Future English Learning: Chatbots and Artificial Intelligence*

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Advancements in robotic research have enabled robots to assist humans in many ways. Chatbots have been considered useful in many areas and research has increasingly focused on applying this technology to language education. The purpose of this study is to report on and review different types of intelligent chatbots in terms of language learning. The findings reveal that there are few chatbot programs that allow for direct interaction between chatbots and humans through voice recognition systems or texting for the purpose of learning foreign languages. Researchers have investigated the limited use of AI in education fields, including chatbot applications aimed at improving English teaching and learning. Based on their empirical studies, chatbots have proven to have some positive effects on students’ communication skills largely by their effect on expanding the quantity of their interactions, meaning negotiation, increasing their motivation, and on raising their interest in learning. Thus, this study proposes that chatbots can enrich language inputs and bring opportunities for language learners to raise communicative competence. More studies should be conducted to develop chatbots for learning foreign languages. Based on the findings of this study, suggestions for future research directions concerning chatbots in the realm of language education are presented, and further pedagogical implications are discussed.

**Key words**  AI, robots, chatbots, English speaking, mobile apps, EFL

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I. Chatbots for Language Learning

A chatbot, also known as a conversational bot or chatterbot, is a software system that can chat with a human user using a natural language such as English (Shawar & Atwell, 2007). Chatbots, as conversational agents, provide a natural language interface to their users. This

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natural language interface allows human-like interaction with any application that can simulate a conversation using artificial intelligence (AI). Chatbots offer a similar communication experience as one might experience communicating with a human user. Because their main aim is to mimic human conversations, chatbots imitate human speech patterns and convince users that they are talking to a real human while, in fact, they are talking to machines.

Chatbots have been developed for various uses. Some of them have been designed for entertainment, acting like virtual characters or entertainers. They can also imitate a game player as part of an interactive game. Others have been created to provide specific information or to provide direct dialogue for specific topics. Chatbots can serve as website guides, frequently asked questions (FAQ) guides, virtual sales agents, virtual support agents, survey takers, or quiz hosts. As their design has become more and more sophisticated, chatbots have been used in entertainment, commerce, and in the public sector (Kerly, Hall, & Bull, 2006). As a matter of fact, the rise in the use of chatbots has been witnessed everywhere around the world during recent years. Chatbots and AI are spreading rapidly, and sometimes eliminate jobs that otherwise require human-to-human interaction. In banking, for example, 70% of front-office jobs such as tellers, customer service representatives, loan interviewers, and clerks are expected to be dislocated by AI (Crosman, 2018). It is undeniable that chatbots/AI are becoming increasingly prevalent in our everyday lives as AI continues to make steady advancements and to take on prominent roles.

In the past few decades, there has been a great deal of interest and attention in technology-assisted language learning. It includes lessons and exercises for language learners to enhance their vocabulary, grammar, and the four language skills: listening, reading, speaking, and writing. Through technology, learners can also receive immediate feedback on their achievements as well as time to reflect on their language use.

In many different settings and environments such as in the English as a second language (ESL) and English as a foreign language (EFL) contexts, various technologies, including interactive websites, virtual environments, and synchronous chat have been developed and applied to provide assistance for language learners (Stockwell, 2007). Nevertheless, there is still a need to focus on practicing the language with a conversational partner (Kim, 2017), and there are few opportunities for learners to get this practice. Chatbots, however, can fill this need (Shawar, 2017).

While there are hundreds of uses for chatbots, their role as a language learning tutor or facilitator has attracted interest. As Wang and Petrina (2013) argued, chatbots have shown tremendous potential, particularly for language learning. They have enabled learners to practice
a language in a conversational manner anytime and anywhere by taking on the role of an on-demand conversation partner (Kim, 2017). Chatbots are distinguished from other types of technology by the fact that they try to simulate an intelligent conversation with human users via text or audio. According to Kerly et al. (2006), language learners can take advantage of these intelligent conversational agents with complex and goal-driven behavior. Many scholars have also argued that chatbots can bring better results for language learners (Shawar, 2017). They can even recreate the learner-teacher bond by providing learners with a character that never gets bored or loses patience with them (Wang & Petrina, 2013). Furthermore, chatbots are opening up new possibilities for foreign language learning, giving especially EFL learners opportunities to practice and learn their English through conversation. There is clearly reason to believe that this may be an effective way to learn a language.

