Effects of Types of Voice-Based Chat on EFL Students' Negotiation of Meaning According to Proficiency Levels*

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Kim, Na-Young. (2017). Effects of types of voice-based chat on EFL students' negotiation of meaning according to proficiency levels. *English Teaching, 72*(1), 159-181.

The current study explores the effects of different types of voice-based chat on EFL students' negotiation of meaning according to proficiency levels. Participants included 123 Korean university students of English. They were divided into two voice-based chat groups: student-student voice-based chat and student-chatterbot voice-based chat. The experiment was administered throughout one semester, 16 weeks. Negotiation of meaning evident in the chats was coded for confirmation check, comprehension check, clarification requests, repetition, and reformulation, and was measured by counting the number of meaning negotiation moves. Important findings were as follows: Firstly, there were significant differences between the first chat and the last chat. The mean frequencies of negotiation moves at all proficiency levels positively changed over time as a result of participating in student-chatterbot voice-based chat. Particulalry, student-chatterbot voice-based chat, as compared to student-student voice-based chat, allowed students to use more negotiation strategies, and the strategies used in the chats also appeared to be different according to the students' proficiency levels. Lastly, positive perceptions of voice-based chat were observed at all proficiency levels. This study provides empirical evidence to substantiate the effects of voice-based chatterbots in oral interaction. Based on the findings, pedagogical implications are made on the effective implementation of voice-based chatterbots in EFL contexts.

Key words: voice-based chatterbot, negotiation of meaning, EFL learning

1. INTRODUCTION

"Speaking is a social skill" (Valette, 1977, p. 119), and technology can help "to

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* This article is based on the author's unpublished doctoral dissertation (Kim, 2016a).

negotiate meaning and to establish social relations with others" (Gutiérrez, 2005, p. 84). Negotiation of meaning is believed to be a vehicle toward speaking ability improvement (Champakaew & Pencingkarn, 2014), leading students to greater awareness of their target language and further improvement in language proficiency (Ko, Schallert & Walters, 2003). Previous studies have shown that negotiation of meaning can enhance students' oral fluency (Nakahama, Tyler & Lier, 2001), and technologies provide substantial opportunities to engage in negotiating for meaning.

With the advancement of technology, EFL students are now able to practice their output and have authentic conversations with others (Bernstein, Najmi & Ehsani, 1999). Speech technologies, particularly, have provided EFL students a lot of opportunities for spoken communication. As wide-ranging speech software programs have advanced, it has become possible to promote user participation and interaction via voice-based chat (Tian & Wang, 2010). Tsui (2001) suggests that synchronous voice-based chat is a useful and effective tool to create interactive environments in which foreign language students can share their feelings and ideas with different chat partners.

One of the speech-enabled software programs, a voice-based chatterbot, was also designed to simulate a conversation with human users via auditory methods. Chiu, Liou, and Yeh (2007) state that voice-based interaction can be facilitated by the speech recognition system in a conversational environment. Furthermore, with the advancement of artificial intelligence, voice-based chatterbots are constantly improved and have allowed EFL students to participate in conversations quantitatively and qualitatively. Intelligent chatterbots give students motivation to have successful interactions (Lee et al., 2011), and participate in meaningful conversations (Chang, Lee, Chao, Wang & Chen, 2010).

The potential uses of chatterbots are extensive, and they can be implemented in a wide variety of EFL classrooms. Software developments in speech recognition are now employing voice-based chatterbots for foreign language students (Coniam, 2008). According to Holland, Kaplan, and Sabol (1999), speech-enabled interactive programs engage foreign language students in meaningful communication, and consequently, improve their oral output. However, little research has compared human-human voice-based interaction versus human-chatterbot voice-based interaction. Furthermore, regarding the students' proficiency levels in voice-based interaction, conflicting results have been reported. Some researchers have noted that only students of medium level or above benefit from voice-based chat in developing their language skills (Kötter, 2001; Stockwell, 2004), while others have claimed that voice-based chat can also be suitable for low-level students (Lee, 2001; Nakahama et al., 2001; Rosell-Aguilar, 2005).

In response to the advancement of speech technology and voice-based chatterbots, therefore, the purpose of this study is to explore the effects of two types of oral interaction – student-student and student-chatterbot voice-based chat – on Korean EFL students'

negotiation of meaning. In particular, it is further important to examine their effects according to the students' proficiency levels in order to confirm the previous findings. Moreover, it is also essential to investigate students' perceptions of the two different types of voice-based chat, given the fact that effective foreign language learning relies heavily on students' perceptions (Lieb, 2005). In this context, the research questions for the present study are as follows:

1. What are the effects of the two different types of oral interaction – student-student voice-based chat and student-chatterbot voice-based chat – on Korean EFL students' negotiation of meaning according to proficiency levels?
2. What are Korean EFL students' perceptions of voice-based chat according to proficiency levels?

2. REVIEW OF THE LITERATURE

2.1. Negotiation of Meaning in an EFL Context

According to Kramsch (1986), communicative competence includes the ability to negotiate meaning. Meaning negotiation is the process whereby interlocutors provide and interpret utterances, which provokes adjustments to linguistic forms, conversation structure, or message content, until they reach mutual understanding (Gass & Mackey, 2006).

The effects of negotiation on language acquisition are noticeable through communication moves (Ellis, 2003). Negotiation moves identified by Long (1996) include confirmation check, comprehension check, clarification request, repetition, and reformulation. These refer to questions or statements made in order to check whether the previous messages have been correctly understood (confirmation checks), questions or statements made in order to check whether the interlocutor understands the previous speaker's message (comprehension checks), questions or statements made in order to elicit clarification of the speaker's preceding utterances (clarification requests), repetition of the previous utterances (repetition), and paraphrases of the previous utterances (reformulation). Long (1996) explains this as the process in which students provide and interpret signals of their own, as well as their interlocutor's perceived comprehension, thus provoking adjustments to linguistic form, message content, or conversational structure in an effort to communicate, until an acceptable level of comprehension is achieved.

Foreign language acquisition takes place via conversational interaction and negotiation. Kramsch (1986) emphasizes the importance of the frequency of opportunities students can actively participate in. The more interaction occurs between students, the more negotiation

develops (Yi & Sun, 2013). In this respect, Long's (1996) Interaction Hypothesis has a great impact on foreign language learning. According to Long, when interlocutors experience difficulty in comprehension, they modify the interaction. This interactional modification or modified speech promotes acquisition. Long's Interaction Hypothesis suggests that students acquire foreign language skills with greater ease and at a quicker rate if they are able to constantly interact with others. Through negotiation of meaning, students apply their own style using the target language in communicative contexts, which plays a crucial role in students' language improvement. Therefore, it is vital to provide EFL students with opportunities to practice their output and interact with others, given that meaning negotiation leads to a rise in language acquisition (Ellis, 2003).

