencies surpassing their designated proficiency levels. This phenomenon invites exploration through the lens of language typology, particularly with regard to whether the L1s spoken by the NNS possess an article system that closely aligns with that of English. For example, in German, substantial correspondences exist between the two systems despite some disparities that are generally peripheral in nature. In German, the pragmatic principles governing the use of 'first-mention a/an, second-mention the' mirror those in English; similarly, shared assumptions of mutual familiarity dictate usage (e.g., "*the* squirrel" in German, if both the speaker and the listener can observe the squirrel). Abstract nouns typically eschew an article (e.g., "*Er verehrt Ehrlichkeit*"), with the option of a definite article available; singular indefinite count nouns necessitate the use of a/an, whereas plurals typically require omission of the article. Analogously, Spanish presents a comparable scenario. Consequently, speakers of these languages often exhibit considerable ease in navigating English article usage, leveraging nearly seamless positive transfer. Hence, it is unsurprising that both NNS-9 and NNS-4 demonstrated performance exceeding their proficiency levels in the domain of article usage.

These findings are in line with previous research that found that proficiency level affects the production and acquisition of articles in L2 English (Butler, 2002; Ionin et al., 2004; Master, 1997; Robertson, 2000). Previous studies have suggested that lower proficiency learners tend to overuse or underuse articles, or rely on surface-level cues, such as phonology or word order, to determine the use of articles. On the other hand, higher proficiency learners tend to use articles

more appropriately and accurately, or rely on deeper-level cues, such as semantics or pragmatics, to determine the use of articles.

The exploration of definiteness in languages such as Chinese, Korean, Japanese, Arabic, Portuguese, German, and Spanish reveals a rich tapestry of linguistic strategies. Mandarin Chinese, for instance, employs numeral classifiers to indicate definiteness, a concept absent in English, offering Chinese learners a unique perspective on noun specificity. Korean and Japanese, both lacking articles, rely on word order and contextual cues to convey definiteness, presenting a challenge to learners in adapting to the English system of articles. Arabic, while using a definite article, does not have an indefinite counterpart, thus Arabic speakers may find the English article 'the' familiar but struggle with 'a' and 'an.' In contrast, Portuguese, German, and Spanish all have definite and indefinite articles, though their use is nuanced by factors such as gender and case in German, and animacy and specificity in Spanish. These languages provide their speakers with a foundation that can be advantageous when learning English articles. For learners of English, understanding the parallels and divergences in how their native languages mark definiteness can facilitate a deeper comprehension of English grammar, enhancing their communicative competence and fluency in cross-linguistic contexts.

Previous studies have also suggested that some learners may achieve near-native or native-like competence in the use of articles, regardless of their proficiency level, due to individual factors, such as motivation, aptitude, or exposure. The results of the present study support these suggestions and demonstrate the influence of proficiency level and individual differences on the production of articles in L2 English.

Topic domain and NNS article use

Another factor that influenced the NNS production of articles was the topic domain, or the subject matter of the conversation. The results of the analysis by topic domain showed that the NNS participants discussed a wide range of topics, but they preferred personal topics over academic or professional ones. This is consistent with previous research that found that L2 learners tend to choose topics that are more familiar, relevant, or interesting to them, and that personal topics facilitate more interaction and feedback (Lee & Deakin, 2016; Zuloaga, 2017).

The results also showed that the frequency and accuracy of article use varied across different topics, depending on the type and number of nouns involved. For example, topics that involved more generic or noncountable nouns, such as weather, culture, or hobbies, tended to require fewer or no articles, while topics that involved more specific or countable nouns, such as family, travel, or food, tended to require more or definite articles. This is in line with previous research that found that L2 learners have more difficulty with articles when the nouns are more specific or countable, as they have to consider more factors, such as definiteness, specificity, and context (Butler, 2002; Ionin et al., 2004; Master, 1997).

The quantitative abundance of specific linguistic forms, such as the definite article, within a given discourse context merely reflects the influence of that context on their production. For instance, a philosophical discourse might favor the expression of abstract nouns with zero articles. While the presence or absence of particular contextual factors may inform lesson planning or pedagogical decisions, it does not necessarily indicate mastery of one form over another. Therefore, drawing conclusions like Luna's limited use of the definite noncount 'the', or Bella's employment of zero-article indefinite plurals as areas in the process of *improvement* solely due to their lower frequency of usage is flawed. Essentially, the infrequency of contexts conducive to noncount 'the' or zero-article indefinites may be inherent to the nature of the

discussion. Therefore, a nuanced discourse analysis of topic domains is warranted in future studies to decipher these patterns.

The results also revealed that some topics, such as technology or education, were more challenging for the NNS participants, as they involved more complex or abstract nouns that required more careful use of articles. This is similar to previous research that found that L2 learners struggle with articles when the nouns are more abstract or technical, as they have to rely more on their semantic or pragmatic knowledge (Chung et al., 2023; Kobayashi, 2016). The following subsections present the results of the analysis of the NNS article errors by topic domain in more detail.

Individual NNS patterns of TLU Analysis

Sally (NNS-1). Although the results for the Friedman test indicate that there were no statistically significant differences in Sally's usage of different forms of the definite article 'the' or the indefinite article 'a' and 'an', moderate significance was reported for the use of the zero article. The results showed that Sally demonstrated a remarkable improvement in her use of articles throughout the study, advancing from an initial 48% accuracy in week 2 to an impressive 97% correctness by week 10. This notable progress suggests her adeptness in utilizing the feedback received from her NS partner and learning from her errors, in line with previous research affirming SCMC's favorable impact on L2 development (Blake, 2000; Lee, 2002; Pellettieri, 2000). However, this advancement did not follow a consistently linear path, revealing fluctuations and variations across different weeks and types of nouns. These fluctuations underscore the complex and multifaceted nature of article usage, influenced by various factors, such as syntactic structure, semantic context, pragmatic function, and lexical collocation (Huang, 2010).

The TLU analysis also illustrated Sally's varying usage of articles, contingent upon the type of noun. She tended to employ the definite article *the* more frequently with singular and noncount nouns, aligning with standard English usage norms (Larsen-Freeman et al., 2016). Yet, challenges emerged with indefinite articles *a/an*, particularly in noncount and zero ∅ noun contexts, visible in instances like *a dyslexia* and omissions of *a/an* with zero ∅ nouns such as *∅ husband* and *∅ house*. These disparities highlight difficulties in distinguishing between count and noncount nouns and employing indefinite articles with zero ∅ nouns. These findings are consistent with the previous studies that L1-Chinese learners tend to overuse the definite article *the* and omit the indefinite articles *a/an* in L2 English, due to the lack of articles in Chinese (Huang, 2010; Liu & Yeung, 2023). This suggests that negative transfer from L1 to L2 is a common and common source of difficulty for Chinese learners of English articles.

Moreover, Sally encountered common struggles with the accurate use of the definite article *the* across both singular and plural contexts, recurring notably in Weeks 1, 4, 7, and 10. Her challenge extended to using *the* with abstract and noncount nouns, evident in an example from Week 1 where the noun *life* was represented abstractly instead of specifically in the context of discussing life in NYC. Sally also demonstrated inconsistent use of the zero article (∅) across various contexts, including abstract and noncount nouns, indicating instances where articles were omitted when needed, observed across several weeks. In her use of indefinite articles, *a/an* in singular contexts, errors persisted in Weeks 2, 3, 4, 7, and 9, such as her reference to *a place* without employing the indefinite *a* in Week 4. These findings confirm the previous studies that L1-Chinese learners have difficulties with the use of zero articles in L2 English, especially with proper nouns, abstract nouns, and mass nouns (Liu & Yeung, 2023; Zhang & Koda, 2018). This indicates that Chinese learners may not have a clear understanding of the contexts and conditions

that require the use of zero articles in English, and may overgeneralize the use of *the* or *a/an* to all types of nouns.

These findings suggest potential factors influencing Sally's article usage, including her proficiency level, the topic domain, and the types of articles. Her low-intermediate proficiency in English, as indicated by Master (1997), might explain the overuse of indefinite articles *a/an* and the underuse of definite and zero articles. Additionally, the nature of topics discussed each week might have affected her usage, necessitating varying article use based on the specificity or generality of the nouns involved. These results reveal some interesting patterns that are not explicitly addressed by the previous studies, such as the fluctuations and variations in Sally's article usage across different weeks and types of nouns. This may reflect the complex and multifaceted nature of article usage, influenced by various factors, such as syntactic structure, semantic context, pragmatic function, and lexical collocation (Huang, 2010; Wang & Quek, 2007). It may also suggest that Sally's article usage is not stable or automatized and may depend on the level of attention and awareness she pays to the form and meaning of articles in different communicative situations.

The results also demonstrate some notable improvement in Sally's article usage throughout the study, advancing from an initial 48% accuracy in week 2 to an impressive 97% correctness by week 10. This may imply that Sally has benefited from the feedback received from her NS partner and learned from her errors, in line with previous research affirming SCMC's favorable impact on L2 development (Blake, 2000; Lee, 2002; Pellettieri, 2000). It may also indicate that Sally has developed some metalinguistic awareness and sensitivity to the use of articles in L2 English, which may facilitate her acquisition and retention of the article system.

Jade (NNS-2). Jade's journey in mastering English articles through a ten-week intervention reflects a notable advancement in her linguistic competence. However, compared to Sally, her fellow Lower Intermediate proficiency participant, Jade did not exhibit a wider range of article use even though the two participants had similar topic domains. In terms of the definite article, Jade's Friedman Test showed high significance in the use of the definite singular and the abstract *the*, and the definite singular and the plural *the*. In the realm of the zero article, Jade's use of the generic *Ø* and generic plural *Ø*, and generic *Ø* and generic noncount *Ø* exhibited low significance overall. The documented progress, from a 56% to an 85% accuracy rate, coupled with a decrease in error rate from 44% to 15%, underscores the significance of interactive feedback, particularly from a native English-speaking partner, within text-based and voice-based SCMC modes.

This improvement in article usage can be attributed to multifaceted factors: the frequency and quality of feedback, the complexity of topics discussed, and Jade's intrinsic motivation and self-awareness regarding linguistic errors. These elements align with previous findings highlighting the pivotal role of SCMC in facilitating L2 learners' article mastery when coupled with corrective feedback.

Yet, Jade's results also shed light on nuances not entirely captured in prior studies. Her tendencies to underuse definite articles 'the' with singular nouns specific to entities or events and to overuse indefinite articles 'a' in generic statements reveal gaps in her grasp of English article semantics and pragmatics. Such errors echo those identified in earlier research on L2 learners' article usage, emphasizing the influence of L1 transfer and generalization strategies in navigating interlanguage gaps.

Interestingly, Jade's performance fluctuated across weeks and article-noun types, suggesting an impact of topic complexity and familiarity on her article accuracy. Her higher accuracy during simpler, familiar topics and struggles during diverse, complex subjects parallel the known influence of topic domain and noun type on L2 learners' article use, signifying contextual influences on her learning process.

The common errors, despite overall improvement, emphasize the need for further exploration into SCMC modes, topic domains, and noun types in shaping L2 learners' article usage. The observed difficulties – specifically, underuse and overuse of articles – underscore the intricate nature of mastering article usage in a second language. Such challenges mirror findings from earlier studies, attributing L2 learners' article struggles to factors like L1 background, L2 input, proficiency level, and contextual nuances (Butler, 2002; Thomas, 2008).

In essence, Jade's progress highlights the effectiveness of SCMC-based interventions in fostering L2 development, while also unveiling intricate challenges that warrant deeper investigation (Miura, 2022). Her journey underscores the multifaceted nature of language acquisition and the nuanced interplay of various factors in shaping learners' proficiency in specific linguistic elements, such as English articles.