However, chatbots still have limitations. Most knowledge bases are manually inserted into chatbots which will only be able to limitedly readapt to different topics or languages. Moreover, the responses of most chatbots are redundant, predictable, and lacking in personality (Chantarotwong, 2006). Shawar (2017) pointed out that chatbots are restricted to the knowledge base that is hand-coded into their AI and this can be an obstacle in their use as agents for teaching a language. Furthermore, chatbot technology is still under development and has not yet been widely applied (Wang & Petrina, 2013). In addition, according to Kim (2017), they are least understood in relation to their efficacy in EFL environments. In this vein, it is worth studying the chatbots for EFL learning. The current study, therefore, aims to report on different types of AI chatbots and their reviews regarding language learning.

II. Different Types of Intelligent Chatbots

Chatbots began with a program named ELIZA in the early 1960s. As a computer program, it was designed to interact with human users typing in English (Weizenbaum, 1966). According to Shah, Warwick, Vallverdú, and Wu (2016), ELIZA is able to facilitate communication and enable authentic interaction between human and machine via text-based input and output. Giving the appearance of understanding, it can mimic human conversations. With keyword matching techniques, this chatbot can respond to human users’ input at a natural speed. However, it relies on programmed responses and only seizes the keywords in the input, not the semantics and syntax of the whole input. This mechanism cannot avoid discrepancies between the infinite variability and exactness of input patterns. Furthermore, since the software program
is not able to hold the memory of the conversation, ELIZA has no contextual understanding of the conversation taking place.

After ELIZA, many more chatbots were developed with the internet. The exponential growth in text and natural language interfaces enabled anyone to talk to them online and encouraged the creation of more chatbots (Fryer & Carpenter, 2006). Jabberwacky was implemented by British programmer Rollo Carpenter to emulate natural human chat in an entertaining, interesting, and humorous manner. Operated entirely through user interaction, the program was developed on the principle that it would learn from all previous conversations with human users. There are no fixed, hard-coded rules programmed into the system. Unlike ELIZA, it stores everything that has been said and uses contextual pattern matching techniques. Although Jabberwacky relies entirely on previous conversations, it selects appropriate and corresponding responses (Shawar & Atwell, 2007).

ALICE is one of the largest free open-source chatbots on the internet (Wang & Petrina, 2013). Created by Richard Wallace in the 1990s, ALICE uses an AI markup language (AIML), made up of units such as topics and categories, and stores its knowledge of conversation patterns in AIML files. The topic means an optional top-level element. It contains a name attribute and includes a set of categories associated with that topic. As a basic unit of knowledge, each category consists of a pattern containing not only words or sentences provided but also a template for matching to find the best response to the input. Atomic, default, and recursive categories refer to a rule for matching and converting the input to output. Kerly et al. (2006) reported that ALICE is viable and experienced, but Fryer and Carpenter (2006) warned of its value as a learning tool. Though factual, it rarely produces human-like responses and needs more language abilities.

Cleverbot is also an AI meant to simulate human-like conversation (See Figure 1). Developed by Rollo Carpenter, this chatbot has a successful artificial dialogue system, according to Shah et al. (2016). Acting like a human interlocutor, Cleverbot learns from real people and has no trouble responding appropriately (Torrey, Johnson, Sondergard, Ponce, & Desmond, 2016). As one of the popular chatbot programs (Daniels, 2015), it has a set of 200 questions. When texted input is sent to the chatbot, the chatbot parses the given texts, compares them to the possible replies, then sends back a text reply. The entire process flows automatically so it seems like one is talking to a human interlocutor. In her study, Kim (2017) claimed that students’ writing performance can improve via interactions with Cleverbot. That is, text with this chatbot can be beneficial for English writing.
One of the key features of Cleverbot is that it puts the flow of the whole conversation above that of individual responses. Since it looks at the whole conversation, small textual clues are put together to give the best possible answer. However, it learns only from the people it chats with and acquires their illogical or nonsensical patterns of thought. This is expressed in future exchanges with other individuals, coming up with a response from the last encounter.