It is not unnatural for foreign language students to have their interaction to go wrong and for misunderstandings to take place. And when this happens, the interactive work which arises is referred to as negotiation (Ellis, 1997). However, there still remain limited opportunities and little encouragement for EFL students to engage in meaningful interaction (Dingfang, 2006). Because of the absence of an authentic English-speaking environment, most students are not only limited in working on speaking in conversation classes (Sun & Yang, 2015), but also have difficulties in English speaking despite having been involved in English class for several years (Han & Kim, 2016). Low and medium-level foreign language students in particular often face difficulties when engaging in conversations, typically having little chance to practice such interactions (Stewart & File, 2007). This lack of interaction and negotiation means that EFL students' communicative competence often fails to develop (Cheon, 2003). Therefore, it is necessary to provide EFL students with a variety of opportunities to practice their output, and further, to interact and negotiate with others.

2.2. Negotiation of Meaning in Synchronous Chat

A number of previous studies have suggested that the process of modified interaction or meaning negotiation facilitate language acquisition, providing comprehensible input, comprehensible output, and feedback (Champakaew & Pencingkarn, 2014). Although Chapelle (1997) suggests that students need opportunities to produce and practice their target language output, notice errors in their own linguistic output, and to correct them, EFL students are typically presented with few opportunities to use their target language. However, with the development of communication technology, students can be provided with more frequent opportunities to practice English, engaging in meaningful interaction (Bernstein, Najmi & Ehsani, 1999). In other words, technology can help students to negotiate meaning with others, while monitoring their own language learning progress (Gutiérrez, 2005).

With the advancement of various technologies, online interaction has offered sufficient and various opportunities for students to practice negotiating meaning. Research has shown that synchronous chat can help students gain competence in oral interaction, as it provides chances to negotiate meaning (Chun, 1994). As mentioned above, negotiation of meaning, as a particular way of interaction, enables students to make input meaningful and to improve their own output (Cheon, 2003). Considering the fact that oral interaction requiring negotiation of meaning is necessary for improving language skills (Ellis, 2003; Long, 1996; Pica, 1994), engaging students in synchronous chat helps them to become more proficient in various oral skills (Sotillo, 2000) and produce a greater quantity of discourse than in a typical oral classroom setting (Kern, 1995).

A growing number of studies have investigated negotiation of meaning in synchronous chat (Blake, 2000; Chun, 1994; Jepson, 2005; Kötter, 2001; Lee, 2001; O'Rourke, 2005; Sauro, 2004; Sotillo, 2000; Sykes, 2005). However, most of them have focused on text-based chat. Studies have shown that communication via text-based chat can lead to varied amounts of negotiation of meaning both between non-native speakers (Blake, 2000) and between native and non-native speakers (Kötter, 2001). Lee (2001) examines the online interaction and communication strategies employed during online communication and reports that participants use a variety of communication strategies, including comprehension check, clarification check, and reformulation to negotiate with each other. Furthermore, investigations of negotiation of meaning in text-based chat reveal that lexical negotiations are much more common than grammatical negotiations (Blake, 2000), and also, that negotiations concentrate more on overall meaning than structure (O'Rourke, 2005).

Only a few studies have investigated negotiation in voice-based chat in comparison with text-based chat. Jepson (2005) compares repair-move patterns in two different chat rooms – voice-based and text-based chat rooms – and reports that a significantly higher number of repair moves are made in voice-based chats than in text-based chats, and qualitative analyses indicate that most repair moves in voice-based chats are pronunciation related. From a qualitative perspective, Sykes (2005) also examines the effects of synchronous voice-based chat and text-based chat, and reports that text-based chat groups outperform voice-based chat groups in terms of the variety and complexity of communication strategies used. Sauro (2004) reports how two non-native speakers of English can change their positions of power, according to a change in chat modes, namely from voice-based to text-based. One participant, relying heavily on text-based chat, renegotiates a more productive and less receptive position in the exchange. In contrast, the other participant, relying exclusively on voice-based chat, reverses his initial position to fall more in line with his partners. Both participants attempt to share their information orally at first, but as they near the close of the interaction, both prefer text-based chat in negotiating meaning.

Although some researchers have reported positive effects of voice-based chat on language learning (Coniam, 2008; Kern, 1995), relatively little empirical research has been conducted in its comparison to text-based chat. Zhao (2013) points out that speech technology is not ready for full implementation in language learning, even though it has already shown its potential. Furthermore, there are only a few studies investigating negotiation of meaning in voice-based chat. Little attention has been paid to the interaction among EFL students in voice-based chat rooms, in spite of the now extensive utilization of speech technology in language learning and practice (Jepson, 2005). Given the fact that oral interaction which requires negotiation of meaning is necessary for improving language skills (Ellis, 2003; Long, 1996; Nakahama et al., 2001), exploration of voice-based interaction in conversational chats, specifically in regard to negotiation moves, is indicated.

2.3. Voice-Based Chatterbot

Increased attention to and interest in chatterbots in real life have been drawn from the recent advancement of robot-related technologies. Chatterbots are not only available on the internet, but can also be downloaded onto mobile devices. They can have a conversation with the human user (Walker & White, 2013), and this is one of the most important functions of chatterbots in interacting with people, actively participating in a conversation with them (Chang et al., 2010).

With the development of speech technology, a variety of tools for speech recognition and analysis have also been adapted toward robot-assisted language learning. Automatic Speech Recognition (ASR) can interpret the meaning of speakers' utterances. It can be used for analyzing students' speech more generally and creating oral interactions between the student and the computer. That is, speech interactions with voice-based chatterbots are enhanced by this ASR system in a conversational environment (Chiu, Liou & Yeh, 2007). With voice recognition technology, voice-based chatterbots are able to provide appropriate responses, communicating and interacting with people (House, Malkin & Bilmes, 2009). They give students practice in responding appropriately within fixed routines such as question and answer, which is commonly evident in spoken language. Students can have authentic and natural conversations with programmed topics (Bernstein, Najmi & Ehsani, 1999), be involved in digital storytelling (Kory & Breazeal, 2014), and practice social conversations with dialogue systems employing recognition technologies (Stewart & File, 2007).

With the significant progress of chatterbots, intelligent and adaptive chatterbots have also given students opportunities for the independent learning of conversation skills. By providing models for pronunciation, voice-based chatterbots have allowed students unlimited repetitions of pronunciation (Walker & White, 2013). Coniam (2008) reports the

linguistic worth of current chatterbot programs, suggesting that they can teach vocabulary and engage students as active participants in meaningful dialogues (Westlund, 2015). Stewart and File (2007) also emphasize this computer dialogue system, allowing students to rehearse social conversations without a human partner.

Voice-based chatterbots enable students to practice output, engaging in an oral interaction between speaker and listener. They now provide foreign language students a means of practicing language, without regard for time and location. Consequently, these speech-enabled interactive programs allow foreign language students to engage in meaningful interaction, which can improve their oral output (Holland, Kaplan & Sabol, 1999). That is, negotiation of meaning, a particular way of interaction which helps foreign language students develop their language skills (Cheon, 2003), can now take place during oral interaction with voice-based chatterbots. Nevertheless, reliable programs of voice-based chatterbots still have a long way to go (Coniam, 2008). But while they are often debated in foreign language education, they are rarely studied. Although they have been widely employed in EFL programs, little is known of the effects of voice-based chatterbots in detail, as there are only a few comprehensive studies.