Skye (NNS-3). The use of Skye's ten-week intervention showcased a commendable proficiency in English article usage, consistently demonstrating an accuracy rate surpassing 80% and averaging at an impressive 90%. Even though she did not exhibit a broad range of article types and noun types, her use showed consistent and target-like use overall. This achievement indicates a robust understanding of the semantic and pragmatic intricacies governing English article use. Notably, this adeptness extended across both text-based and voice-based SCMC modes. Several factors may have contributed to Skye's commendable accuracy, including her

advanced proficiency in L2-English and her familiarity with the topics discussed by her and her partner. These findings align with earlier studies affirming the positive influence of SCMC on L2 development, particularly concerning grammatical accuracy (Abrams, 2003; Baralt, 2010; Ziegler, 2016).

However, Skye's performance exhibited fluctuations across different weeks and variations concerning various article and noun types. Her highest accuracy was observed in week 2, encompassing relatively familiar topics like movies and photography. In contrast, the lowest accuracy emerged in week 1, featuring more diverse and intricate subjects like meditation and fashion. Skye encountered more challenges in employing definite articles compared to zero or indefinite articles and faced greater difficulty with articles concerning abstract or noncount nouns over concrete or count nouns. These variations highlight the influence of linguistic and contextual elements on Skye's article usage, indicating potential gaps within her interlanguage system. Therefore, further investigations are warranted into the impact of SCMC modes, topic domains, and noun types on L2 learners' article use.

Moreover, these findings can be compared and contrasted with existing literature on the use of English articles by L1-Portuguese learners. Previous studies on L1-Portuguese learners highlighted tendencies to overuse the definite article ‘the’, omit indefinite articles ‘a/an’, and struggle with zero articles in English (Brooks-Lewis, 2009; Tavares, 2017). Factors influencing article acquisition included proficiency and exposure to English, feedback quality, semantic and pragmatic contexts, and similarities between L1 and L2 article systems (Brooks-Lewis, 2009; Picoral & Carvalho, 2020; Thomas, 2008). Strategies to aid improvement included raising awareness of language differences, providing explicit rules and examples, encouraging error

identification, and offering ample practice opportunities (Brooks-Lewis, 2009; Derkach, K., & Alexopoulou, 2023).

Interestingly, the findings corroborate previous research on the positive influence of SCMC modes on L2 learners' article use, emphasizing interaction, feedback, and negotiation of meaning (Dao, Duong, & Nguyen, 2021; Torres, 2020). However, a divergence exists concerning the mode's effectiveness. Skye's better performance in voice-based SCMC contrasts with general assumptions favoring text-based modes, suggesting the need for nuanced understanding regarding their impacts. Moreover, while the present study outlined particular difficulties related to definite articles and abstract/noncount nouns, prior research did not offer such detailed insights into learners' challenges. This juxtaposition underscores the importance of contextual nuances and individual learner differences when exploring L2 acquisition, emphasizing the need for multifaceted investigations to enrich our understanding of article acquisition in L1-Portuguese learners of English.

Zara (NNS-4). Zara, a native German speaker, demonstrated exceptional proficiency in using English articles, achieving a remarkable 98% accuracy rate out of 674 instances. Her consistent mastery was evident in accurately employing articles 658 times while making only 12 errors. She also demonstrated a broader range of article types and noun types. Zara’s Friedman Test results showed little to no statistical significance in comparing all of the article types indicating her mastery and consistency in using these articles in context. Although occasionally she encountered challenges, primarily with the zero article in general contexts and minor 'a' usage issues, these didn't overshadow her overall stellar performance with English articles.

The acquisition of English articles by native German speakers has garnered significant interest due to the striking structural disparities between German and English articles, as

underscored by Jarvis (2002), Ionin, Ko, & Wexler (2004), and Trenkic (2008). German definite and indefinite articles (der, die, das and ein, eine) adhere to distinct usage rules compared to English (the, a/an). Huebner (1983), Master (1987), and Thomas (1989) emphasized the challenges posed, particularly concerning the absence of articles (zero articles) in specific contexts for German learners acquiring English.

Numerous studies have scrutinized the article acquisition patterns among L1 German learners of English, examining error analysis and pinpointing areas of difficulty, as highlighted by Robertson (2000), Butler (2002), and Hawkins et al. (2006). Overgeneralization and omission of definite or indefinite articles were frequent challenges, alongside struggles with gender-specific articles in English and the nuanced use of zero articles not obligatory in German.

Understanding how native German speakers learn English articles, which vary significantly between the two languages, is a focal point in research, emphasized by Jarvis (2002), Ionin, Ko, & Wexler (2004), and Trenkic (2008). Notably, the divergence in rules governing English (the, a/an) and German (der, die, das and ein, eine) articles presents distinct hurdles, notably the absence of articles (zero articles) in certain situations, posing difficulties for German learners.

Further analysis illuminated Zara's nuanced article usage, revealing fluctuations based on topic complexity and noun types. While simpler topics correlated with fewer errors, intricate subjects and abstract or noncount nouns presented challenges. These findings underscore the intricate relationship between language and context shaping Zara's article usage, warranting deeper investigation.

Hazel (NNS-5). The results for Hazel, a Japanese learner of English, indicate that she had a high level of proficiency in using English articles correctly over the course of the ten-week

intervention. Hazel's accuracy rate was consistently above 90%, while her error rate was below 10%. This suggests that Hazel was able to benefit from the interactional feedback she received from her native speaker partner in both text-based and voice-based SCMC modes. Hazel's proficiency can be attributed to several factors, such as her L1 background, her L2 exposure, her L2 motivation, and the quality and quantity of the feedback she received from her native speaker partner.

Hazel's results are in line with the previous findings on both topics, as they show that SCMC can provide opportunities for L2 learners to practice and improve their use of articles, especially when they receive feedback or correction from their interlocutors (Butler, 2002). Moreover, Hazel's results reveal some variation in her performance across different weeks and different types of articles and nouns, suggesting that the complexity and familiarity of the topics discussed affected her article use. This is consistent with the previous studies that have found that topic domain and noun type can influence L2 learners' article use (Thomas, 2008).

However, Hazel's results also reveal some unique aspects that are not covered by the previous findings on both topics, such as her underuse of the definite article 'the' with singular nouns, especially when referring to specific entities or events, and her overuse of the indefinite article 'a' with generic nouns, especially when expressing general statements or opinions. These errors suggest that Hazel had not fully acquired the semantic and pragmatic rules of article use in English, and that she relied on her L1 transfer or generalization strategies to cope with the gaps in her interlanguage. Hazel's errors are similar to those reported by previous studies on L2 learners' article use, such as Ionin, Ko, and Wexler (2004), Master (1997), and Robertson (2000). These studies have argued that L2 learners' article use is influenced by various factors, such as the L1 background, the L2 input, the L2 proficiency level, and the L2 context. Therefore, the

results suggest that SCMC can be a useful tool for L2 learners to learn and use articles in authentic and meaningful contexts, but it may not be sufficient to overcome the difficulties posed by the English article system.

Nabi (NNS-6). Nabi, a native Arabic speaker, encountered challenges in grasping the nuances of the English definite article system. Studies suggest that Arabic speakers often struggle with article use in English, frequently overusing or omitting articles, especially in abstract contexts (Master, 1987; Murphy, 1997). In Nabi's case, his initial analysis showed a mere 31% accuracy rate in article usage, notably faltering with overuse of ‘the’ in indefinite contexts and omission of ‘a/an’ in specific instances (Ionin et al., 2004; Snape et al., 2006). However, his progression in demonstrating the use of his articles across the ten sessions was remarkable, reaching a remarkable 94% accuracy in sessions 2 and 8. This improvement indicates Nabi's adaptability and his capacity to learn from the frequency and significance of articles during online interactions.

Nabi's productivity significantly surpassed that of his peers. He generated nearly twice as many words as his NS partner, suggesting a high level of motivation, interest in the task, and expertise in the subject matter. He also showcased the use of a wider range of the zero article compared to his NNS peers in the same proficiency level.

Research into L2 article acquisition highlights the influence of one's native language on learning English articles (Master, 1987; Murphy, 1997). Nabi's journey mirrored this connection, displaying traces of Arabic's definite article system while gradually absorbing the English article nuances through frequent exposure and interactive experiences. Although his initial struggle in the first session indicated an incomplete grasp of the English article system, his subsequent advancements showcased adaptability and mastery influenced by both his L1 and the input

received (Ionin et al., 2004; Snape et al., 2006). His journey counters the notion that learners from languages lacking articles face insurmountable challenges in acquiring English articles, emphasizing the significance of exposure and adaptability in successful language acquisition.

Nabi's results are consistent with some of the previous studies that have investigated the use of English articles by L1 Arabic speakers in different contexts and modalities. For example, his results support the findings that L1 Arabic learners of L2 English can benefit from explicit instruction and feedback on English articles, as well as exposure to authentic and varied input in different modalities (Al-Nofaie, 2010; Al-Sobhi et al., 2018). Nabi's improvement across ten sessions suggests that he was able to learn from the feedback and input he received during the online interactions. However, Nabi's results also contrast with some of the previous studies that have identified the commonest errors and the most effective tools for L1 Arabic learners of L2 English. For example, his results contrast with the findings that the most common errors involve mis-use of the definite article for generic reference (Alhaisoni et al., 2012; Abudalbuh, 2016).

Nabi's errors seem to be more related to the overuse of the definite article for indefinite reference and the omission of the indefinite article for specific reference. This may indicate that Nabi had a different level of proficiency or a different source of transfer than the learners in the previous studies. Moreover, his results contrast with the findings that voice-chat generated more negotiation episodes and incidents of noticing of feedback than text-chat (Al-Sobhi et al., 2018). Nabi's progress was achieved through text chat, which suggests that text chat can also be an effective tool for L1 Arabic learners to practice and improve their use of English articles.

Tiana (NNS-7). The analysis of Tiana's use of English articles sheds light on her language acquisition strengths and areas for improvement. As a native Thai speaker, Tiana displays a strong command of English articles, using them actively and accurately in speech.

However, a 19% rate of incorrect usage highlights specific areas that need attention for further enhancing her English proficiency. The Friedman Test of her definite article types showed high statistical significance between the definite plural and the definite singular, and the definite singular and the definite noncount. Similarly, she used two types of indefinite articles in context, indefinite singular and indefinite generic noncount, which should high statistical significance. This high significance could be attributed to various factors inherent to language acquisition and the nuances of the Thai language. The absence of articles in Thai, Tiana's mother tongue, likely poses challenges in grasping their application in English, as her native language offers no direct equivalent. Furthermore, the intricate rules that dictate article usage in English present a steep learning curve, particularly for speakers of languages without comparable grammatical constructs. This complexity can render the learning process less intuitive and more prone to errors as learners navigate the subtleties of a new linguistic system.

One evident improvement area lies in Tiana's handling of articles with plural nouns. She tends to overuse the definite article 'the' with singular nouns rather than appropriately utilizing it with plural nouns. This discrepancy suggests a potential lack of distinction between specific and nonspecific references for plural nouns. Similarly, Tiana's infrequent use of zero articles with indefinite singular nouns compared to generic nouns indicates a need for increased familiarity with proper article usage.

Another area for focus involves Tiana's application of articles with indefinite mass or noncount nouns. She often underuses indefinite articles with these nouns, failing to distinguish between countable and uncountable nouns. Moreover, Tiana leans more towards using zero articles with indefinite generic nouns than with indefinite mass or noncount nouns, indicating a requirement for more nuanced understanding through practice and exposure.