Another widely used chatbot is called Elbot (See Figure 2), the winner of the Loebner Prize.
2008 Artificial Intelligence Contest (Shah et al., 2016) for its successes in human-machine interaction. According to Floridi, Taddeo, and Turilli (2009), Elbot deserved the prize given that interrogators were convinced that it was a human. Developed by Fred Roberts, this chatbot uses natural language interaction (NLI) to converse with its users about many different topics, rather than just offering up a self-contained and specialized set of FAQs. Moreover, Elbot took on the challenging task of being conversant on a variety of topics. However, Shah et al. (2016) noted that it still remains machinelike with robotic themes.

In terms of chatbots, Talk to Eve (See Figure 3) is another virtual agent that attempts to create a humanlike conversational character. Its conversational skills, including its humanlike behavior, are simulated through AI. Eve can be a simple conversation partner responding in a clear voice with advanced voice recognition. Its users can have a real live conversation as it will remember a lot of details it has been taught. However, it is hard to have a deep conversation on one subject with Eve. Another limitation of this chatbot is its inability to understand multiple sentences at once. Furthermore, as it is meant for idle conversation, it cannot give meaningful advice or provide factually correct answers from time to time. Nevertheless, Eve is actually intelligent. It remembers what users have said, and answers back when appropriate.

Replika is an AI chatbot application that tries to become the user's best friend by having a conversation via SMS messages (Figure 4). It learns from its users, and through interaction with its users, its personality actually becomes more similar to that of its users.
Users can connect their social media accounts such as Facebook or Instagram so that Replika can understand them better. It is thus easy for them to share their thoughts, feelings, and experiences with this chatbot. Nonetheless, it often cannot understand what its users have said and fails to answer like a real human (Hsu, 2018). Sometimes, this chatbot forgets the questions users asked and moves on to a completely different topic.
Lyra is an AI-personal assistant (Figure 5). Users can talk to Lyra as if they are talking to a human and can continue the same intelligent conversation across multiple online devices. Lyra might even give its personal opinion. In addition, as a personal assistant, it can manage the user’s schedule, save notes and reminders, and set alarms. Lyra can also translate words and phrases over 70 other languages instantly, find local restaurants, open maps and give directions, and provide general knowledge through Google or other search engines. For entertainment, it can even play YouTube videos and tell jokes. In spite of all these advantages, Lyra is limited in saving the conversation when the application is closed. It also lacks background knowledge and sometimes cannot provide corresponding answers. In addition, due to its lack of understanding, Lyra often avoids answering the question by passing it on to the Google search engine so that Google can give the search result.

Andy English Bot is known as a virtual English tutor. This chatbot can help its users to learn and practice English. It allows its users to chat, study new words, learn grammar, and play language games (see Figure 6). Particularly, users can study English by actually using it in a conversation. By practicing real-life conversations with Andy, they can have casual day-to-day interactions such as greeting and chatting about the weather. It is also possible to learn how to ask and answer questions.

Since this chatbot can imitate discussions, users can discuss various topics like movies, hobbies, travel, art, and jokes with Andy. After several interactions, they can play games and do
language exercises. However, there are some issues that Andy needs to overcome. It fails to remember and save previous conversations. Sometimes, Andy talks too fast to understand and respond. Moreover, it still lacks enough expressions.

As seen in Figure 7, Pocket Friend is a virtual pet. This can be an animal companion with a powerful artificial intelligence providing four different artificial intelligence settings. With an easy user interface, its users can have a chat with their animal friend, taking care of him by feeding him, cleaning him, and playing with him. Although Pocket Friend allows its users to have a friendly conversation, it frequently uses the same expressions that are not related to the topic and fails to remember its users' information and conversations. Additionally, it is not easy for Pocket Friend to respond to a series of questions. There are few studies exploring the effects of this chatbot for language learning. Thus, it is worth studying.