To meet the new demands in extended utilization of speech technology in foreign language learning and practice, therefore, it is necessary to investigate how voice-based chatterbots affect EFL students' language acquisition. In particular, considering that meaningful interaction facilitates language learning (Pica, 1994), it is necessary to examine the effects of voice-based chatterbots specifically in regard to negotiation of meaning. In addition, given that little research has attempted to compare negotiations of meaning as they occur in either mode – student-student and student-chatterbot voice-based chat – it is also essential to explore the effects of the two different types of voice-based chat.

3. METHODOLOGY

3.1. Participants

Participants in this study consisted of 123 Korean students of English enrolled in a freshman English speaking class at a university in Korea. In order to compare the extent to which the different subgroups of proficiency levels were affected by different types of voice-based chat, participants were divided into three proficiency groups, based on TOEIC listening scores: score range 200-295, low-level (n=39); 300-395, medium-level (n=41); 400-495, high-level (n=43) by Liao (2010). Next, the participants were further divided into two groups: student-student voice-based chat group (n=60) student-chatterbot voice-based chat group (n=63). See Table 1.

TABLE 1

Participants

Proficiency Levels	Student-Student Voice-Based Chat	Student-Chatterbot Voice-Based Chat	Total
Low-level	19	20	39
Medium-level	19	22	41
High-level	22	21	43
Total	60	63	123

3.2. Data Collection and Data Procedures

The present study was designed to examine the effects of two types of voice-based chat on Korean EFL students' negotiation of meaning, according to proficiency levels. In order to confirm the participants' proficiency levels, a TOEIC listening test by ETS was administered prior to the experiment.

The whole study lasted over the course of one semester of the 2016 academic year at a university in Korea. The participants engaged in speaking activities with two different chatting tools, student-student voice-based chat and student-chatterbot voice-based chat. Participants in the student-student group were randomly divided into pairs, and during the experimental period, they engaged in an oral interaction with the same chat partners. Participants in the student-chatterbot group activated the chatterbot application and had an interaction with voice-based chatterbots. In the student-student voice-based chats, the *Kakaotalk* messenger program was used, given that the messenger program is widely used in Korea (Han & Kim, 2016). Because of its ubiquity and students' consequent comfort in using it, this program in the language classroom did not affect the students' oral performance or progress in their oral language learning, an important factor when employing technologies (Barr, Leakey & Ranchoux, 2005). For student-chatterbot voice-based chats, the *Indigo* application program was used. Participants managed this chatterbot software very easily, so there was no need to practice running this application program. After downloading the program onto their smartphone, they interacted with the voice-based chatterbot using a microphone and headphones.

Participants engaged in 10-minute voice-based chats once a week for the duration of the experiment. This made for 10 chat sessions in total, with topics relating to the participants' daily lives, including school life and classmates. The participants recorded their oral interactions via smartphone. They then submitted the recorded materials to the researcher.

This study was not designed to investigate the effects of proficiency differences in pair interaction. Davis (2009) concludes that there is little effect of interlocutors' proficiency-level differences on synchronous interaction. Similarly, Watanabe and Swain (2007) note that proficiency differences do not affect language learning when having a conversational

interaction. Likewise, many other previous studies have shown that the collaborative dyads performed better regardless of their interlocutor's proficiency (Storch, 2001). This study, therefore, suggests that proficiency differences may not have effects on oral interaction.

In order to compare the changes and group differences in students' perceptions of different types of voice-based chat, structured pre- and post-test surveys were conducted, based on previous research (Han & Kim, 2016). The evaluative statements were designed to be scored on a six-point Likert scale, from 1 (strongly disagree) to 6 (strongly agree). The reliability of the instrument was tested using Chronbach's alpha, which was revealed to be 0.903, deemed to be an acceptable level (Field, 2000).

3.3. Data Analysis

The purpose of the present study was to examine changes in the frequencies of negotiation moves as a result of voice-based chat, and to investigate the differences between two groups: student-student voice-based chat and student-chatterbot voice-based chat. The data were analyzed using SPSS version 18. To examine the frequencies of negotiation of meaning, participants' oral interaction for the first and last chat sessions were chosen at random and manually transcribed using word processing software. In total, 90 chat scripts were obtained; 45 from the first chat and another 45 from the last chat.

TABLE 2
Descriptions of Negotiation of Meaning

Types	Definitions	Examples
Confirmation Check	Check whether the preceding utterance has been correctly heard or understood	A: Accident. B: You had an accident? A: Yes.
Comprehension Check	Check whether the previous utterance has been understood	A: It's called Top Twenty. B: Do you know what Top Twenty is? A: I'm not quite sure.
Clarification Request	Elicit clarification of the preceding Utterance	A: I love my friends. B: Who do you mean by 'my friends'? A: Jessica and Tom.
Repetition	Repeat the previous utterance to confirm an agreement on its meaning	A: What's the problem? B: Spilt coffee … A: Spilt coffee?
Reformulation	Reformulate the preceding utterance to move it closer to correspondence with its meaning	A: I studied and drinked tea. B: Drank tea. C: Yes.

As seen from Table 2, five different characteristics were identified according to Long (1996): confirmation check, comprehension check, clarification request, repetition, and reformulation. Participants' negotiation of meaning was measured by counting the number

of negotiation moves, as those indicate the quantity of interaction, which raises language acquisition (Ellis, 2003). Whether the interaction ended in successful negotiation of meaning was not considered[1]. The chat script was coded and analyzed based on the previous research (Chun, 1994; Sotillo, 2000).

Descriptive statistics were computed for all analyses. In addition, paired-sample t-tests were performed in order to compare the mean differences in increase in frequencies of negotiation moves between the first and the last chat session within the two experimental groups, suggesting the extent to which participants increased their negotiation moves. Then, independent t-tests were employed to compare the mean frequencies of negotiation moves between the two groups: student-student voice-based chat group and student-chatterbot voice-based chat group. The *p* value was set at .05.

4. RESULTS AND DISCUSSION

4.1. Effects of Voice-Based Chat on Korean EFL Students' Negotiation of Meaning According to Proficiency Levels

To examine the frequencies of negotiation moves in the synchronous oral interaction, voice-based chat, 10-minute chat scripts were coded and analyzed based on previous research (Chun, 1994; Sotillo, 2000). Paired-sample t-tests were conducted between the mean frequencies in the first and last chat in order to examine the changes in negotiation of meaning as an outcome of the two types of voice-based chat. Results of descriptive statistics and paired-sample t-tests are shown in Table 3.

As seen from Table 3, results show that there are some significant differences in the mean frequencies of negotiation of meaning among the student-chatterbot voice-based chat group. To be specific, low-level participants show significant mean differences in the frequencies of repetition ($t = 4.430$, $p = .001$) and reformulation ($t = 3.732$, $p = .003$), indicating that they repeat the preceding utterance less often but paraphrase the previous utterance more often in the last chat. In the case of medium-level participants, findings show that they request clarification more frequently as time goes by ($t = 3.194$, $p = .010$). In respect to high-level participants involved in student-chatterbot voice-based chats, findings show statiscally significant mean differences in the frequency of confirmation checks ($t = 4.392$, $p = .007$), indicating that they check whether the preceding utterance was understood correctly, more frequently in the last chat than in the first.

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[1] This was the limitation of the current study. Given that negotiation happens when learners encounter difficulties in comprehensibility (Pica, 1994), further research is needed to investigate whether the negotiation of meaning in voice-based chat resolves communication problems.