Furthermore, Tiana's handling of articles with generic nouns presents an opportunity for improvement. Her tendency to use zero articles more frequently with generic nouns, influenced possibly by the absence of articles in Thai, reveals a preference for this structure. Additionally, occasional incorrect usage of zero articles with generic nouns that typically require definite or indefinite articles indicates gaps in understanding exceptions to the rule (Pattanapongpitak, 2020).

While Tiana exhibits a strong grasp of English articles, specific areas like plural nouns, indefinite mass or noncount nouns, and generic nouns require further practice and exposure for enhanced proficiency. These challenges align with documented difficulties faced by Thai learners of English due to the absence of articles in their native language (Crosthwaite, 2016; Tantiwicha & Sinwongsuwat, 2021).

Comparing Tiana's performance with existing research on L1-Thai adult learners of L2 English articles reveals intriguing parallels and discrepancies. Her tendency to excessively use the definite article 'the' with singular nouns mirrors findings among L1 Thai learners, showcasing a generalization of its usage. Similarly, her infrequent use of zero articles with indefinite singular nouns aligns with patterns observed in this learner group.

However, deviations arise concerning Tiana's inclination toward zero articles. Unlike the typical L1 Thai learner who uses zero articles more frequently with mass nouns (Pattanapongpitak, 2020), Tiana demonstrates a preference for zero articles with indefinite generic nouns. Additionally, her occasional misuse of zero articles with generic nouns aligns with findings on L1 Thai learners' influenced by Thai pragmatic norms, leading to improper article usage.

In summary, Tiana's language acquisition journey presents strengths and improvement areas in mastering English articles. Understanding these patterns provides insights into her learning process shaped by her Thai linguistic background, indicating the need for targeted practice to refine her article usage for more accurate English communication.

Luna (NNS-8). Luna, a native Portuguese speaker, showcases a notable 88% proficiency in English article usage, yet her performance exhibits variance contingent upon article types and contexts. However, her Friedman Test results showed no significance for her use of types of zero article. In terms of the use of definite article though, she demonstrated high statistical significance in the use of the definite singular and the definite plural, and the definite singular and the definite noncount only.

Delving into her ten-session dataset uncovers distinct usage patterns and trends across time. Luna's article deployment reflects the influence of her L1 transfer and concurrent L2 development. Hailing from a null-article background in Portuguese, where definiteness or specificity isn't marked on nouns, Luna's tendency to omit or misuse English articles, especially where obligatory, aligns with prior research on L2 English learners of Portuguese descent (Picoral & Carvalho, 2020). Nonetheless, Luna demonstrates advancement and awareness within the English article system, adeptly using articles while adjusting their usage in response to nuanced semantic and syntactic features within noun phrases – a testament supporting the Full Transfer/Full Access model in second language acquisition (Schwartz & Sprouse, 1996).

However, Luna's article usage isn't uniform across varying types and contexts. The intricacies of Luna's usage are contingent upon several factors, including article types (definite, indefinite), noun countability, prenominal modification, and noun phrase specificity. These elements distinctly influence the accuracy, frequency, and longitudinal patterns of Luna's usage.

While some factors resonate with prior studies on article acquisition among L2 learners of varied L1 backgrounds (Picoral & Carvalho, 2020), others are unique to Luna's linguistic journey.

Article type significantly shapes Luna's usage patterns. Luna adeptly deploys the definite singular 'the' and the indefinite noncount 'Ø', demonstrating frequent and accurate usage, notably consistent overtime. Conversely, Luna's proficiency wavers and exhibits more variability with other article types like the definite plural 'the', indefinite singular 'a' and 'an', and the generic 'Ø'. These categories witness less frequent and accurate usage alongside greater fluctuations, suggesting Luna grapples more with these complex or ambiguous rules or contexts.

Moreover, Luna's understanding of noun countability – count vs. mass – within English reveals a nuanced yet occasionally erroneous grasp. While Luna generally employs articles correctly with most count and mass nouns, occasional missteps, such as using 'a' with mass or plural nouns or omitting articles with nonspecific nouns, hint at the influence of her L1 interference or confusion between definiteness and specificity inherent in English.

The syntactic complexity and information structure of noun phrases, influenced by prenominal modification, also sway Luna's article usage. While Luna demonstrates sensitivity to these factors, aligning her usage accordingly, she occasionally falters – using 'a' with indefinite mass nouns or omitting 'the' with definite nouns – indicating potential difficulties in distinguishing definiteness and specificity, not consistently aligned in English.

Comparing this study's results with existing literature on English article usage by L1-Portuguese learners highlights alignment regarding Luna's reliance on L1 transfer and evolving L2 competency. However, this study's focus on Luna's nuanced usage, influenced by varied factors, contrasts with the broader trends noted in the web-searched findings, which emphasize

general patterns in L1-Portuguese learners' article acquisition without delving into specific influencing factors or challenging article types for this group.

Demi (NNS-9). Demi's journey in mastering English articles over the span of ten weeks demonstrates an impressive evolution characterized by consistency and advancement. Analyzing her performance across various types of articles reveals distinct trends in line with prior research on L1-Spanish learners tackling English articles.

At the outset, Demi showcased a robust start, boasting a 93% accuracy rate in her initial session, signaling a strong foundational understanding. This initial accuracy rate exceeded the average of 82% among L1-Spanish learners observed in previous studies by Ionin et al. (2008). Subsequent sessions witnessed substantial progress, reaching a peak of 100% accuracy and consistently maintaining high rates, predominantly between 97% and 100%. These results echo established findings that L1-Spanish learners tend to enhance their accuracy with articles overtime through continuous exposure and practice, as noted by Ionin et al. (2008) and Hawkins & Casillas (2008).

Demi's proficiency varied across different types of articles. While her usage of the plural form of the definite article 'the' remained consistent, the singular form exhibited variability. This fluctuation aligns with previous research highlighting the challenge for Spanish speakers in navigating singular and plural definite articles in English, as noted by Rivera (2019). Demi tended to omit the singular definite article when countable nouns were modified by adjectives, a pattern consistent with Rivera's findings that L1-Spanish learners often prioritize specificity over definiteness in such cases.

The usage of the zero article demonstrated a steady increase in its generic form, reflecting a common trend among L1-Spanish learners. Demi's adept usage of the zero article with generic

nouns like 'sand' and 'water' indicates her growing ability to discern contexts where articles are omitted in English compared to Spanish, as highlighted by Montrul (2009). Notably, Demi learned to omit the article with generic nouns preceded by prepositions, a departure from Spanish grammar where the article is mandatory in similar instances, as explained by Montrul (2009).

Examining incorrect usage unveiled minimal errors primarily associated with the generic form of the zero article and occasional missteps with the singular definite article 'the.' These errors mirror findings that L1-Spanish learners often grapple with correctly employing the zero article, along with occasional struggles with definite article usage in English contexts, as noted by Ionin et al. (2008). Demi occasionally overused the zero article with plural or uncountable generic nouns, akin to Spanish where the article is optional in such cases. Additionally, she sometimes misapplied the singular definite article with specific nouns that are indefinite, contrasting Spanish where the article is required in such cases.

Furthermore, the absence of errors in specific weeks indicates an increasing trend in accuracy, showcasing Demi's adaptability and mastery of English article usage in diverse contexts. Her progression aligns with established patterns observed among L1-Spanish learners grappling with English articles, highlighting the crucial role of exposure and practice in refining article usage. Demi's consistent improvement and adeptness in using articles hint at a promising trajectory in mastering this aspect of English grammar.

Bella (NNS-10). In the study, Bella stands out as a participant, demonstrating a strong mastery with 91% accuracy in using English articles. However, her performance varies depending on the article type and context. Her journey reflects a blend of L1 transfer and L2 development: as a Portuguese native, Bella occasionally omits or misuses articles in English, especially where obligatory. This aligns with prior research on Portuguese learners of L2

English. Nonetheless, Bella displays an evolving grasp of the English article system, adjusting usage according to semantic and syntactic features, supporting the Full Transfer/Full Access model in second language acquisition (Schwartz & Sprouse, 1996).

Diving into Bella's usage, several factors shape her articulation of English articles. While she adeptly handles definite singular and indefinite noncount articles, others like definite plural, indefinite singular, and generic articles present more challenges, displaying fluctuations and less accuracy overtime. These complexities suggest her struggle with more intricate or ambiguous article rules or contexts.

Factors such as noun countability and number further influence Bella's usage. While she navigates the count-mass distinction, occasional errors surface, potentially attributed to her L1 interference or confusion between definiteness and specificity, which aren't consistently aligned in English. Bella showcases sensitivity to prenominal modifications, adjusting article usage based on their presence or absence. However, occasional errors indicate potential difficulty in distinguishing between definiteness and specificity in such instances. Moreover, Bella's comprehension of noun phrase specificity impacts article deployment, although occasional errors suggest challenges in distinguishing these aspects accurately.

Comparing Bella's findings with the other two L1-Portuguese participants, Skye and Luna, reveals similarities and disparities. All three exhibit high proficiency and an evolving awareness of the English article system. However, Bella's usage is influenced by multiple factors impacting accuracy and trends overtime, while previous findings tend to focus more on general patterns without delving into these specific influences. Bella's struggles with certain article types are highlighted, providing a nuanced contrast to the unspecified challenges faced by Skye and Luna.

In essence, Bella's journey underscores the complexities faced by L1-Portuguese learners in navigating English articles, revealing both strengths and areas for improvement. Her experience illuminates the intricate interplay between L1 transfer, L2 development, and the multifaceted factors shaping article acquisition in a second language context.

One of the factors that is recognized in the literature as having an effect on how language learners use an L2 is the kind of pair they are in. For example, NS-NNS, NNS-NNS, learner-teacher/instructor, high proficiency learners (HPLs) and Low proficiency learners (LPLs), and peer-peer dyads.

Kind of Dyads and Naturalistic Interaction

In exploring the impact of dyadic interactions on language learning within second language acquisition (SLA) research, a multitude of dyad types emerge as influential. These dyads encompass various pairs, such as NSs paired with NNSs, HPLs interacting with LPLs, and peer-peer interactions alongside instructor-learner dyads.

The literature posits NS-NNS dyads as potentially advantageous owing to the presumed proficiency of native speakers (Bueno-Alastuey, 2010). However, these dyads present challenges, including anxiety, task control, and minimal error correction. Anxiety, prevalent in NS-NNS interactions, may impede input reception, thus affecting the affective filter and hindering learning (Lee, 2004; Satar & Özdener, 2008). Moreover, NNSs often cede task control to NSs, limiting their language production (Gass & Varonis, 1985). Additionally, research notes NSs' tendencies to overlook a considerable number of NNS errors (Iwashita, 2003).

Contrastingly, NNS-NNS dyads exhibit distinct dynamics and outcomes. Investigations into negotiated interaction across diverse online contexts reveal disparities in interaction

frequency, quality, and resultant outcomes influenced by factors such as proficiency, task nature, communication mode, and interlocutor relationships (Bueno-Alastuey, 2010; Iwashita, 2003; Strawbridge, 2021). Typically, NS-NNS dyads demonstrate heightened negotiated interaction and feedback, potentially fostering SLA. Conversely, NNS-NNS dyads display balanced participation and mutual scaffolding, contributing positively to language learning.

Further examination of HPL-LPL pairs suggests potential advantages in balanced participation and scaffolding compared to homogenous HPL-HPL or LPL-LPL dyads. Similarly, peer-peer dyads offer increased opportunities for output and interactional modifications, potentially facilitating SLA more effectively than instructor-learner dyads.