Mondly is another well-known language learning app (See Figure 8). It offers a more in-depth language learning experience with a chatbot that lets users practice languages. Like other apps, it uses word repetition and flashcards as a learning method. The Mondly chatbot supports users in 33 languages, allows them to memorize words and sentences in previous conversations, and helps learners' pronunciation by exposing them to conversations between native speakers. With everyday scenarios such as ordering food in a restaurant, users can understand the nature of the language. Mondly also features language lessons with a virtual teacher that has the ability to carry human-like conversations with users, giving instant feedback
Duolingo is one of the most popular language learning chatbot platforms. This app aims at improving general language skills with games and other fun activities. It also allows users to practice speaking with chatbots. This chatbot can understand the user context, and allow it to respond with contextually unique answers. Virtual language instructors help users to learn a new language comfortably without the embarrassment of miscommunication with native speakers. This chatbot discusses topics in more than 23 different languages. Duolingo uses gamification strategies to motivate learners to continue.

Overall, while there are many chatbots apps that are similar in some ways, some chatbot apps are better than others in enhancing and encouraging users to learn, talk, and communicate. Additionally, chatbots can help users perform different tasks. The current study analyzed chatbots with characteristics that might support language learning. Based on select criteria (Mittal, Agrawal, Chouksey, Shriwas, & Agrawal, 2016, p. 1056), each chatbot app was rated on factors such as the ability to understand complex user inputs, taking turns, recalling the name of users, multi-language support, voice input and output, text input and output, access to the conversation history, ability to answer unfamiliar questions, and surmounting typos. The nine characteristics of chatbots are presented in Table 1.
(TABLE 1) Chatbots for Language Learning

<table>
<thead>
<tr>
<th></th>
<th>Ability to understand complex user input</th>
<th>Taking turn</th>
<th>Recalling the name of the user</th>
<th>Multi-language support</th>
<th>Voice input and output</th>
<th>Text input and output</th>
<th>Access to conversation history</th>
<th>Ability to answer unfamiliar questions</th>
<th>Surmounting typos</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALICE</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>ELIZA</td>
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<td>−</td>
<td>+</td>
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<tr>
<td>Cleverbot</td>
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<tr>
<td>Elbot</td>
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<tr>
<td>Talk to Eve</td>
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<tr>
<td>Replika</td>
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<td>Lyra</td>
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<tr>
<td>Andy</td>
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<td>Poket Friend</td>
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<tr>
<td>Mondly</td>
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<tr>
<td>Duolingo</td>
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</tr>
</tbody>
</table>

Note: (+) The chatbot has its feature; (-) The chatbot does not have its feature.

As shown in Table 1, each chatbot has a different mix of functions. Chatbots can provide opportunities to use target languages but have limitations in language learning due to such things as their inability to provide appropriate feedback (See Table 1). However, as Chatbots offer some potential as a promising tool for language learning, they can support learning activities for students and expand learning experiences. In short, AI apps give students greater interactivity and more opportunities to use foreign languages.

III. Previous Studies of Educational Robots/Chatbots

From the viewpoint of language teaching, teachers give lectures, and students listen to
lectures in a traditional class. These days, however, student-centered classrooms make a better learning environment and offer more effective ways to teach and learn. In most classes, successful learning occurs when teachers play a role primarily as facilitators or activators of learning. Instead of giving formulaic lectures, teachers can provide engaging learning experiences for students to increase motivation and interests. In this regard, chatbots might assume the role of facilitator instead of teachers. Furthermore, according to Jia and Ruan (2008), robots could allow students to have stronger motivation and to operate in more comfortable environments which are beneficial for language learning. The efficiency of using chatbots to support learning would be increased if the common drawbacks were eliminated, such as the difficulty to customize and the difficulty of interaction.

To illustrate the findings of previous studies, the research was categorized into three different sections. Each section contains a table with the main topics and the researchers for each study. First, there were some studies regarding educational robots. Second, research about English learning using chatbots was presented and, lastly, studies on AI were discussed.