TABLE 3

Paired-Sample *t*-Tests for Negotiation of Meaning

			First Chat		Last Chat		*t*	*p*
			M	*SD*	*M*	*SD*		
Low	Confirmation Checks	Student-Student	2.50	1.22	2.17	1.72	.598	.576
		Student-Chatterbot	3.46	1.33	3.85	2.27	1.100	.293
	Comprehension Checks	Student-Student	1.33	1.03	1.50	1.52	.542	.611
		Student-Chatterbot	0.92	1.04	1.00	1.08	1.000	.337
	Clarification Requests	Student-Student	0.83	0.98	0.67	1.03	1.000	.363
		Student-Chatterbot	1.69	0.85	1.92	1.66	.762	.461
	Repetition	Student-Student	1.67	1.17	1.51	1.33	-.696	.518
		Student-Chatterbot	5.69	1.32	4.00	1.53	-4.430	.001
	Reformulation	Student-Student	1.33	1.21	1.50	1.52	1.000	.363
		Student-Chatterbot	2.54	1.05	3.08	1.32	3.742	.003
Medium	Confirmation Checks	Student-Student	2.25	0.46	1.88	1.36	1.000	.351
		Student-Chatterbot	3.18	1.40	4.36	2.80	1.725	.115
	Comprehension Checks	Student-Student	1.88	1.46	1.63	1.92	1.000	.351
		Student-Chatterbot	1.27	1.01	1.45	1.44	.516	.617
	Clarification Requests	Student-Student	1.13	0.83	1.50	1.20	1.426	.197
		Student-Chatterbot	2.36	1.43	3.27	2.05	3.194	.010
	Repetition	Student-Student	1.50	1.07	1.50	1.41	.000	1.000
		Student-Chatterbot	5.55	2.11	4.64	2.38	-2.085	.064
	Reformulation	Student-Student	1.13	1.13	1.38	1.51	1.528	.170
		Student-Chatterbot	1.91	1.04	2.18	1.25	1.936	.082
High	Confirmation Checks	Student-Student	2.06	1.18	2.38	1.41	1.576	.136
		Student-Chatterbot	3.83	1.17	5.33	1.37	4.392	.007
	Comprehension Checks	Student-Student	1.69	1.30	1.81	1.52	.696	.497
		Student-Chatterbot	1.17	0.75	1.17	1.60	.000	1.000
	Clarification Requests	Student-Student	2.00	0.97	1.88	1.09	1.000	.333
		Student-Chatterbot	2.50	1.76	3.00	2.00	2.236	.076
	Repetition	Student-Student	1.69	0.95	1.75	1.18	.565	.580
		Student-Chatterbot	5.17	1.83	4.17	2.40	-1.732	.144
	Reformulation	Student-Student	1.56	1.21	1.63	1.26	1.000	.333
		Student-Chatterbot	2.00	1.10	2.50	1.76	1.464	.203

Overall, the mean frequencies of negotiation moves at all proficiency levels positively changed as a result of participating in student-chatterbot voice-based chat. That is, students at different proficiency levels can benefit from voice-based interaction with chatterbots, showing the effective use of meaning negotiation strategies to improve their language skills. These results support previous findings, indicating that conversational interaction has the potential to offer substantial opportunities at multiple proficiency levels (Nakahama et al., 2001). Rosell-Aguilar (2005) also suggests that voice-based chat can be as suitable for low-level students as it is for higher levels.

In the present study, independent t-tests were also performed to examine the group differences in frequencies of negotiation of meaning between the two types of voice-based chat according to the participants' proficiency levels. The descriptive statistics and independent-test results are shown in Table 4.

As for the low-level participants, there were statistically significant mean differences in the frequencies of repetition between the two voice-based chat groups for both the first chat ($t = 5.632$, $p = .000$) and the last chat ($t = 4.116$, $p = .002$). Significant mean differences related to reformulation were also witnessed between the two groups for both the first chat ($t = 2.220$, $p = .040$) and the last chat ($t = 2.314$, $p = .034$). Results indicate that low-level students in the student-chatterbot voice-based chat group repeat and reformulate the previous utterance more often than those in the student-student voice-based chat group.

Meanwhile, medium-level students also showed statistically significant differences between the two types of voice-based chat in mean frequencies: confirmation checks for the last chat ($t = 3.420$, $p = .034$), clarification requests for both the first chat ($t = 2.180$, $p = .044$) and the last chat ($t = 2.178$, $p = .044$), and repetition for both the first chat ($t = 4.944$, $p = .000$) and the last chat ($t = 3.313$, $p = .004$). That is, students at medium-level check whether the previous utterance is understood correctly, elicit clarification of the preceding utterance, and repeat the previous utterance more often when they are involved in student-chatterbot voice-based chat.

In the case of high-level students, there are again significant mean differences in the frequencies of confirmation checks for both the first chat ($t = 3.155$, $p = .011$) and the last chat ($t = 4.485$, $p = .001$), and in repetition for the first chat ($t = 4.429$, $p = .004$). Results indicate that high-level students check their understanding and repeat the preceding utterance more often when they engage in voice-based chat with chatterbots.

Findings of this study reveal that there are significant differences between the two voice-based chat groups according to proficiency levels. Although students at all proficiency levels use more repetition strategies when engaging in student-chatterbot voice-based chat, the results are consistent with previous studies which show that types and frequencies of negotiation moves vary according to students' proficiency (Oliver, 2002). To sum up, in this current study's student-chatterbot group, students at low proficiency levels use more reformulations, while those at medium-level and above use more confirmation checks. In addition, medium-level participants appear to use more clarification requests when they engage in voice-based chat with chatterbots.

Nakatani (2005) notes that relatively lower proficiency-level students use repetition strategies more frequently than higher proficiency-level students. Because of the fact that lower proficiency-level students seek to employ simple strategies, repetition is frequently used to overcome their communication breakdown with voice-based chatterbots. The results of the current study show that low-level participants in the student-chatterbot voice-based chat group use less repetitions but more reformulations over time. That is, voice-based chat with chatterbot enables the low proficiency-level students to use more complex strategies, those frequently used by high proficiency-level students. In terms of high-level students, findings of the current study also support previous studies