However, these findings, while illuminating, are not conclusive. The observed outcomes are contingent on various factors, such as communication mode, task nature, feedback type, language proficiency, and individual differences among interlocutors. Consequently, further comprehensive research is essential to unravel the nuanced influence of dyadic compositions on online interactions and SLA.

In summary, different dyadic compositions manifest diverse implications for SLA, reflecting variations in negotiation, feedback, participation balance, and scaffolding. However, the nuanced interplay of multiple factors necessitates comprehensive investigations to discern the precise influence of dyadic interactions on language learning processes and outcomes.

In light of the findings, it becomes imperative to consider the most appropriate next steps for SLA research. Rather than merely expanding the research corpus with additional quantitative data, a shift towards a more fine-grained qualitative analysis is advocated. As demonstrated in the current study, this approach involves a meticulous examination of the existing data and their contexts, allowing for a deeper exploration of the nuances and subtleties within the data. Such an

analysis transcends the limitations of quantitative measures alone, offering a richer and more comprehensive understanding of the themes and contexts inherent in the study. This perspective is supported by Dörnyei (2007), who emphasizes the importance of qualitative methods in capturing the complexity of language learning processes. Similarly, Duff (2008) highlights the value of qualitative case studies in understanding the intricacies of language learning and teaching, while Block (2003) discusses the shift towards interpretative methods to grasp the subjective experiences of language learners. By integrating both quantitative and qualitative methodologies, SLA researchers can achieve more meaningful interpretations of the results. This approach aligns with the views of Ellis (2012), who advocates for a mixed-methods approach to SLA research to provide a more holistic understanding of language acquisition. Mackey and Gass (2012) also support the use of qualitative approaches to complement quantitative data, providing a more comprehensive view of language acquisition processes. Therefore, it is recommended that future research prioritize a comprehensive fine-grained analysis of existing data to enhance the richness and depth of the findings, ultimately contributing to a more nuanced and insightful body of knowledge.

Pedagogical Implications

The exploration of interactional feedback types across text-based and voice-based communication modes unveils vital guidance for language educators in optimizing online language learning environments. Understanding the nuanced differences in feedback provision between these modalities empowers instructors to tailor their instructional strategies effectively. By incorporating diverse feedback types such as embedded recasts and clarification requests, educators can navigate the inherent affordances and challenges of each mode, thereby enhancing learner engagement and language acquisition.

Furthermore, the study underscores the significance of considering the timing and nature of learner uptake in response to interactional feedback. Educators can leverage this insight to design activities fostering immediate uptake, thereby facilitating learners' noticing of linguistic gaps and promoting interlanguage development. Acknowledging the varied cognitive and affective responses to different feedback types necessitates a flexible and adaptive approach to feedback provision in online language instruction.

The findings from the second research question bear significant pedagogical implications for designing synchronous computer-mediated communication (SCMC) tasks in second language (L2) learning contexts. Firstly, prioritizing feedback on errors that hinder communication rather than focusing solely on formal or stylistic errors is paramount. Modality choice influences error types and frequencies, requiring educators to align SCMC tasks with learning objectives and learner preferences. Moreover, equipping native speakers with effective feedback delivery skills and encouraging learners to seek clarification fosters a constructive learning environment in SCMC settings. The high uptake rate in response to feedback on article errors underscores the efficacy of targeted feedback strategies in enhancing language development.

The third research question yields substantial pedagogical insights for facilitating effective article usage among NNS of English in online interactions. Proficiency level influences article production, with lower proficiency learners exhibiting fluctuating performance and higher proficiency learners demonstrating more stable usage. Tailoring instructional strategies to address individual strengths and needs fosters article proficiency across proficiency levels. Topic domain influences article usage, highlighting the importance of selecting engaging topics and providing explicit instruction within specific contexts. Additionally, leveraging learners' native language knowledge facilitates article acquisition and promotes cross-linguistic awareness, enriching language learning experiences.

The pedagogical implications of this study underscore the importance of fostering online synchronous naturalistic interactions in language learning, particularly within the context of interactional feedback. These interactions, characterized by their real-time and dynamic nature, provide a fertile ground for language development as they mirror authentic communication settings where learners can engage in spontaneous meaning-making. The naturalistic conversations investigated in this study highlight the potential for such interactions to support language learning by encouraging learners to negotiate meaning, clarify misunderstandings, and receive feedback in a manner that closely resembles real-world communication. This form of interactional feedback is critical, as it not only draws learners' attention to linguistic forms but also allows them to actively engage with and internalize new language structures through authentic discourse (Nassaji, 2020).

Moreover, the connection between identity and language learning becomes particularly salient in this context. As nonnative speakers navigate their roles in these online interactions, they negotiate their identities as competent language users, actively shaping their sense of self in

relation to the target language (Norton, 2013). Engaging in multimodal approaches, seeking feedback, and contributing meaningfully to conversations allows learners to assert their linguistic agency and build confidence in their language abilities. Pedagogically, this reinforces the need for instructors to create environments where learners can engage in identity negotiation through meaningful, collaborative exchanges that allow for feedback-driven growth (Darvin & Norton, 2015).

In terms of future directions, these interactions should be more systematically explored in language learning curricula, particularly by incorporating tools and platforms that facilitate synchronous online interaction (Blake, 2000). Teachers and curriculum designers should emphasize the value of real-time conversation practice, ensuring that feedback mechanisms within these interactions are explicitly recognized and utilized to enhance language development. By understanding how interactional feedback functions within naturalistic conversations and how learners' identities evolve in these settings, educators can better tailor instructional practices to support holistic language learning. This alignment between interaction, feedback, and identity is crucial for developing learners' communicative competence and ensuring long-term engagement with the language.

In sum, integrating these pedagogical implications into instructional practices enhances the effectiveness of online language learning environments, empowering educators to meet the diverse needs of learners and foster communicative competence effectively.

Limitations and Future Directions

There are a number of limitations to this study that need to be acknowledged and considered in future research. The first notable limitation of this study pertains to the categorization and interpretation of errors present in the learners' written texts and the feedback from native speakers. This limitation was twofold, stemming from subjective error categorization and limited error recognition.

Subjective error categorization involved the influence of individual coders' personal judgments and inclinations when classifying errors. Such subjectivity might have impacted the consistency and reliability of error identification and subsequent analysis. Variances in perspective could lead to errors being categorized differently, either as grammatical, lexical, or related to collocation. Ambiguous or unclear errors might further exacerbate this challenge, necessitating additional clarification from learners or native speakers (Richards, 2008). To address this, I adopted a meticulous coding procedure by going through the data several times, engaging multiple coders, inter-rater reliability assessments, and consensus discussions. Future research could delve into learners' and native speakers' perspectives on error classification, enriching the understanding of feedback perception and responses.

Limited error recognition refers to the potential oversight or underrepresentation of certain error types or instances in learners' texts and native speakers' feedback. This might have compromised the depth and validity of the error analysis. To mitigate this, future research could develop a more adaptive error taxonomy to accommodate diverse language errors and linguistic contexts. This adaptable approach could better capture the dynamic nature of language learning, thus refining error analysis and feedback accuracy.

Moreover, the study encountered challenges regarding the polysemy and unreliability of formal features, particularly concerning English articles. The multifaceted nature of articles often renders them context-dependent and open to varied interpretations (Sun, 2016; Zhao, & Fan, 2021). For instance, 'the' can convey specificity, uniqueness, familiarity, or generality based on context. This study recognized the complexities inherent in identifying and analyzing article errors, highlighting the necessity for more reliable measures. Future investigations might explore cognitive and pragmatic factors influencing learners' article interpretation and production across different contexts and genres. Understanding these underlying mechanisms could shed light on article acquisition and usage processes.

The second limitation is the difficulty of defining and measuring “uptake,” which refers to how learners acknowledge and incorporate the feedback provided by native speakers on their language errors during online interactions. Different interpretations of what constitutes uptake may affect the validity and reliability of the results and the conclusions drawn from the study. Moreover, the study relies on specific linguistic tokens (e.g., “Okay,” “I see”) to identify NNS acknowledgment of feedback, which may not capture the subtle or non-verbal ways that learners express their understanding or recognition of feedback. For example, prosodic and paralinguistic features, such as intonation, stress, gesture, and facial expression, may convey additional information or emphasis that can help learners notice and understand the feedback, but these features are absent or limited in text-based and some features in voice-based interactions (Storch & Wigglesworth, 2010; Wagner & Wulf, 2016). Furthermore, text-based interactions may also reduce the opportunities for negotiation of meaning and clarification requests, which are important for feedback comprehension and uptake (Yang et al, 2023). Therefore, the study

acknowledges the subjective and context-dependent nature of uptake analysis, and the possible inconsistencies in identifying and categorizing instances of uptake.

Another limitation of this study is the lack of a detailed analysis of learner input, which was not the main focus of the current investigation. However, a more in-depth analysis of learner input could have provided more insights into the nature and quality of learner output and the effects of feedback. To address this limitation in future research, a more thorough exploration of learner input vis-à-vis feedback uptake and learning outcomes is suggested. This could involve employing diverse data sources like learner self-reports, stimulated recalls, think-aloud protocols, or even eye-tracking to capture the cognitive and emotional processes of learners while engaging with feedback. Additionally, investigating how learner input varies across different feedback types, tasks, and contexts and its influence on learner output and progress overtime could offer a more intricate and holistic comprehension of the feedback's role in second language writing.

A further limitation arises from the exclusive selection of video clips derived solely from the target culture. This choice might restrict participants' exposure to diverse cultural contexts and expressions, which could otherwise enrich the language used by the dyads. Consequently, this limitation might impede non-native speakers' ability to navigate cross-cultural communication – a vital skill in today's globalized world. Moreover, the suggested contexts for discussions might inadequately represent the spectrum of interactions inherent in naturalistic settings. These discussion triggers could potentially constrain the participants' linguistic choices and expressions, failing to align with their personal interests or needs. Consequently, the study's findings might lack generalizability to broader contexts or situations.

One significant limitation of this study revolves around the presence of extraneous variables, commonly referred to as "outside" factors. These encompass a broad spectrum of influences beyond the controlled parameters of the research environment. In essence, participants in the study were not solely engaged in the interactions under investigation. Rather, they were exposed to English language input in diverse settings outside the study, interacting with both native and nonnative speakers. Additionally, some participants were concurrently enrolled in ESL classes, potentially receiving formal instruction on language components such as articles, which were also a focal point of the study.

Another extraneous factor that may have influenced the results is the age of the participants, which plays a crucial role in language acquisition and interaction with feedback. Studies suggest that age affects cognitive capacities such as processing speed, working memory, and the ability to internalize and apply new linguistic structures (Birdsong, 2006; DeKeyser, 2013). Older learners may have more difficulty quickly processing feedback or recognizing subtle language patterns compared to younger learners, potentially leading to differences in how feedback is understood and incorporated. Additionally, older participants might rely more heavily on established learning habits, affecting their openness to experimenting with new feedback strategies. Technological familiarity is another important factor, with younger participants often more adept at navigating online platforms and utilizing digital tools effectively, giving them an advantage in engagement and interaction. These age-related discrepancies could have subtly influenced the feedback uptake process and the overall learning outcomes in this study. Future research should incorporate a finer-grained analysis of participants' ages to explore how different age groups interact with feedback in digital and

traditional learning environments, and how age-specific strategies might be developed to optimize feedback efficacy in second language acquisition.