(Table 2) Educational Robots/Chatbots

<table>
<thead>
<tr>
<th>Researchers</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chang et al. (2010)</td>
<td>Using humanoid robots as educational means for teaching a second language in elementary school</td>
</tr>
<tr>
<td>Wang, Y. F., &amp; Petrina. S. (2013)</td>
<td>Understanding a chabot Lucy, learning analytics, instructional design process</td>
</tr>
<tr>
<td>Lee et al. (2014)</td>
<td>POMY: POSTECH Immersive English study with haptic feedback</td>
</tr>
<tr>
<td>In, J., &amp; Han, J. (2016)</td>
<td>Prosodic changes for elementary students using robots, RALL (Robot-assisted Language Learning), ROBOSEM (educational service robot)</td>
</tr>
</tbody>
</table>

As shown in Table 2, previous research has investigated aspects of educational robots. Fryer and Carpenter (2006) investigated the role of chatbots in language learning and introduced a short history of chatbots while noting six practical ways chatbots can enhance language learning for students: 1) Students seem to feel more comfortable talking to bots than to people; 2) Unlimited repetition can be possible with bots; 3) It's possible for students to practice listening and reading with bots; 4) Bots are interesting; 5) Students can have chances to study words and different expressions with bots; 6) Bots can provide immediate feedback for grammar and
spelling mistakes effectively. For teachers, chatbots can be useful for free speaking, review, self-evaluation, monitoring students’ progress, and listening practice. Therefore, chatbots should be designed to adjust to the different levels of learners so that learning languages through chatbots could be both facilitating and interactive.

Chang, Lee, Chao, Wang, and Chen (2010) investigated the possibility of using robots in the language classroom. Reviewing previous studies, they analyzed the characteristics of robots and instructional media such as repeatability, flexibility, digital data representation, humanoid appearance, body movement, and interaction, which could provide us with the potential of using robots in language teaching environments. According to class observation and teachers’ interviews, the study concluded that robots may serve as an interactive interlocutor for teachers and students, and it can be possible for teachers and students to design their own materials. Wang and Petrina (2013) examined how student-produced data can be used to explain an intelligent language tutor, Lucy, to facilitate English language learning. Lucy was designed to help learners study Lucy’s embedded grammar and vocabulary. Several advantages were revealed when interacting with Lucy: repetition, matching ability for appropriate responses, and adequate feedback for learners. However, there were also some limitations such as Lucy’s lack of cultural knowledge embedded in the context and the lack of continuous feedback that can fulfill the needs of specific learners. Consequently, this study concluded that Lucy can provide learners with great opportunities to experience human-like communication which can lead to better learning performances for language learners.

Some researchers have investigated aspects of human-robot interaction. Lee et al. (2014) developed a system called POMY (POSTECH Immersive English Study) that aimed to help students study English while talking to characters generated by computers. To prove that this system was effective, elementary school students participated using the haptic feedback system embedded in POMY and also using POMY with no haptic system. Findings illustrated that the students were satisfied using the system. Moreover, two different types of haptic feedback were used to understand the learning content and to make students concentrated on studying. This system suggested the possibility of integrating the technology of a spoken dialog system with English language learning.

In line with the aforementioned study, In and Han (2016) developed ROBOSEM (an educational service robot) with a Text To Speech (TTS) engine to enhance learners’ accents and speaking rates. It specifically examined whether there were accent changes for learners using the robot’s TTS system. The results showed that there were no changes and that there was a decrease in terms of learners’ F0 ranges after the robot TTS speaking activity. F0 range refers to
“a prosodic variable that shows the changes in stress within a sentence” (p. 325). To speak English naturally, it is important to widen the F0 range to the native speakers’ level. In short, the results indicated that this ROBOSEM was more effective for the rate of speaking improvement compared with natural accent improvement.