TABLE 4
Independent *t*-Tests for Negotiation of Meaning

			Student-Student		Student-Chatterbot		*t*	*p*
			M	*SD*	*M*	*SD*		
Low	Confirmation Checks	First	2.50	1.22	3.46	1.33	1.499	.152
		Last	2.17	1.72	3.85	2.27	1.604	.127
	Comprehension Checks	First	1.33	1.03	0.92	1.04	-.633	.535
		Last	1.50	1.52	1.00	1.08	-.827	.420
	Clarification Requests	First	0.83	0.98	1.69	0.85	1.946	.068
		Last	0.67	1.03	1.92	1.66	1.697	.108
	Repetition	First	1.67	1.17	5.69	1.32	5.632	.000
		Last	1.17	1.33	4.00	1.53	4.116	.002
	Reformulation	First	1.33	1.21	2.54	1.05	2.220	.040
		Last	1.50	1.52	3.08	1.04	2.314	.033
Medium	Confirmation Checks	First	2.25	0.46	3.18	1.40	2.057	.061
		Last	1.88	1.36	4.36	2.80	3.420	.034
	Comprehension Checks	First	1.88	1.46	1.27	1.01	-1.068	.301
		Last	1.63	1.92	1.45	1.44	-.222	.827
	Clarification Requests	First	1.13	0.83	2.36	1.43	2.180	.044
		Last	1.50	1.20	3.27	2.05	2.178	.044
	Repetition	First	1.50	1.07	5.55	2.11	4.944	.000
		Last	1.50	1.41	4.64	2.38	3.313	.004
	Reformulation	First	1.13	1.13	1.91	1.04	1.564	.136
		Last	1.38	1.51	2.18	1.25	1.275	.219
High	Confirmation Checks	First	2.06	1.18	3.83	1.17	3.155	.011
		Last	2.38	1.41	5.33	1.37	4.485	.001
	Comprehension Checks	First	1.69	1.30	1.17	0.75	-.915	.371
		Last	1.81	5.12	1.17	1.60	-.878	.391
	Clarification Requests	First	2.00	0.97	2.50	1.76	.860	.400
		Last	1.88	1.09	3.00	2.00	1.711	.103
	Repetition	First	1.69	0.95	5.17	1.83	4.429	.004
		Last	1.75	1.18	4.17	2.40	2.360	.057
	Reformulation	First	1.56	1.21	2.00	1.10	.773	.448
		Last	1.63	1.26	2.50	1.76	1.305	.207

(Champakaew & Pencingkarn, 2014), indicating that higher proficiency-level students use clarification requests and confirmation checks more often compared to lower proficiency-level students. Nakatani (2005) also confirms that higher-level students use more complex strategies such as confirmation checks and clarification requests more frequently, while lower-level students produced the highest instances of repetition strategies.

Overall findings of the current study reveal that voice-based chat with chatterbots can lead to more effective use of meaning negotiation than in chat with other students. The results of the current study show that chatterbots serve as conversation partners in oral interaction, allowing students to use various negotiation moves, which improve students' language ability (Ko et al., 2003). It is natural for foreign language students to have their attempts to interact go wrong and for misunderstandings to occur. When this happens,

interactive work takes place, such work referred to as meaning negotiation (Ellis, 1997). What students need is not necessarily simplifying linguistic forms, but rather having an opportunity to interact with others, working together to reach mutual understanding. Through negotiation of meaning, students attempt to use their own style of the target language in communicative contexts, which plays a crucial role in language improvement.

EFL acquisition takes place most efficiently when students have ample opportunities to negotiate with others in cases of communication difficulty. Such negotiation brings students into contact with their foreign language learning. Interaction embodied by negotiation allows students to correct misunderstandings when a communication problem occurs, and ultimately, this clear comprehension contributes to successful foreign language acquisition (Jeong, 2008). By examining how meaning negotiation strategies impact language development, previous research has also confirmed that meaning negotiation moves contribute to reinforce the level of mutual understanding (Pica, Lincolin-Porter, Paninos & Linnell, 1996). Considering the fact that students produce more negotiation strategies when they engage in student-chatterbot voice-based chat, chatterbots can be helpful for language acquisition.
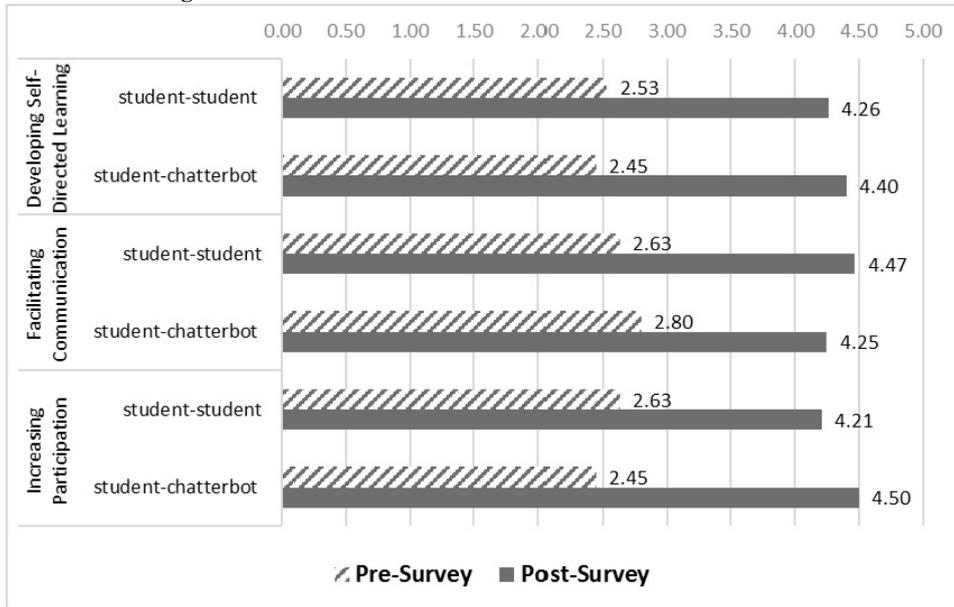
4.2. Korean EFL Students' Perceptions of Voice-Based Chat According to Proficiency Levels

To investigate the participants' responses to the voice-based chat, questionnaires were administered to all participants at the beginning and end of the experiment. Firstly, to examine whether the engagement in different types of voice-based chat influenced the participants' perceptions of voice-based chat, mean scores of pre- and post-surveys were compared across the two experimental groups, and the results are visually displayed in Figure 1, 2, and 3, according to proficiency levels.

The overall responses of the participants at all proficiency levels in both groups changed positively as a result of engaging in voice-based chats. That is, all participants believe that voice-based chat can develop self-directed learning, facilitate their communication, and increase participation in interaction with others. It is remarkable that all the mean scores for the post-survey increased in both the student-student and student-chatterbot voice-based chat groups (Figure 1, 2, and 3). A close examination reveals that the mean scores of the participants' responses were around 3.00 for the pre-survey, while 4.00 for the post-survey. These results indicate that, overall, the experience of the two different types of voice-based chat, whether student-student or student-chatterbot voice-based, makes for positive effects on the participants' perceptions, which can enhance language learning. This is in line with a great number of studies suggesting that technology can help EFL students have positive attitudes towards language learning (Hanson-Smith, 2000; Kern, 1995).
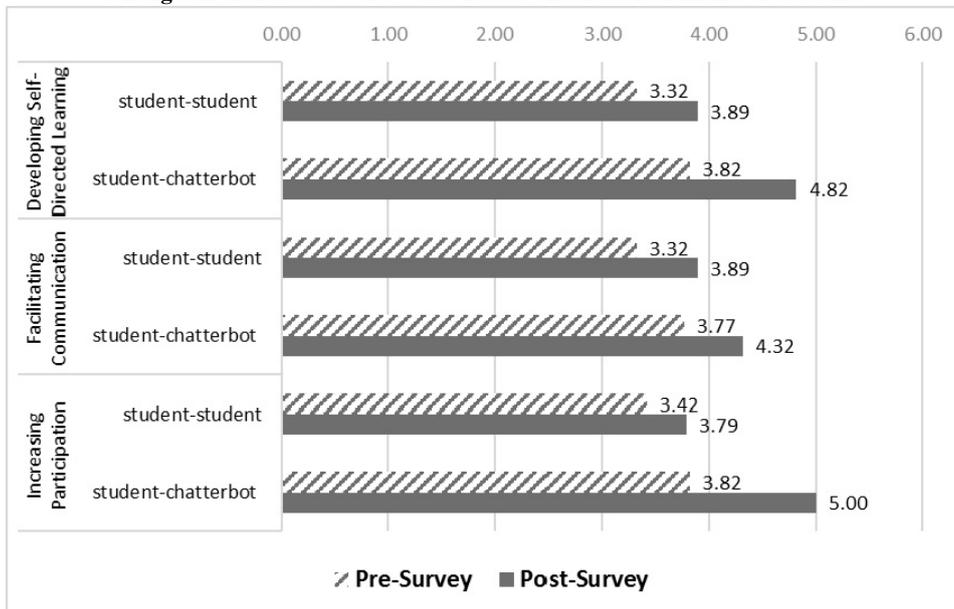
FIGURE 1