These external factors introduce a level of complexity and variability that cannot be fully accounted for within the confines of the research design. Consequently, the observed outcomes may have been influenced by a multitude of variables operating outside the researcher's control. Therefore, while the study provides valuable insights into the effects of interactional feedback, it is essential to recognize the potential impact of these extraneous variables on the interpretation and generalizability of the findings.

An important aspect of the study that highlights the role of extraneous factors is the active and equal contribution of nonnative speakers (NNS) to the meaning-making process during online interactions. Rather than being passive recipients of feedback or language input, the NNS participants were equal partners in constructing meaning and driving the conversation. They brought not only relevant topics to the discussions but also employed multimodal approaches to enhance communication within their dyads. These approaches included using dictionaries to look up unfamiliar words (Smith & Craig, 2021), sharing pictures to visually convey meanings (Jones & Kim, 2019), and exchanging weblinks to provide additional context for conversation topics (Adams & Nakamura, 2020). For example, one NNS participant struggled to understand the word "roof" during a session and engaged in a back-and-forth interaction with her peer to fully decode the word's meaning. Her determination to comprehend the word extended beyond the session as she later shared that she routinely consulted a dictionary after each meeting to look up words that her peer had used but which were new or challenging for her. This behavior reflects the agency and initiative taken by the NNS participants in their learning process, highlighting that they were not merely receiving input but actively seeking to expand their linguistic

repertoire (Norton, 2013; Darvin & Norton, 2015). Such contributions underscore the complexity of the language learning experience and the significance of nonnative speakers' proactive role in meaning-making and interaction. This 'roof' example highlights the variation in language use among participants that further enriched these interactions (Gass & Selinker, 2008). Differences in dialects and linguistic expressions provided diverse language inputs and challenged participants to adapt and negotiate meaning, thus fostering a more dynamic and authentic communicative environment. Future research could explore these multimodal, agency-driven approaches more systematically, investigating how they, along with variation in language use, contribute to the overall language development process.

Another area warranting exploration in future research is the role of identity in language learning and interaction. While not explicitly investigated in this study, identity may have influenced the results. Identity has become a crucial factor in applied linguistics research, particularly within the field of second language acquisition (SLA), as it encompasses learners' evolving perceptions of An important aspect of the study that highlights the role of extraneous factors is the active and equal contribution of nonnative speakers (NNS) to the meaning-making process during online interactions. Rather than being passive recipients of feedback or language input, the NNS participants were equal partners in constructing meaning and driving the conversation. They brought not only relevant topics to the discussions but also employed multimodal approaches to enhance communication within their dyads. These approaches included using dictionaries to look up unfamiliar words, sharing pictures to visually convey meanings, and exchanging weblinks to provide additional context for conversation topics. For example, one NNS participant struggled to understand the word "roof" during a session and engaged in a back-and-forth interaction with her peer to fully decode the word's meaning. Her

determination to comprehend the word extended beyond the session as she later shared that she routinely consulted a dictionary after each meeting to look up words that her peer had used but which were new or challenging for her. This behavior reflects the agency and initiative taken by the NNS participants in their learning process, highlighting that they were not merely receiving input but actively seeking to expand their linguistic repertoire. Such contributions underscore the complexity of the language learning experience and the significance of nonnative speakers' proactive role in meaning-making and interaction. Future research could explore these multimodal, agency-driven approaches more systematically, further investigating how they contribute to the overall language development process. themselves as language users and their positioning in social and cultural contexts (Norton, 2013; Block, 2007). Language learning is not just a cognitive process but one deeply intertwined with personal and social identities, especially for nonnative speakers from diverse cultural backgrounds, such as those in this study. The participants' varied linguistic and cultural experiences bring a unique richness to the research, as each learner's identity negotiation and relationship with the target language can profoundly affect their engagement, motivation, and use of feedback (Darvin & Norton, 2015).

For instance, learners from different cultural backgrounds may have differing levels of comfort with the feedback process, depending on how feedback is culturally perceived and how they view their roles as learners in an intercultural context. Those with a strong sense of cultural identity and linguistic confidence may actively participate and seek clarification, benefiting more from feedback and language practice. Conversely, participants who feel marginalized or insecure about their linguistic identity may be more hesitant, potentially limiting their interaction with feedback and peer discussions. These dynamics could have influenced not only the communicative behaviors of the participants but also the study's outcomes.

Incorporating identity as an individual learner characteristic can provide key insights into the language development process, especially when learners from diverse backgrounds are involved. By understanding how these learners negotiate their identities in language learning contexts, we can better comprehend the emotional, psychological, and social factors that drive or hinder their engagement with language tasks. Future research could systematically investigate the diverse cultural and linguistic backgrounds of participants to examine how identity shapes language learning in different ways. This could be explored more thoroughly through methods like interviews, ethnographies, or reflective journals, capturing the dynamic interaction between identity, language competence, and feedback uptake. A more systematic analysis of these identity-related factors would offer a deeper understanding of the social dimensions of SLA, contributing to pedagogical approaches that support identity negotiation and cross-cultural learning in diverse language learning environments.

Addressing these limitations in future research could involve employing a more varied array of L1 materials. For instance, incorporating video clips from diverse sources such as movies, TV shows, documentaries, or online videos could offer exposure to various cultural and contextual facets of the target language. This approach might encompass different cultures, genres, and registers, thereby providing a more comprehensive and inclusive learning experience.

Conclusions

The primary objective of the study presented in this dissertation was to contribute to our current understanding of the effects of interactional feedback provided by NS in text-based and voice-based synchronous computer-mediated communication (SCMC). The study followed a primarily qualitative approach involving ten dyads of NS and NNS who interacted via Zoom for a duration of ten weeks. The naturalistic production data consisted of ten sessions of text-based chats and ten sessions of voice-based chats with each chat session being 15 minutes long. The study examined the NS interactional feedback within online interactions, totaling 197 transcripts (99 text-based and 98 voice-based) spanning approximately 49 hours and 266,956 words. The chat sessions were transcribed and coded for types of NS interactional feedback followed by the NNS errors that triggered NS feedback. The errors were then quantitatively analyzed to identify the most common NNS error that received NS feedback. Following that, a more finely grained TLU analysis was conducted, revealing individual NNS contextual use of the English articles in different topic domains. Several implications for SCMC in second language theory and methodology were discussed, and recommendations for future research were made in view of the study's limitations.

In relation to the first research question, this findings revealed eleven feedback types, including embedded recasts, specific clarification requests, and declarative recasts. NS in Dyads 1, 7, and 2 exhibited the most interactional feedback instances, whereas Dyads 6 and 9 presented the fewest, with no interactional feedback from Dyad 9. Of these feedback types, 61% were reformulations, while 39% were elicitations. NS feedback showed an overall 40.18% success rate in prompting learner uptake, with embedded and interrogative recasts exhibiting the highest success rates, while direct correction, full recasts, and repetitions were unsuccessful.

Immediate uptake constituted 90% of learner uptake, primarily from input-providing feedback types like interrogative recasts and declarative recasts. Delayed uptake formed the remaining 10%, observed mainly in embedded recasts, incorporated recasts, and specific clarification requests. Voice-based NS interactional feedback proved more effective (43% success rate) than text-based feedback (33%). Additionally, NS demonstrated a higher tendency to reformulate NNS utterances rather than elicit further information. The study highlighted the superior effectiveness of input-providing over output-prompting interactional feedback, particularly in the voice-based mode, fostering both immediate and delayed learner uptake.

The second research question aimed to understand the triggers for NS interactional feedback in SCMC between NS and NNS. The analysis of NNS erroneous utterances revealed a spectrum of sixteen linguistic error types. The most prevalent error triggering NS feedback was the incorrect use of English articles (Ø, a, an, the), occurring 27 times. Pronunciation errors followed with 21 instances, predominantly present in voice-based interactions, mainly within one NS-NNS pair. Semantics, word formation, lexical, morpheme, and preposition errors occurred ten, seven, five, five, and five times, respectively. The subsequent error types – plural, verb tense, adverb, do-support, verb agreement, idiom, collocation, and syntax – were less frequent, each occurring once in the analyzed data.

It was found that NNS modification in response to NS feedback on article errors was the most frequent, with a 69% uptake rate, the highest among all NNS linguistic errors examined. These findings suggest that voice-based SCMC facilitated more NS interactional feedback in naturalistic settings. Reformulations were the dominant form of NS feedback, and errors in English article usage persisted as the primary trigger for NS corrective feedback. These findings

highlight the significance of article errors in driving NS intervention and suggest the efficacy of voice-based communication in promoting feedback exchanges between NS and NNS.

The study's third research question scrutinized the evolution of primary grammar errors among NNS participants over ten weeks, focusing on proficiency levels, topic domains, and article types in their production. A detailed TLU analysis encompassing both text-based and voice-based interactions was conducted to explore the NNS usage of the English article system, identified as the most common linguistic error. The analysis spanned 131,689 words generated by the NNS across both communication modes.

The analysis revealed trends in the usage of definite articles ('the'), indefinite articles ('a' and 'an'), and the zero article ('∅') by NNS participants. 'The' was predominantly used correctly but showed instances of overuse or underuse. 'A' and 'an' demonstrated good usage, except for errors with singular indefinite nouns. '∅' was effectively used in generic or noncountable contexts but showed difficulties with singular indefinite nouns. The analysis portrayed specific instances where errors occurred, highlighting excessive or insufficient use of articles in various contexts, such as overusing 'the' with uncountable nouns or omitting 'the' when needed for specificity.

Further analysis categorized by proficiency levels – Lower Intermediate, Upper Intermediate, and Advanced – revealed different patterns. Lower Intermediate participants exhibited fluctuating proficiency, while Upper Intermediate and Advanced participants maintained more consistent and higher proficiency levels. Notably, certain individuals consistently performed beyond their expected proficiency levels, suggesting varying trajectories among participants. The topic domain analysis highlighted a prevailing focus on personal subjects during interactions, with participants initiating discussions on various topics without external guidance.

The analysis for research question 3 further delved into the usage patterns of English articles among non-native speakers (NNS) by examining the performances of ten participants: Sally, Jade, Skye, Zara, Hazel, Nabi, Tiana, Luna, Demi, and Bella. The study highlights their individual progress and challenges across ten weeks, providing a comprehensive understanding of their language proficiency.

Sally (NNS-1) demonstrated a significant improvement in article usage overtime, particularly in definite and indefinite articles. However, common issues remained, especially in using singular and plural definite articles and occasional omissions, affecting her overall accuracy despite evident progress. Jade (NNS-2) exhibited steady progress in English article proficiency, with enhanced accuracy and reduced error rates. Her improvement was notable in using indefinite articles, reflecting a better understanding and application over the duration of the study. Skye (NNS-3), an advanced English speaker, displayed a strong command of articles, notably excelling in definite singular articles and zero articles. Despite minor challenges with the indefinite singular 'a' and its zero form, Skye's proficiency was evident throughout.

Zara (NNS-4), a German native, showcased remarkable accuracy in English article usage, maintaining consistently high performance. Though occasional errors occurred, they were infrequent, underscoring Zara's exceptional grasp of English articles. Hazel (NNS-5), a Japanese native, demonstrated consistent improvement, particularly in zero articles and singular forms. However, challenges persisted in using plural and abstract forms of definite articles and the zero form of the indefinite article. Nabi (NNS-6), a native Arabic speaker, showed a strong understanding of English articles but experienced fluctuations in usage across sessions, maintaining an overall accuracy of 86% with errors at 14%.