<table>
<thead>
<tr>
<th>Researcher (year)</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerly et al. (2006)</td>
<td>Chatbots, open learner modelling, intelligent tutoring systems for negotiation facilities</td>
</tr>
<tr>
<td>Jia &amp; Ruan (2008)</td>
<td>Use chatbot CSIEC to facilitate English learning</td>
</tr>
<tr>
<td>Lee &amp; Han (2009)</td>
<td>Development of a robot for elementary English education, digital media storytelling, contents for robots</td>
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<tr>
<td>Ban et al. (2010)</td>
<td>Effects and affective factors using telepresence type robots in English skills (speaking, listening, reading)</td>
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<tr>
<td>Yoo (2010)</td>
<td>Perception of robot-based instruction</td>
</tr>
<tr>
<td>Lee et al. (2013)</td>
<td>Effects of using an educational robot on interactional aspects in group-based communicative activities.</td>
</tr>
</tbody>
</table>

Previous research shown in Table 3 investigated whether robots or chatbots could improve language learning in several ways, including facilitating communication, encouraging interaction and meaning negotiation, promoting engagement with in-class activities, enhancing student motivation, and improving their English communicative competence (Jia & Ruan, 2008; Lee et al., 2013). Moreover, a few studies have been conducted to investigate the effects of using chatbots in a language classroom. Jia and Ruan (2008) investigated the integration of CSIEC’s (Computer Simulation in Educational Communication) multiple functions into the English syllabus design in a middle school. CSIEC is an intelligent web-based human-computer dialogue system with natural language and a learning assessment system for learners and teachers. This consists of grammar gap-filling exercises, and chatting with robots on a given topic. Middle school students were in the computer-equipped room with Internet access performing gap-filling exercises with the computer which was embedded with interactive
dialogs from the textbook. These exercises could also be accessed outside of school if they had access to the Internet. The results of the pre and the post exam indicated a great improvement in students’ performance in speaking and students reacted positively toward this CSIEC system.

Other studies investigated the effects of using an educational robot on the interactional aspects of communicative activities with 24 elementary students. The results showed that robots could positively influence students' interaction and meaning negotiation, thus improving their English communicative competence (Lee et al., 2013). Also, Shim et al. (2012) explored whether an educational robot can be used as a tool to evaluate students' speaking proficiency in order to get over difficulties of speaking assessment. The findings indicated that students' speaking ability in terms of fluency and task completion statistically improved. Also, their perspectives on interacting with robots were positive. The study confirmed the importance of utilizing robots in the classroom if combined with support from teachers and administrators. Furthermore, the robot-assisted assessment could utilize more high-technologies such as voice recognition for human-robot-interaction, text-to-speech (TTS) or speech-to-text (STT).

More studies examined student perceptions such as learning involvement, enjoyment, motivation, confidence, and interest in using robots in English classes (Ban et al., 2010; Bii et al., 2013; Yoo, 2010; You et al., 2006). Ban et. al. (2010) introduced Telepresence robots that helped students interact and communicate in English. The findings revealed that listening and reading were not improved in any statistically effective manner, whereas there was an improvement in speaking. Students were satisfied with their English classes using robots. Confidence and motivation were enhanced. There were several suggestions which should be implemented for a more effective language atmosphere: maximize the useful functions of robots, develop appropriate content given the limitations of robots, and support technical difficulties.

Lee and Han (2009) also shed light on how a robot can be adapted to meet the needs of those who want English education in areas where private English education is otherwise not possible. Researchers developed English learning content for robots, prompting great interest from elementary students who were interested in learning English. They eagerly participated in the learning exercises, raising the confidence of some English learners. Learning from English robots can additionally provide added incentives to promote interaction among learners. Utilizing robots can further replace other forms of multimedia to better enhance communicative competence.

In the study of You et al. (2006), they explored how to use a robot in an English learning classroom taking on the role of teacher. The researchers developed structured human-robot
interactions with five models. In Storytelling mode, the robot tells a short story taking different roles and changing the voices featured in the story. In Q & A mode, students can ask the robot questions while in Cheerleader mode, the robot provides competitive activities to enhance student enjoyment. In Let's Act mode, the robot orders students to do something. In Pronunciation Leading mode, students repeat as the robot speaks words at different rates and in different voices. Most students in the study displayed positive attitudes and showed great interest in robot-assisted English learning. Yoo (2010) further analyzed elementary school students' and teachers’ perceptions of robot-based instruction. Based on that survey with 195 teachers and 1,315 students, 46% of the students responded that it was necessary while almost 70% of the teachers expressed negative reactions in terms of using robots in the classroom. With regard to motivation, the mean scores of the students were higher than those of the teachers. One of the reasons for the teachers’ negative perception of using robots was because they did not have enough experience using robots in their classes; thus, they did not understand the educational functions of using robots. Therefore, the overall findings indicate that before applying robot-based instruction on different subjects in elementary schools, certain variables should be considered, such as the implementation of adequate training and in the various uses of robots in specific situations.