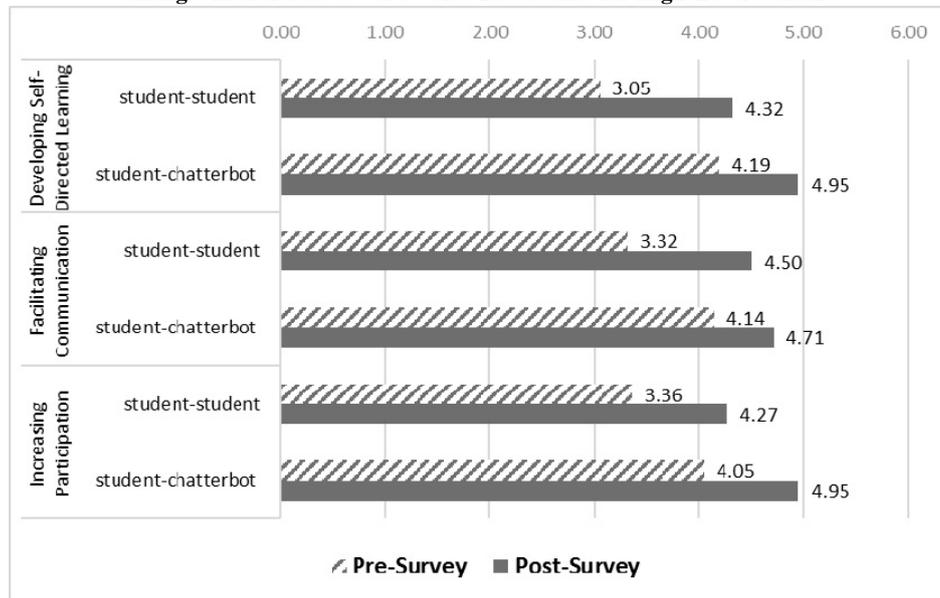**Changes in Attitudes toward Voice-Based Chat for Low-Level Students**

FIGURE 2

**Changes in Attitudes toward Voice-Based Chat for Medium-Level Students**

FIGURE 3

Changes in Attitudes toward Voice-Based Chat for High-Level Students

In order to compare the participants' perceptions of student-student voice-based chat versus student-chatterbot voice-based chat, mean scores for the two experimental groups were examined. A close examination reveals that the participants' responses are positive in regard to all the technology-related items for both groups, with mean scores of around 4.00 (see Figure 4).

Overall, results indicate moderately positive satisfaction for the two different types of voice-based chat. It is noticeable that participants who engage in student-chatterbot voice-based chat group show more positive perceptions of voice-based chat except in regard to one item: facilitating communication for low-level students. These findings indicate that the participants in the student-chatterbot voice-based chat group express more satisfaction than those in the student-student voice-based chat group. An analysis of the survey results reveal that most participants prefer student-chatterbot voice-based chat to student-student voice-based chat, citing reasons including easier control to suit their personal liking and better flexibility with regards to schedule management. Previous studies also demonstrated that voice-based chat with chatterbots can be enjoyable, showing positive perceptions of voice-based chatterbots (Kim, 2016b; Roed, 2003).

Interestingly, medium- and high-level participants in the student-chatterbot voice-chat group show more positive reactions towards voice-based chat, as compared to low-level participants. In line with the current study, a number of previous studies have reported that

FIGURE 4

Group Comparison of Attitudes toward Voice-Based Chat
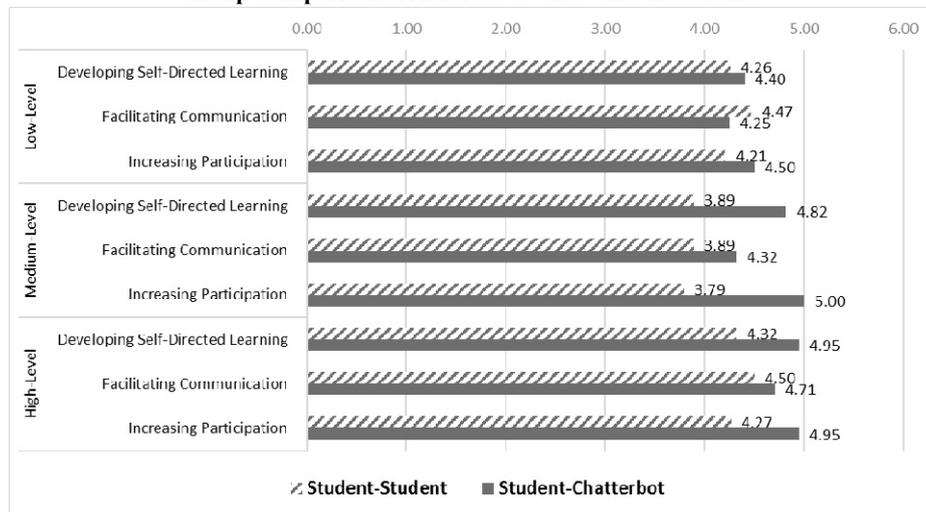
students of higher-level proficiency benefit more from voice-based chat (Kötter, 2001; Stockwell, 2004). Kötter (2001) notes that voice-based chat is more helpful to students of medium-level proficiency or above. Stockwell (2004) predicts that it can be better suited to higher-proficiency students because voice-based chat places a higher cognitive load on the student. Considering the fact that effective language teaching and learning rely heavily on students' perceptions and attitudes (Lieb, 2005), more research is needed to provide low-level students with more positive learning environments.

5. CONCLUSION

The purpose of this study was to explore the effects of two different types of voice-based chat on EFL students' negotiation of meaning and to examine their attitudes toward voice-based chat, all according to their proficiency levels. Important findings from this study are as follows. Firstly, there were statistically significant differences in the mean frequencies of negotiation moves between the first and the last chat for the student-chatterbot voice-based chat group. Low-level participants showed positive changes in the use of negotiation moves, indicating that they used less repetitions and more reformulations as a result of engaging in voice-based chat with chatterbots. Medium-level participants used more clarification requests over time, while students at high levels showed an increase in the frequency of confirmation checks. Findings of this study support

previous studies reporting that students of lower-level proficiency produce repetition strategies more often, while higher-level students use confirmation checks and clarification requests more frequently (Champakaew & Pencingkarn, 2014; Nakatani, 2005).