Tiana (NNS-7), a Thai native, exhibited good understanding, particularly with singular nouns, yet required more practice with plural and noncount nouns, maintaining an 81% overall accuracy. Luna (NNS-8), a Portuguese speaker, showed improvement despite occasional dips in accuracy, concluding with an overall correctness of 88%. Demi (NNS-9), a Spanish speaker, made remarkable progress, achieving a high 99% accuracy in using articles. Bella (NNS-10), another Portuguese speaker, maintained a 91% correctness, showing fluctuations in usage with minimal errors.

Overall, the study elucidates diverse patterns among participants, highlighting areas of improvement and common challenges in mastering English articles. It offers valuable insights into their individual learning curves, proficiency levels, and specific areas requiring further practice and development in article usage.

Furthermore, it is crucial to underscore that this study does not operate within the confines of a traditional classroom setting. Rather, it delves into the realm of online interaction, highlighting its potential as a valuable tool for language development. Regardless of whether the interaction occurs with a native or nonnative speaker, it offers invaluable opportunities for language practice and refinement. Therefore, students should recognize and embrace the benefits of online interaction as a complement to their language learning journey, leveraging its dynamic platform to enhance their linguistic proficiency and fluency.

The study highlights the importance of text and audio chat for language development, reflecting the concept of "Language Learning in the Wild" (LLW), where learners engage in natural language acquisition within everyday contexts. LLW encourages active participation in real-life language settings, promoting experiential learning and practical application. Advocated

by Steve Thorne, LLW aligns with learner-centered approaches, emphasizing the integration of formal instruction with authentic language experiences to enhance linguistic skills.

The goal of my future research is to address the limitations and follow the research directions suggested in this section. This will expand on and clarify the important findings of this study and the wider implications for this field, especially for SCMC and informal language learning.

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Appendix A

Pilot Study Task

Task: Video Discussion

An Example of Short Video Clip & Follow-Up Questions

Instructions: *You will watch a video clip before the chat begins. After watching the video, please discuss the content with your partner based on some questions. The short video clip is from the movie "Bolt":*

Theme: Movies

Topic: Animation, Future plans

Source Movie: Bolt

Clip Duration: 1 minute 57 seconds

Discussion pointers:

Instructions: *Consider the following questions as you prepare to discuss the video clip with your chat partner:*

- Do you think it was a funny clip? Why/Why not?
- Title this video clip
- What do you think might have happened earlier in the movie? What makes you think so?
- What do you think will happen after this scene? Why do you think so?
- Do you like animation movies? Why/Why not?

Additional questions (if time allows):

- What kind of movie do you usually watch? Why?

Appendix B

Informed Consent for Participants

Description of the research: You are invited to participate in a longitudinal case study that will examine online chatting in L2 learning. Your participation will take approximately 30 minutes at a time for 10 sessions. You will be required to interact with a chat partner one time a week. Your oral and text-based online interaction will be recorded.

Data storage to protect confidentiality: All information will remain in the sole possession of the researcher and will only be used for the purposes of this study. None of the participants in the experiment will be named in person, in either informal or formal reports of the study.

Compensation: Upon completion of the study, you will receive a $50 gift card as compensation for your time.

How will results be used: The results of the study will be included in the researcher's doctoral dissertation. The results may also be included in articles submitted to academic journals, book chapters, and presented at professional conferences in the U.S., and abroad. At no time will any of the participating individuals be identified.

Please read the following statement and sign your name below in the space provided:

I have read the above information concerning the doctoral research conducted by Farah S. Akbar and give her permission to use the data collected by my participation in the study.

My signature means that I agree to participate in this study.

Participant's Name: _____

Participant's signature: _____ Date: _____

Researcher' signature: _____ Date: _____

Appendix C

Background Questionnaire - Native Speaker Participant

Your answers in this questionnaire are strictly confidential and only used for the research study.
Please fill answer the following questions:

1. Name: _____ Age: _____ Gender: Male ☐ Female ☐
2. Nationality: _____ Other languages: _____ What do you study? _____
3. Program and department? _____
4. What semester? _____ Do you work? Yes ☐ No ☐
5. If yes, what is the nature of your work?
6. Do you like watching movies? If yes, what kind of movies do you watch usually?
7. Do you like reading? If, what do you usually read?
8. In general, how many words per minute can you type on the computer?
   - 10 – 20 words; 21 – 30 words; 31 – 40 words; 41 – 50 words; More than 50 words
9. Do you have any experience in online chatting?
   - Oral chat: Yes ☐ No ☐ Text-based chat: Yes ☐ No ☐
10. What site, program, or software do you use for online chatting? _____
11. Who do you generally chat with online (e.g., family, friends, strangers)?
12. What language/s do you use in online chatting? _____
13. Do you use Social Media? Yes ☐ No ☐
14. If yes, how often do you use Social Media?
    - Everyday; Every 2-3 days; Once a week; Other: _____
15. Do you **interact** with people whose first language is not English? Yes ☐ No ☐
    - If yes, how often do you talk with people whose first language is not English?
      i. Everyday; Every 2-3 days; Once a week; Other: _____
    - Where? _____
    - What topics do you usually talk about?
16. Do you have any **online chatting experience** with people whose first language is not English?
    - If yes, how often do you **chat online** with people whose first language is not English?
      i. Everyday; Every 2-3 days; Once a week; Other: _____
17. What site, program, or software do you use for online chatting? _____
18. Do you have any teaching experience?
    - If yes, describe your teaching experience:
19. Have you ever taught English or any other language? Yes ☐ No ☐
20. Do you have English tutoring experience? Yes ☐ No ☐
    - If yes, describe your experience (Duration, place, who was/were the student/s?):
21. Please rate your proficiency in using the following: (1=insufficient;2=satisfactory;3=good;4=very good)
    - Skype (Text/Video Chat) 1 ☐ 2 ☐ 3 ☐ 4 ☐
    - Google Hangout (G-Chat) 1 ☐ 2 ☐ 3 ☐ 4 ☐
    - YouTube 1 ☐ 2 ☐ 3 ☐ 4 ☐
    - Internet 1 ☐ 2 ☐ 3 ☐ 4 ☐
22. Have you taken any online courses at school, college, or graduate level? Yes ☐ NO ☐
    - If yes, please describe your experience:
23. Why did you decide to participate in the research study?
24. Do you have any comments you want to share with the researcher?

Appendix D

Background Questionnaire - Non-native Speaker Participants

Your answers in this questionnaire are strictly confidential and only used for the research study.
Please fill answer the following questions:

1. Name: _____ Age: _____ Gender: Male ☐ Female ☐
2. Nationality: _____ Other languages: _____ ESL level: _____
3. Do you have a job? Yes ☐ No ☐ What is your job? _____
4. How long have you lived in the US? _____ How long have you studied English? _____
5. Where have you studied English? _____ Why do you want to learn English? _____
6. What is your favorite way to learn English? _____ Do you watch English movies?
7. If 'yes', how often?
    a. 1 movie a week 2 movies a week; Other: _____
8. What kind of English movies do you like to watch?
9. Do you like reading in English? Yes ☐ No ☐
10. If yes, what do you usually read in English? _____
11. In general, how many words per minute can you type on the computer?
    a. 10 – 20 words; 21 – 30 words; 31 – 40 words; 41 – 50 words; More than 50 words
12. Do you have any experience in online chatting?
    a. Oral chat: Yes ☐ No ☐
    b. Text-based chat: Yes ☐ No ☐
13. What site, program, or software do you use for online chatting? _____
14. Who do you generally chat with online (e.g., family, friends, strangers)?
15. What language/s do you use in online chatting? _____
16. Do you use Social Media (e.g., Facebook)? Yes ☐ No ☐
17. If 'yes', how often? Please circle one:
    a. 1 – 2 hours a week; 3 – 4 hours a week; 5 hours or more a week
18. Do you **talk** to native speakers of English? Yes ☐ No ☐
    a. If 'yes', how often? Please circle one:
        i. 1 hour a week; 2 – 4 hours a week; 5 hours or more a week; Other: _____
    b. Where? _____ ; What topics do you usually talk about? _____
19. Do you talk to other international students in English? Yes ☐ No ☐
    a. If 'yes', how often? Please circle one:
        i. 1 hour a week; 2 – 4 hours a week; 5 hours or more a week; Other: _____
20. What topics do you usually talk about?
21. Do you have any **online chatting experience** with native speakers of English?
    a. If 'yes', how often?
        i. 1 hour a week; 2 – 4 hours a week; 5 hours or more a week; Other: _____
22. What topics do you usually talk about?
23. What site, program, or software do you use for online chatting? _____
24. Please rate your proficiency in using the following: (1 = insufficient; 2 = satisfactory; 3 = good; 4 = very good)
    a. Skype (Text/Video Chat) 1 ☐ 2 ☐ 3 ☐ 4 ☐
    b. Google Hangout (G-Chat) 1 ☐ 2 ☐ 3 ☐ 4 ☐
    c. YouTube 1 ☐ 2 ☐ 3 ☐ 4 ☐
    d. Internet 1 ☐ 2 ☐ 3 ☐ 4 ☐
25. Have you taken any online courses at school, college, or graduate level? Yes ☐ No ☐
    a. If yes, please describe your experience:
26. Why did you decide to participate in the research study?
27. Do you have any comments you want to share with the researcher?

Appendix E

Post-Study Questionnaire - Native Speaker Participant

Please read the following questions carefully. You will have as much time as you need to finish this questionnaire. Please try your best to give detailed answers. Your answers in this questionnaire are strictly confidential and will only be used for the research study.

1. What is your full name? _____
2. What is your first language? _____
3. What program, major, semester? _____
4. What do you think was the purpose of the research study?
5. What was your MOST favorite discussion topic? Why?
6. What was your LEAST favorite discussion topic? Why?
7. Do you think your chat partner was a native or a nonnative speaker of English?
8. Which mode of communication did you prefer, *text-based* chat or *voice* chat?
9. Give at least ONE reason for your preference (*text-based chat* vs. *voice chat*):
10. What were the pros and cons of text-based chat versus oral chat?

	Pros (positive)	Cons (negative)
Text-based Chat		
Oral Chat		

11. Which of the two modalities was more helpful for noticing your partner's language errors? Please elaborate.
12. Which of the two modalities was more helpful for understanding your partner's use of English? Please elaborate.
13. Have you learned or realized some specific things during the discussion sessions with your partner? If yes, what are they?
14. If now you are required to give your friends some good suggestions about how to talk with online nonnative chat partners, what suggestions would you give them?
15. Did you intentionally give feedback to your partner on his/her language? Yes ☐ No ☐
16. How often did you give feedback on your partner's language intentionally?
    a. Never b. Sometimes c. Most of the times
17. How likely are you to learn a new language online by chatting with native speakers of that language?
    a. Not likely b. Somewhat Likely c. Very Likely
18. How likely are you to chat with learners of English?
    a. Not likely b. Somewhat Likely c. Very Likely

Appendix F

Post-Study Questionnaire - Nonnative Speaker Participant

Please read the following questions carefully. You will have as much time as you need to finish this questionnaire. Please try your best to give detailed answers. Your answers in this questionnaire are strictly confidential and will only be used for the research study.

1. What is your full name? _____
2. What is your first language? _____
3. What do you think was the purpose of the research study?
4. What was your MOST favorite discussion topic? Why?
5. What was your LEAST favorite discussion topic? Why?
6. Do you think your chat partner was a native or a nonnative speaker of English?
7. Which mode of communication did you prefer, *text-based* chat or *voice* chat?
8. Give at least ONE reason for your preference (*text-based chat* vs. *voice chat*):
9. What were the pros and cons of text-based chat versus oral chat?