Bii et al. (2013) explored students’ attitudes concerning the use of a chatbot named Knowie. All 30 students responded to 19 items (close-ended) and one open-ended question in the questionnaire. Several suggestions were proposed to improve the use of chatbots. Students went through training sessions then interacted with chatbots for an hour per session once a week for eight weeks. Students talked about the topics taught during the class periods. The results of the survey indicated that, with an average score of 4.12, students displayed a positive attitude toward the use of chatbots. The implication of this study was to demonstrate that chatbots could be utilized for various types of Q&A sessions in that they were able to respond to most of the questions based on a given topic. Kerly et al. (2006) also established that interacting with robots can be both motivating and fun for learners. Specifically, they showed that while interacting with robots, students were motivated to learn, enjoyed the interaction with chatbots and could complete the negotiation tasks. They introduced chatbots and Intelligent Tutoring Systems to investigate the benefits of natural language interaction with the negotiation of the open learner model using a Wizard-of-Oz paradigm. The findings implied that if there is an enhancement for dealing with technical difficulties, chatbots can support negotiation facilities for learners.

Robots can further provide immediate feedback so that students can practice their speaking
and listening skills in a comfortable atmosphere while teachers can help students to review and monitor students’ progress. Furthermore, learning a language using chatbots could facilitate communicative competence by providing students with virtually unlimited interactivity not reliant on human partner (Ban et al., 2010; Jia & Ruan, 2008; Lee & Han, 2009; Lee et al., 2013).

TABLE 4) Studies on Artificial Intelligence

<table>
<thead>
<tr>
<th>Researcher (year)</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Song (2017)</td>
<td>Relationship between AI robots and humans</td>
</tr>
<tr>
<td>Park &amp; Shin (2017)</td>
<td>Attitudes towards AI instructors, AI technology, and as an assistant learning tool by elementary, secondary, high school students</td>
</tr>
<tr>
<td>Lim et al. (2018)</td>
<td>Lip recognition, developing English pronunciation program</td>
</tr>
<tr>
<td>Lee (2019)</td>
<td>A developmental plan for an English conversation learning system through the application of a talking robot based on artificial intelligence</td>
</tr>
</tbody>
</table>

AI technology is becoming increasingly popular taking on roles such as information recommender, personal assistant, news presenter, etc. In the education field, a few studies have been conducted and are presented in Table 4. Song (2017) investigated the relationship between AI robots and humans, noting the characteristics of AI systems. However, given that there are many definitions of “AI”, it remains difficult to pinpoint one universally acceptable conception of AI. As AI systems develop, the boundary between robots and their AI systems remains ambiguous, leading to ethical issues related to personification and autonomy. The author further noted some of the possibilities and potential of AI vis-a-vis humans. Thus, humans should design AI for specific roles and decide precisely how they will best fulfill humans’ needs.

Concerning English language learning with AI technology, Park and Shin (2017) investigated students’ perspectives on using AI and interacting with AI teachers. There were 752 students’ surveys analyzed for findings and implications. The first implication was that elementary school students favored using AI technology while those in middle and high school did not. In other words, their opinions diverged depending on their views of AI technology. Regarding the second implication, some systems (such as a tutoring system) can be applied to both students’ learning and to teachers’ instruction. AI should thus be applied to target a more specific learning application appropriate to the needs of learners, and to concentrate on more structured learning content. The final implication was that the role of learning and teaching should be divided between the AI instructors and the teachers.
Lim et al. (2018) developed an AI face recognition program based on “facial landmarks” to improve English pronunciation. First, the study introduced a method to detect “facial landmarks.” Then, it explained how these landmarks could be used and applied to a program called ESC (Easy Simple Coaching). This program is for adults who passed the critical period and it can help them to pronounce words like Americans. In other words, using this program can maximize their English pronunciation to enhance their English learning.