In terms of group comparisons in negotiation of meaning between the two types of voice-based chat, findings of the current study show that taking part in voice-based chat with chatterbots leads to more active negotiation of meaning. The results indicate that chatterbots play an important role as conversation partners in voice-based interaction using meaning negotiation strategies. As Swain (1997) points out, students are able to improve their language using three strategies: (a) comparing their own language production with the target language, (b) testing how the language works, and (c) reflecting and talking about the language and technologies that can provide these opportunities (Butler-Pascoe & Wiburg, 2003). Above all, voice-based chat resembles face-to-face conversation, and the benefits in oral proficiency also seem similar to those attained in face-to-face conversation, in that students are involved in the actual act of speaking (Levy & Stockwell, 2006). Considering the fact that meaning negotiation in conversational interaction is effective for improving students' speaking ability (Ko et al., 2003), the present study provides insight into how voice-based chatterbots can be effectively used to improve EFL students' language proficiency.

As for the participants' perceptions of voice-based chat, findings indicate that the experience of the two different types of voice-based chat resulted in more positive effects on their perceptions over time. Results of the current study support previous findings. Through voice-based chat, students are offered opportunities to communicate and learn collaboratively with other students worldwide (Shield & Weininger, 2004). Providing meaningful interactions, students may engage in authentic environments (Chun, 1994).

Furthermore, findings of the present study also shed light upon which type of voice-based chat helps Korean EFL students have more positive perceptions. An analysis of the survey results revealed that most participants preferred student-chatterbot voice-based chat over student-student voice-based chat. Regarding students' proficiency levels, medium- or above-level students reacted more positively towards voice-based chat than lower-level students. More research is needed to provide low-level students with opportunities which lead them to perceive learning a foreign language more positively, which can in turn lead to more successful language learning (Lieb, 2005).

Given the fact that little is known of voice-based chatterbots, and there is little comprehensive research related to voice-based chatterbots (Coniam, 2008; Westlund, 2015), the effects of voice-based chatterbot programs were proven through empirical evidence of the current study. These findings yield some practical and pedagogical implications for language instructors in EFL contexts. Accumulated pedagogical experience using the two different types of voice-based chat in EFL contexts indicates that

each chat condition presents both language teachers and students with different scenarios and different challenges depending on their own technological conventions and sociocultural circumstances. Particularly, language instructors should be aware of the technological limitations, given that chatterbots work using pre-determined topics and pre-stored phrases, influencing natural language processing (Stewart & File, 2007). Also, they associate more with traditional genres of written language, not using colloquialisms or incomplete sentences (Walker & White, 2013). Understanding these drawbacks of voice-based chat, language instructors should consider their different characteristics in order to most appropriately and productively employ the technology in their classes.

Although the present study was not designed to investigate the effects of proficiency differences within pair interaction, it is nonetheless recommended that they be examined in future research. Some previous studies report that there is little effect of the interlocutors' proficiency-level differences on conversational interaction (Davis, 2009; Watanabe & Swain, 2007). However, considering that the negotiation moves of the participants in the current study were found to be different depending on their proficiency levels, further research is necessary to better understand the effects of interlocutors' proficiency differences on students' negotiation of meaning when having a voice-based chat.

Whether different types of voice-based chat influence participants' English language learning had been previously examined by the current study's researcher (Kim, 2016a; Kim, 2016b). However, the present study took things one step further by investigating the effects of different types of oral interaction on Korean EFL students' negotiation of meaning. Given that negotiation of meaning in conversational interaction is a crucial factor improving foreign language learners' language proficiency (Ko et al., 2003), this study provides deeper insights into Korean EFL students' language learning.

REFERENCES

Barr, D., Leakey, J., & Ranchoux, A. (2005). Told like it is!: An evaluation of an integrated oral development project. *Language Learning & Technology, 9*(3), 55-78.

Bernstein, J., Najmi, A., & Ehsani, F. (1999). Subarashii: Encounters in Japanese spoken language education. *CALICO Journal, 16*(3), 361-384.

Blake, R. (2000). Computer mediated communication: A window on L2 Spanish interlanguage. *Language Learning & Technology, 4*(1), 120-136.

Butler-Pascoe, M. E., & Wiburg, K. (2003). *Technology and teaching English language learners*. New York, NY: Allyn & Bacon.

Champakaew, W., & Pencingkarn, W. (2014). The effectiveness of negotiation for

meaning strategies on EFL learners' oral proficiency development in two-way communication tasks. *The New English Teacher, 8*(1), 80-101.

Chang, C. W., Lee, J. H., Chao, P. Y., Wang, C. Y., & Chen, G. D. (2010). Exploring the possibility of using humanoid robots as instructional tools for teaching a second language in primary school. *Journal of Educational Technology & Society, 13*(2), 13-24.

Chapelle, C. (1997). CALL in the year 2000: Still in search of research paradigms? *Language Learning & Technology, 1*(1), 19-43.

Cheon, H. (2003). The viability of computer mediated communication in the Korean secondary EFL classroom. *Asian EFL Journal, 5*(1), 1738-1460.

Chiu, T. L., Liou, H. C., & Yeh, Y. (2007). A study of web-based oral activities enhanced by automatic speech recognition for EFL college learning. *Computer Assisted Language Learning, 20*(3), 209-234.

Chun, D. M. (1994). Using computer networking to facilitate the acquisition of interactive competence. *System, 22*(1), 17-31.

Coniam, D. (2008). Evaluating the language resources of chatbots for their potential in English as a second language. *ReCALL, 20*(1), 98-116.

Davis, L. (2009). The influence of interlocutor proficiency in a paired oral assessment. *Language Testing, 26*(3), 367-396.

Dingfang, S. (2006). Towards a new model of classroom instruction in foreign language teaching. *Foreign Language World, 4*, 3.

Ellis, R. (1997). *SLA research and language teaching.* Oxford, UK: Oxford University Press.

Ellis, R. (2003). *Task-based language learning and teaching.* Oxford, UK: Oxford University Press.

Field, A. P. (2000). *Discovering statistics using SPSS for Windows: Advanced techniques for the beginner.* London, UK: Sage.

Gass, S. M., & Mackey, A. (2006). Input, interaction and output: An overview. *AILA Review, 19*(1), 3-17.

Gutiérrez, D. G. (2005). Developing oral skills through communicative and interactive tasks. *Profile Issues in Teachers' Professional Development, 6,* 83-96.

Han, J.-I., & Kim, N.-Y. (2016). The effects of post-task CMC activities and task types on Korean EFL learners' oral performance. *STEM Journal, 17*(2), 109-135.

Hanson-Smith, E. (2000). *Technologically enhanced learning environments.* Alexandria, VA: TESOL.

Holland, M. V., Kaplan, J. D., & Sabol, M. A. (1999). Preliminary tests of language learning in a speech-interactive graphics microworld. *CALICO Journal, 16*(3), 339-359.