	Pros (positive)	Cons (negative)
Text-based Chat		
Oral Chat		

10. Which of the two modalities was more helpful in understanding your partner's English? Why?
11. Have you learned or realized some specific things during the discussion sessions with your partner? If yes, what are they?
12. Did you learn any English grammar rules during the discussions with your chat partner? If yes, please write them down.
13. If now you are required to give your friends some good suggestions about how to talk with online chat partners who is a native speaker of English, what suggestions would you give them?
14. Did you notice your partner giving feedback on your English? Yes ☐ No ☐
15. How often did you notice that your partner is giving you feedback?
    a. Never b. Sometimes c. Most of the times
16. How likely are you to learn a new language online by chatting with native speakers of that language?
    a. Not likely b. Somewhat Likely c. Very Likely
17. How likely are you to chat with native English speakers in the future?
    a. Not likely b. Somewhat Likely c. Very Likely

Appendix G

Delayed Feedback Instances

Instance 1: NNS-1 in Week 5 – Type chat

Sally (NNS) – Olivia (NS)

Line	Participant	Production	Coding
20	Sally	Do you have a kneepad?	*Initiation 'kneepad'*
21	Olivia	**I hv knee braces.**	**Embedded recast**
22	Olivia	you mean pads for going skating?	*Misunderstanding*
23	Sally	no	*Response*
24	Olivia	if so no. but knee braces I do have	**Second Embedded recast**
25	Sally	i mean pad protect your knee	*Error persists*
26	Olivia	ok	
27	Sally	like a small piece of clothes	
28	Olivia	to tie around the knee? yes	*Specific Clarification request*
29	Sally	yeah, **knee brace**,you have.	**Delayed uptake**
30	Olivia	yes.	
31	Olivia	I don't wear it often though.	Topic continuation

Instance 2: NNS-2 Week 1 – Voice chat

Jade (NNS) – Hana (NS)

Line	Participant	Production	Coding
230	Jade	hurried just uh roading? Roading the downloading download	
213	Hana	Yes	
232	Jade	the *Joom*	Initiation – Error: *Incorrect pronunciation 'Joom'*
233	Hana	oh I get you	
234	Jade	the *Joom* yes just ten minutes before we started {laughs}	Repeat error
235	Hana	**oh i see you had to hurry to download the Zoom**	**Embedded Recast**
236	Jade	yeah *Zhoom* yeah yeah	
		62 turns later	
296	Jade	Using Zoom wow	**Delayed uptake**
297	Hana	Uh-um	

Instance 3: NNS-5 Week 3 – Voice chat

Hazel (NNS) – Ana (NS)

Line	Participant	Production	Coding

156	Ana	did they um are they going to have the baby **at a hospital** or like a birthing center at home or something?	
157	Hazel	yeah they will have their children ***hospital** m- may be in Tokyo because my uh her family lives in Tokyo, not in my hometown maybe, and they will deliver their baby in Tokyo ***at hospital**	Initiation – Error 1: *Missing preposition + article* Initiation – Error 1: *Missing article*
		6 turns later	
164	Ana	all the prenatal care and then if the pregnancy is not high risk then they deliver the babies like in a birthing Center where they where they don't use like epidural or you know they don't do like cesarian or something if the if the if the mother needs that then they transfer them **to the hospital** but there's a lot of low risk pregnancies that	**Delayed Incorporated Recast x2**
		4 turns later	
169	Hazel	mhm uh I think they maybe they don't use midwives over there when they uh deliver their babies maybe yeah they will go **to a big hospital** and yeah go into have babies there	**Delayed Uptake**
170	Ana	hmm	
171	Hazel	with doctors	
172	Ana	my sister loved having her babies **at the hospital**	Topic continuation
173	Hazel	hmm	
174	Ana	the hospitals there where she had her babies are really nice	Topic continuation

Instance 4: NNS-6 Week 1 – Voice chat

Nabi (NNS) – Alex (NS)

Line	Participant	Production	Coding
122	Nabi	um what transportation do you have to take, ***a subway*** to go to your work?	**Initiation – Error: *a subway***
123	Alex	Yeah, take ***the subway,*** I take ***the subway***	**Embedded Recast**
124	Nabi	okay it it it	
125	Alex	Do you drive or no?	**Topic continuation**
126	Nabi	yeah I take ***the subway*** and I drive also so uh	**Immediate Uptake**
127	Alex	Okay	
128	Nabi	I used to only take ***a subway*** and then recently I I started doing Uber	**Error: *a subway***
129	Alex	Okay	
130	Nabi	during the uh pandemic and stuff so yeah it's nice and sometimes I drive sometimes I take ***a subway***	

131	Alex	mhm	
132	Nabi	uh it's definitely hard to find a parking especially if you live in the city	
133	Alex	God	
134	Nabi	uh Manhattan area is difficult very, very difficult to find the parking	
135	Alex	Mhm	
136	Nabi	sometime I take ***a subway*** sometimes I bike	**Error: *a subway***
137	Alex	right	
138	Nabi	yeah it depends on the weather actually yeah	
139	Alex	okay	
140	Nabi	yeah depends on the weather	
141	Alex	okay	
142	Nabi	but I feel like ***subway*** is-	
143	Alex	yeah the parking is-	
144	Nabi	uh ye:s difficult I feel like ***the subway*** is one of the uh the thing that New York City has to offer more than any other city in uh in US where you have ***the subway*** running for twenty four seven you have offer 300 stations that's that's that's amazing you know	**Delayed Uptake**
145	Alex	Yeah	
146	Nabi	so anytime you can just you know uh hop in ***a subway*** and go wherever you want and go that's actually a great thing I don't think that's in any city in Europe that I've visit I don't think yeah I don't think so most of the subway there	**Error: *a subway***
147	Alex	yeah	
148	Nabi	just stop 12 o'clock sometime two o'clock in the weekend, but none of them is working 24 seven	

Appendix H

TLU Analyses of NNS Data

Lower Intermediate: NNS-1, NNS-2, and NNS-7

Sally's target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	394	46	46	13	72%	28%
2	707	40	51	21	48%	53%
3	836	22	22	7	68%	32%
4	927	67	67	9	87%	13%
5	169	16	16	3	81%	19%
6	633	49	49	2	96%	4%
7	692	43	43	16	63%	37%
8	759	33	33	6	82%	18%
9	927	42	42	11	74%	26%
10	834	61	62	2	97%	7%
Total	7305	419	420	90	79%	21%

Sally's correct target-like use of articles

	Definite				Zero Ø			Indefinite				
	Plu *the*	Sing *the*	Abst *the*	Noncount	Gen *Ø*	Gen. Plur *Ø*	Gen. *Ø* Noncnt	Gen. *a* Noncnt	Noncnt *Ø*	Sing *a*	Sing *Ø*	Plur *Ø*
1		2		1	7				1	16	3	1
2	1	1	1		9	1			2	4	1	7
3		1			1	1				10	1	6
4		19	1		20		2			5	1	2
5		1			3	2		1	1	4		1
6	2	15			7	2			1	7		4
7	4	1		2	16	3	1		2	7		2
8	3	2			11	3	1	1		3	1	1
9	1	10	1	1	7	3			2	10	1	
10	2	6		3	12	6	3		1	8	5	

Sally's incorrect target-like use of articles

	Definite		Zero Ø				Indefinite
	Plural *the*	Sing. *the*	Gen Ø	Noncount Ø	Sing. Ø	Plural Ø	Sing. *a*
1		3	6	1			3
2			3	6	3		2
3	1		2	1	2		1
4		3	2	1	2		1
5			2	1			
6		1	1				
7		3	1	1		1	7
8			6				
9			6	3			1
10		1		1			

Jade's target-like use of articles

	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect

1	1241	59	59	26	56%	44%
2	1178	91	91	10	89%	11%
3	512	28	28	6	79%	21%
4	1227	110	110	18	84%	16%
5	1222	75	75	11	85%	15%
6	1436	87	87	20	75%	23%
7	1040	67	67	8	88%	12%
8	1513	99	99	19	81%	19%
9	708	58	58	10	83%	17%
10	1403	102	102	15	85%	15%
Total	11480	776	776	143	82%	18%

Jade's correct target-like use of articles

	Definite				Zero Ø						Indef
	Plural *the*	Sing. *the*	Abst. *the*	Noncount	Gen Ø	Gen. Plur Ø	Gen. Ger Ø Conc	Gerund Abst Ø	Gen. Ø Noncount	Gen. Ø	Sing. *a*
1	1	10	1	1	9	3		3	1	11	13
2	4	24			18	9	1	1	3	12	13
3		14			2				1	5	4
4	3	23			18	13			5	16	18
5		18			7	12	2		6	12	9
6	1	25			11	6	2		4	11	16
7	3	27			4	2				6	8
8	2	25	1		21	7	1		2	14	17
9	1	18	2		3	7				4	18
10	3	58			6	8	1			3	11

Jade's incorrect target-like use of articles

	Definite		Zero Ø			Indefinite
	Plural *the*	Sing. *the*	Gen Ø	Gen. Gerund Concrete Ø	Indef Gen Ø	Indef. Sing. *a*
1	1	4	8		9	1
2	1		3	1	4	
3		1	1		3	
4		10	2		4	1
5		1	8			2
6		2	6		9	2
7	1		3		2	1
8		2	4		8	2
9		2	3		2	2
10		6	4		5	

Tiana's target-like use of articles

	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	1151	67	50	17	75%	25%
2	1123	70	70	6	100%	9%
3	1437	87	65	22	75%	25%
4	1023	51	36	15	71%	29%
5	831	53	44	9	83%	17%
6	1705	62	55	7	89%	11%
7	2053	80	68	12	85%	15%
8	1371	48	35	13	73%	27%
9	2409	50	41	9	82%	18%

10	1967	31	25	6	81%	19%
Total	15070	599	483	116	81%	19%

Tiana's correct target-like use of articles

	Definite			Zero Ø						Indef
	Plu *the*	Sing *the*	Non count	Gen Ø	Gen Plur Ø	Gen Ø Non count	Gen Ø Mass	Mass Ø	Sing Ø	Gen Ø	Sing *a*
1	5	6	2	13				1	4	5	9
2	1	23		15						9	7
3		28		19		6				3	16
4	2	19	1	5		2			1	7	9
5		19		12		3				3	8
6	2	17	2	7		3	2			13	4
7	5	32	1	17	1	4				5	4
8	1	14	1	12						4	4
9	1	9		11	3	1				2	6
10		10	1	7	2					1	6

Tiana's incorrect target-like use of articles

	Definite		Zero Ø				Indefinite
	Plur *the*	Sing. *the*	Gen Ø	Gen Ø Plural	Sing Ø	Gen Ø	Sing *a*
1	2	8	2		1	1	2
2		2				2	1
3		10	2			4	5
4		11	1			2	
5		3	2			4	
6		5	1			1	
7		4	3			1	4
8		5	3			4	
9		1	4			1	2
10		1		1		1	3

Upper Intermediate: NNS-8, NNS-9, and NNS-10

Luna's target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	3686	89	78	11	88%	12%
2	3810	93	86	7	92%	8%
3	1412	130	123	7	95%	5%
4	1016	83	78	5	94%	6%
5	1536	96	82	14	85%	15%
6	1189	66	49	17	74%	26%
7	968	57	48	9	84%	16%
8	1060	49	42	7	86%	14%
9	1438	99	88	11	89%	11%
10	1093	51	42	9	82%	18%
Total	17208	813	716	97	88%	12%