Lee (2019) noted that few English learning programs that consist of interactions between chatbots and human learners have been developed. Thus, he proposed three design patterns: a system-directed program forming a placement test, dialog practice, evaluation, and feedback process; a learner-directed program consisting of six components including a diagnostic test, selection of themes and situations, conversation based on a scenario, a free conversation, and a helper to provide feedback; and a platform application comprising an Internet search engine, free conversation, and a helper to provide feedback. The study intended to introduce content development for language learning that can be developed realistically considering the problems of existing chatbots.

Kim, Shin, Yang, and Lee (2019) investigated the possibility of using artificial intelligence chatbots in the English curriculum, using two AI chatbots: Alexa and Google assistant. The participants in the study exchanged small talk, asked for information, and solved problems via the AIs. Data was collected to investigate the difficulty of vocabulary use, and the adequacy and quality of the conversation with the chatbot. The results revealed that both chatbots showed a high success rate of carrying out the tasks, and provided adequate interactions. In addition, they used vocabulary at the recommended vocabulary level in the English curriculum. They reported that the Google assistant was more user-friendly and easier to comprehend than Alexa. It was concluded that chatbots should be integrated into English class curricula and developed as learning tools.

As indicated by previous studies, AI chatbot learning approaches are increasingly being integrated into language teaching and learning because such technologies can increase students’ opportunities for practice, and encourage more positive attitudes toward learning a foreign language. Therefore, integrating chatbots and developing educational AI chatbots as a learning tool are vital to the future learning environment.
IV. CONCLUSION & IMPLICATIONS

The present study discussed how chatbots can be variably utilized for language learning where different types of AI chatbots were assessed in terms of their main characteristics and limitations. The previous literature analyzing the use of chatbots in the English language environment and other areas has thus been updated. Based on the contents of this study, two pedagogical implications are suggested.

First, language instructors should be able to select appropriate chatbots for their learners in their teaching environment. Given that there are many different types of chatbots, instructors should have knowledge of the different characteristics of the various chatbots and select the most efficient types for meeting their pedagogical goals. Unless instructors understand their learners’ language learning styles and needs as well as the key features of chatbots, it would not be beneficial to simply introduce such technology.

For example, in order to provide learners with voice chat experience on different topics, Elbot and Cleverbot could be used. In the case of ELIZA and ALICE, the instructors can make use of these chatbots to provide their students with opportunities to check their grammatical errors and incorrect use of words allowing them to further identify and correct these errors. Andy and Mondly can be recommended for those who want to practice more complex sentences given that they can correctly interpret the meaning of a sentence and reply with an appropriate answer because they are capable of understanding complex user inputs.

Another implication to be addressed is relates to the limitations of chatbots. Although chatbots are conducive to language learning, they often do not understand the users’ language, lack content to deal with various topics, and limit the duration of interaction. For example, Replika often cannot understand what its user has said and forgets the questions the user has asked and just moves on to a completely different topic. It is difficult for Talk to Eve to understand multiple sentences at once. Lyra, for its part, lacks sufficient background knowledge and cannot provide corresponding answers to its users. In the case of ELIZA, this chatbot does not save the conversation when the application is closed and cannot remember the conversation.

Therefore, language instructors should be aware of the limitations of chatbots as well as their advantages to build up learners’ language development. Particularly, the abovementioned limitations should be carefully considered to ensure their efficient use by learners. Regarding the previous research, there have been some studies on educational robots, chatbots for English learning, and artificial intelligence. Although previous studies have shown its positive
effects on language learning by providing students with enriched inputs and opportunities to practice, more educational studies on AI chatbot should be explored. There remain too few AI studies aimed at maximizing the facilitating functions of AI English language learners and also to minimize its constraints. Particularly, the effects of the use of AI chatbots on EFL teaching and learning should be investigated in various aspects including the four fundamental language skills: listening, reading, speaking, and writing.

REFERENCES


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