House, B., Malkin, J., & Bilmes, J. (2009). The VoiceBot: A voice controlled robot arm. In B. Lee & N. Henry (Eds.), *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 183-192). Boston, MA: ACM.

Jeong, N.-S. (2008). The effect of task type and group structure on meaning negotiation in synchronous CMC. *Multimedia-Assisted Language Learning, 11*(3), 9-28.

Jepson, K. (2005). Conversations – and negotiated interaction – in text and voice chat rooms. *Language Learning & Technology, 9*(3), 79-98.

Kern, R. G. (1995). Reconstructing classroom interaction with networked computers: Effects on quality and quantity of language production. *The Modern Language Journal, 79*(4), 457-476.

Kim, N.-Y. (2016a). *Effects of different voice-chat conditions on Korean EFL learners' speaking ability, oral interaction, and affective factors.* Unpublished doctoral dissertation, Ewha Womans University, Korea.

Kim, N.-Y. (2016b). Effects of voice chat on EFL learners' speaking ability according to proficiency levels. *Multimedia-Assisted Language Learning, 19*(4), 63-88.

Ko, J., Schallert, L., & Walters, K. (2003). Rethinking scaffolding: Examining negotiation of meaning in an ESL storytelling task. *TESOL Quarterly, 37*(2), 303-324.

Kory, J., & Breazeal, C. (2014). Storytelling with robots: Learning companions for preschool children's language development. In P. A. Vargas & R. Aylett (Eds.), *Proceedings of the 23rd International Symposium on Robot and Human Interactive Communication* (pp. 643-648). Edinburgh, UK: IEEE.

Kötter, M. (2001). Developing distance language learners' interactive competence: Can synchronous audio do the trick? *International Journal of Educational Telecommunications, 7*, 327-353.

Kramsch, C. (1986). From language proficiency to interactional competence. *The Modern Language Journal, 70*(4), 366-372.

Lee, L. (2001). Online interaction: Negotiation of meaning and strategies used among learners of Spanish. *ReCALL, 13*(2), 232-244.

Lee, S., Noh, H., Lee, J., Lee, K., Lee, G. G., Sagong, S., & Kim, M. (2011). On the effectiveness of robot-assisted language learning. *ReCALL, 23*(1), 25-58.

Levy, M., & Stockwell, G. (2006) Computer-mediated communication. In M. Levy & G. Stockwell (Eds.), *CALL dimensions* (pp. 84-109). Mahwah, NJ: L. Erlbaum.

Liao, C. W. (2010). *TOEIC listening and reading test scale anchoring study.* Princeton, NJ: Educational Testing Service.

Lieb, M. M. (2005). Popular music and its role in the EFL classroom. In D. E. Shaffer & J. Kimball (Eds.), *Proceedings of the Thirteenth Annual KOTESOL International Conference* (pp. 91-96). Seoul, Korea: Myeongjinsa.

Long, M. H. (1996). The role of the linguistic environment in second language acquisition.

Handbook of Second Language Acquisition, 2(2), 413-468.

Nakahama, Y., Tyler, A., & Lier, L. (2001). Negotiation of meaning in conversational and information gap activities: A comparative discourse analysis. *TESOL Quarterly, 35*(3), 377-405.

Nakatani, Y. (2005). The effects of awareness-raising training on oral communication strategy use. *The Modern Language Journal, 89*(1), 76-91.

Oliver, R. (2002). The patterns of negotiation for meaning in child interactions. *The Modern Language Journal, 86*(1), 97-111.

O'Rourke, B. (2005). Form-focused interaction in online tandem learning. *CALICO Journal, 22*(3), 433-466.

Pica, T. (1994). Research on negotiation: What does it reveal about second language learning conditions, processes, and outcomes? *Language Learning, 44*(3), 493-527.

Pica, T., Lincolin-Porter, F., Paninos, D., & Linnell, J. (1996). Language learners' interaction: How does it address the input, output, and feeback needs of L2 learners? *TESOL Quarterly, 30*(1), 59-81.

Roed, J. (2003). Language learner behaviour in a virtual environment. *Computer Assisted Language Learning, 16*(2), 155-172.

Rosell-Aguilar, F. (2005). Task design for audiographic conferencing: Promoting beginner oral interaction in distance language learning. *Computer Assisted Language Learning, 18*(5), 417-442.

Sauro, S. (2004). Cyberdiscursive tug-of-war: Learner repositioning in a multimodal CMC environment. *Working Papers in Educational Linguistics, 19*, 55-72.

Shield, L., & Weininger, M. J. (2004). Logfiles revisited: A qualitative analysis of online discourse as a tool for teachers. *TEL & CAL Magazine, 2*, 6-12.

Sotillo, S. M. (2000). Discourse functions and syntactic complexity in synchronous and asynchronous communication. *Language Learning & Technology, 4*(1), 82-119.

Stewart, I. A., & File, P. (2007). Let's chat: A conversational dialogue system for second language practice. *Computer Assisted Language Learning, 20*(2), 97-116.

Stockwell, G. (2004). Communication breakdown in asynchronous computer-mediated communication. *Australian Language and Literacy Matters, 1*(3), 7-31.

Storch, N. (2001). How collaborative is pair work? ESL tertiary students composing in pairs. *Language Teaching Research, 5*(1), 29-53.

Sun, Y. C., & Yang, F. Y. (2015). I help, therefore, I learn: Service learning on Web 2.0 in an EFL speaking class. *Computer Assisted Language Learning, 28*(3), 202-219.

Swain, M. (1997). Collaborative dialogue: Its contribution to second language learning. *Revista Canaria de Estudios Ingleses, 34*(1), 115-132.

Sykes, J. M. (2005). Synchronous CMC and pragmatic development: Effects of oral and written chat. *CALICO Journal, 22*(3), 399-431.

Tian, J., & Wang, Y. (2010). Taking language learning outside the classroom: learners' perspectives of eTandem learning via Skype. *Innovation in Language Learning and Teaching, 4*(3), 181-197.

Tsui, A. B. M. (2001). Classroom interaction. In R. Carter & D. Nunan (Eds.), *The Cambridge guide to teaching English to speakers of other languages* (pp. 120-125). Cambridge: Cambridge University Press.

Valette, R. M. (1977). *Modern language testing*. New York: Harcourt Brace.

Walker, A., & White, G. (2013). *Technology enhanced language learning: Connecting theory and practice.* Oxford: Oxford University Press.

Watanabe, Y., & Swain, M. (2007). Effects of proficiency differences and patterns of pair interaction on second language learning: Collaborative dialogue between adult ESL learners. *Language Teaching Research, 11*(2), 121-142.

Westlund, J. K. (2015). Telling stories with green the DragonBot: A showcase of children's interactions over two months. In L. Riek & F. Broz (Eds.), *Proceedings of the Tenth Annual ACM/IEEE International Conference on Human-Robot Interaction* (p. 263). Portland, OR: ACM.

Yi, B., & Sun, Z. (2013). An empirical study of the effectiveness of negotiation of meaning in L2 vocabulary acquisition of Chinese learners of English. *English Language Teaching, 6*(10), 120-131.

Zhao, Y. (2013). Recent developments in technology and language learning: A literature review and meta-analysis. *CALICO Journal, 21*(1), 7-27.

Applicable levels: Tertiary

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