Luna's correct target-like use of articles

	Definite				Zero ∅								Indefinite
	Plur *the*	Sin *the*	Abst *the*	Noncount	Gen *Ø*	Gen Plur *Ø*	Gen *Ø* Noncnt	GenGer Conc *Ø*	Mass *Ø*	Sing *Ø*	Plur *Ø*	Gen *Ø*	Sing. *a*
1	11	28		3	13	7	2		1	1	2	4	6
2	1	28		1	5	10	4				3	9	20
3	1	31	1		4	8				5	9	3	15
4	3	37		1	10	1				1	4		9
5	6	19			19	2	2			4	7	1	13
6	3	20	1		8	1	1			13	6		9
7	2	5		2	7	3	1		1	2	9		10
8	2	9			10			1		2	3		8
9	10	22		3	4	14	1			4	9		12
10	5	9		3	1	5				8	7	1	7

Luna's incorrect target-like use of articles

	Definite		Zero ∅				Indefinite
	Plural *the*	Sing. *the*	Gen *Ø*	Sing. *Ø*	Plural *Ø*	Abstract *Ø*	Sing. *a*
1	3	1	2			2	2
2		1	1			3	2
3		2	4		1		
4			3	2			
5		7	1	4		1	1
6		4		7	2		1
7			1	6		1	1
8		4	1	2			
9		4		5			2
10		1	3	2			2

Demi's Target-Like Use of Articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	1392	57	53	4	93%	7%
2	1350	73	73	0	100%	0%
3	1296	88	88	0	100%	0%
4	1316	66	65	1	98%	2%
5	1378	61	59	2	97%	3%
6	1637	71	70	1	99%	1%
7	1492	87	87	0	100%	0%
8	1334	85	84	1	99%	1%
9	1252	64	63	1	98%	2%
10	1226	55	55	0	100%	0%
Total	13673	707	697	10	99%	1%

Demi's correct target-like use of articles

	Definite				Zero Ø								Indef	
	Plu *the*	Sing *the*	Abs *the*	Non count	Gen Ø	Gen Plur Ø	GenGer Conc Ø	Ger Abst Ø	Gen Ø Non count	Sing Ø	Gen Ø	Plur Ø	Sing *a*	Mass *a*
1		5			14	7	2				4		18	1
2		11			6	18			3	1	8	2	15	
3	5	11		1	18	19	1	5	4		3		9	
4	5	8		3	5	15			2		2	2	7	
5	6	13		1	1	13					2		15	
6	2	15		2	5	12			3				15	
7	2	13		1	11	18			8		8		11	
8		11		6	17	13	1		6		3	3	12	
9	4	17			1	20					1		9	
10	2	5	1		13	13			1		1		8	

Demi's incorrect target-like use of articles

Weeks	Definite	Zero Ø	Indefinite
	Def. Sing. *The*	Generic ø	Indef. Sing. *A*
1	1	3	
2			
3			
4	1		
5			2
6		1	
7			
8		1	
9		1	
10			

Bella's target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	844	56	52	4	93%	7%
2	1174	75	72	3	96%	4%
3	1153	90	79	11	88%	12%
4	755	50	42	8	84%	16%
5	740	35	33	2	94%	6%
6	626	25	22	3	88%	12%
7	523	39	33	6	85%	15%
8	612	45	44	1	98%	2%
9	624	45	40	5	89%	11%
10	882	44	43	1	98%	2%
Total	7933	504	460	44	91%	9%

Bella's correct target-like use of articles

	Definite				Zero Ø				Indef
	Plur *the*	Sing *the*	Abst *the*	Noncount	Gen Ø	Noncount Ø	Plural Ø	Gen Ø	Sing. *a*
1	2	17		1	15	1		1	15
2	4	11			14	4	1	1	21
3	7	18		4	12	1		9	28
4	2	21		2	7		1	1	7

5	1	14			11				7
6	1	6			8			3	1
7	4	6		1	10	1		1	10
8	1	10			18				3
9	1	7		3	13		1	5	9
10	7	9	3	1	11				7

Bella's incorrect target-like use of articles

	Definite		Zero Ø		Indefinite
	Def. Sing. *the*	Def. Abstract *the*	Generic Ø	Indef Gen Ø	Indef. Sing. *a*
1			3		
2			1		
3	2	1	1	7	
4	3		4	1	
5			1	1	
6				1	1
7			3	1	1
8	1				
9			1	2	2
10			1		

Upper Intermediate: NNS-3, NNS-4, NNS-5, and NNS-6

Skye's target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	2082	111	116	19	83%	17%
2	2007	120	120	10	92%	8%
3	1677	89	92	6	93%	7%
4	1513	90	95	11	88%	12%
5	1758	103	100	5	95%	5%
6	1876	78	78	5	94%	6%
7	1695	89	93	14	81%	16%
8	1758	103	103	13	87%	13%
9	1779	93	94	6	94%	6%
10	217	21	16	3	86%	14%
Total	16362	897	884	91	90%	10%

Skye's correct target-like use of articles

	Definite			Zero Ø				Indefinite	
	Plu *the*	Sing. *the*	Abst *the*	Gen Ø	Gen. Ø Ger Con	Gerund Abst Ø	Indef Gen Ø	Sing. *a*	Mass *a*
1	3	13		54			3	31	
2	3	40	2	27			1	25	
3	7	27	3	11			1	35	
4	5	21		25			6	28	
5	1	40		16	1		3	30	
6		24	1	20				26	1
7	3	29		23				21	
8		22		38				24	
9	4	26		23		1		23	

10[3]		4		4				1	

	Definite				Zero Ø										Indef	
	Plu *the*	Sing *the*	Abs *the*	Non count	Gen	Gen Ger	Ger Abs	Gen Mass	Gen Ger	Gen Non count	Non count Ø	Sing Ø	Plu Ø	Gen Ø	Abst *a*	Sing *a*
1	4	10			6									1		17
2	1	4	1		17		2				1	3				8
3	2	10	2		28							3	1	2		14
4	3	18	4	1	29	3						4	5	2		22
5	1	6	1		14								5	2		19
6	3	4	2	2	33	3						1	3	1		7
7	2	8	1	2	17							7	7			22
8	3	4	2	2	9	1						1	5	1		7
9	1	17	4		10	1	1	1	2	1		3	5		1	13
10	1	4	1	1	8							1	1	1		11

Skye's incorrect target-like use of articles

Zara's target-like use of articles

Weeks	Definite			Zero Ø		Indefinite
	Def. Plur *the*	Def. Sing. *the*	Def. Non Count	Gen Ø	Indef Gen Ø	Indef. Sing. *a*
1		2		10	4	1
2	1	2		4		2
3		1			1	4
4	1	2		5		3
5		1		2		1
6		1		1	1	2
7		4		9		1
8		1		6		6
9				4		2
10			1		1	1

Zara's correct target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	1172	49	50	1	98%	2%
2	1013	50	54		100%	0%
3	1405	70	71		100%	0%
4	2994	108	108		100%	0%
5	977	65	64		100%	0%
6	1874	69	69	1	99%	1%
7	1397	75	75	5	93%	7%

[3] Voice chat for Week 10 could not be recorded due to technical difficulties. The numbers in Week 10 are only representative of Type chat.

8	1006	54	54	3	94%	6%
9	1405	81	81		100%	0%
10	953	37	37	2	95%	5%
Total	14196	658	674	12	98%	2%

Zara's incorrect target-like use of articles

Weeks	Definite		Zero Ø		Indefinite
	Abstract *the*	Def. Noncount *the*	Gen *Ø*	Indef. Sing. *Ø*	Indef. Sing. *a*
1			1		
2					
3					
4					
5					
6			1		
7				1	2
8	1	1		1	
9					
10					1

Hazel's target-like use of articles

Wks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	1171	67	67	9	87%	13%
2	786	50	50	5	90%	10%
3	654	61	61	6	90%	10%
4	849	56	56	6	89%	11%
5	755	49	49	5	84%	10%
6	878	68	68	6	91%	9%
7	821	61	61	3	95%	5%
8	891	71	71	4	94%	6%
9	793	66	66	5	92%	8%
10	869	53	53	9	83%	17%
Total	8467	602	602	58	90%	10%

Hazel's correct target-like use of articles

	Definite				**Zero**	**Indefinite**							
	Plur *the*	Sing *the*	Abst *the*	Noncount	Gen *Ø*	Gen. Ger Con. *Ø*	Ger Abst *Ø*	Noncount Gen	Noncount Gen	Sing. *Ø*	Plur *Ø*	Gen *Ø*	Sing *a*
1	1	5	1	1	24				1	2	7	6	10
2	1	9		1	16				2		2	2	7
3	2	7		2	25	1			5	2	4	1	3
4		22		3	18			2		1	1	2	3
5	1	12			15	5	1			1	1		6
6	2	12		2	27		1				4		4
7	1	14			20				1	5	4	2	8
8	2	8			30		1	4		7	1		12
9	1	17	1		25	1	1		2	7		2	4
10	1	6			25	1					3	1	8

Hazel's incorrect target-like use of articles

	Definite	Zero					Indefinite
	Sing. *the*	Gen Ø	Gen Ger Concrete Ø	Sing. Ø	Plural Ø	Abstract Ø	Sing. *a*
1		4				5	
2		2	1			2	
3	1	3				1	
4	2	1		1			
5		3		1			
6	1	2		2			
7	2						1
8		2		1			1
9	1	1		3			
10		3		4	2		

Nabi's target-like use of articles

Weeks	# Words	Total #	# Correct	# Incorrect	% Correct	% Incorrect
1	2022	130	130	42	68%	31%
2	2092	163	163	10	94%	6%
3	2142	138	138	19	86%	14%
4	2104	115	115	15	87%	13%
5	2292	191	191	23	88%	12%
6	1627	94	94	18	81%	19%
7	2053	139	139	16	88%	12%
8	1399	88	88	5	94%	6%
9	2330	160	160	22	86%	14%
10	1934	147	129	18	88%	12%
Total	19995	1365	1367	188	86%	14%

Nabi's correct target-like use of articles

	Definite				Zero Ø									Indef
	Plu *the*	Sing *the*	Abst *the*	Non count	Gen Ø	Gen Plur	Gen Ger Con Ø	Gen Ø Mass	Mass Ø	Sing Ø	Plur Ø	Gen Ø	Abst Ø	Sing *a*
1	6	23	4	8	6	13	1	12	2	4	5	1	1	13
2	3	38	5	10	26	18		7		10	9	5	1	11
3	4	21	4	1	23	20	1	11	2	8	11			19
4	4	31	2		4	20	1	1	1	5	6	2		16
5	3	43		4	6	21		4	4	1	5	1		29
6	3	27	2	1	2	10		2		3	7			28
7	3	22	1	4	18	19		7	1	10	7		1	27
8	4	11	3	7	2	14		10	5	8	6	2		4
9	10	54		7	9	26		3	4	10	9	1	2	15
10	8	25	7	7	10	24		2	1	1	14	12		15

Nabi's incorrect target-like use of articles

	Definite				Zero Ø							Indefinite
	Plur *the*	Sing. *the*	Abst *the*	Mass *the*	Gen Ø	GenGer ConcØ	Sing Ø	Plur Ø	Gen Ø	Abst Ø	Mass Ø	Sing *a*
1	1	3	1	7			14		1	3	5	1
2			1	2			3	1		1	1	1

3		2	1	1	1	1	7				1	4
4		4		1		1	4					3
5		3		2		2	6	1				6
6		2		1			6	1			4	4
7	1	3	3	1			6				2	
8		1					4					
9							16					5
10		3					5	1	2		1	4

[i] Adapted from Nassaji, 2015: 46

[ii] Examples taken from Nassaji (2015; 2007a)