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Boosting Students' ESP Vocabulary by Utilizing AI Chatbot

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Abstract. Technology integration in foreign language learning is a must today. One of the issues is the utilization of artificial intelligence (AI) Chatbot in English language teaching. Some studies have mentioned the benefits and advantages of using AI Chatbot. Nonetheless, none of the studies examines deeply on hoe ESP vocabulary. To fill the gaps, this study examines the effect of AI Chatbot especially Dialogflow enhanced the ESP vocabulary acquisition. The experimental comparison of two groups—an experience group and a control group—is the backbone of this study in order to accomplish that purpose. Both groups underwent pre-tests and post-tests to assess the effectiveness of utilizing AI chatbot in learning ESP vocabulary. The chatbot content was meticulously constructed to incorporate vocabulary features such as synonyms and concise explanations of word meanings. The study's findings revealed that utilizing chatbots significantly improves the acquisition of ESP vocabulary. It was found that students in the experimental group that used Dialogflow, a chatbot, performed better than students in the control group. To add, the study suggests that chatbots could be utilized in many situations to enhance language learning in general or in specific ESP courses. A chatbot provides a stimulating setting to facilitate positive interactions where the negotiation of meaning occurs explicitly, which appears to greatly benefit learners in advancing their second language lexical development.

Keywords: AI Chatbot, ESP, Vocabulary, English learning

Introduction

The amalgamation of technology and language learning has proven to be beneficial and is now an undeniable reality. Adult learners generally have limited time and rarely prioritize making time for learning (Mageira et al., 2022; Prastikawati et al., 2020; Rusmiyanto et al., 2023). Chatbots can aid students and are not restricted by human limitations like memory lapses and recollection. Conversational learning technology, like as chatbots, can mimic a conversation

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with a colleague for learning and training purposes (Hoang et al., 2023). A training event should simulate a casual interaction with a colleague, being personable, concise, and entertaining. A chatbot is an AI computer that interacts with users through natural language and operates according to predetermined rules (Jung, 2019; Li, 2017).

Several studies have explored the use of chatbots in language teaching and learning. Nghi et al. (2019) mentions that Chatbots can assist students in learning by providing courses that cater to the individual language proficiency of the participants, offering flexibility in the learning process. Developing an AI chatbot necessitates a high level of expertise and IT knowledge due to its scale and intricacy. In the same vein, Chien et al. (2022) also investigated the utilization of LINE Chatbot in language learning. The study reveals that The LINE ChatBot contextual learning environment somewhat improved the performance of both groups of students, but no significant changes were seen. Extrinsic motivation in both the experimental and control group increased when they spoke anonymously. The LINE ChatBot's contextual learning environment dramatically enhanced trainees' English speaking and listening skills. Moreover, the study demonstrated that incorporating a competitive aspect significantly boosted the students' innate drive to learn English using the LINE ChatBot. Moreover, Jeon (2024) tried to capture the learner's perspective on the use of AI Chatbot for English learning. In his study he proves that AI-powered chatbots can serve as valuable learning aids to encourage interactive communication in a certain language. Many future elementary school teachers recognize that AI chatbots can be beneficial as educational tools for both educators and kids. A guided approach is essential when incorporating different learner data into chatbot technology, including learner evaluation and diagnosis, to ensure a tailored discussion suitable for the learner's level and characteristics.

In order to engage students in the learning process and create productive interactive environments for instructors and students alike, today's educational institutions are exploring new and innovative approaches. Exploring chatbots' potential as a helpful tool for student-teacher communication and learning support, several studies have examined their impact on English for Specific Purposes (ESP) learning in online classrooms (El Janati et al., 2020). In line with that, the current project intends to investigate how Dialog chatbots can be effective online platforms for assisting ESP learners in acquiring vocabulary.

AI Chatbot and Language Learning

An increase in the number of industries using AI has contributed to the meteoric rise of the information and communication technology sector. AI is a dynamic area that interacts with other prominent thriving topics like cognitive computing, deep learning, and machine learning (Rusmiyanto et al., 2023; Y.-C. Wang, 2015). According to Zhang (2022), a plethora of online resources, neural networks, and software programs have emerged alongside the development of AI. As a result, there is proof that AI systems are altering the way languages are taught and learned. Since AI has become an essential component of many domains, such as education and language learning, the diversity of literature on the topic is clear. For example, according to Delgado et al. (2020), AI is shorthand for computer programs that aid in emulating and re-creating human intellect, including learning and problem-solving. AI-powered conversational interfaces for extensive second

and foreign language acquisition. Moreover, artificial intelligence focuses on developing algorithms capable of performing tasks that a human could potentially do more effectively using their intelligence. Chheda & Tambawala (2023) and Nasution (2022) define AI as smart systems or intelligent agents capable of replicating human intelligence and making autonomous judgments, such as Google Assistant, Alexa, and Cortana. Language learners can gain advantages from various AI-created apps such as translation tools, conversational tools like chatbots, and helpers for automatic three-dimensional facial recognition (Y. F. Wang & Petrina, 2013). In a smart way, Haristiani (2019) defines a chatbot as an AI-based computer software capable of engaging in conversations through voice or text, with potential applications in language learning.

A chatbot is an artificial intelligence computer that can imitate human communication by responding to voice commands, text chats, or a mix of both. A chatbot, often known as a chatterbot, can be incorporated and used on almost any popular messaging network. A chatbot is a computer software application that simulates human communication using auditory or textual approaches to appear intelligent, as defined by (Y. F. Wang & Petrina, 2013). Chatbots are sophisticated tools that facilitate communication between individuals and robots using natural language processing. Experts in this area use the word "chatbots" to describe robotic actions. In other words, Chatbots are a specific type of robot built to engage in communication with human users over the Internet (Bini, 2018).

Point to English learning, a robust vocabulary is crucial for acquiring a language and for the cognitive processes of thinking, learning, and expressing ideas about the environment. In a second or foreign language in particular, expanding one's vocabulary opens up a world of new possibilities for discovery. One common method for learning new words is memorization, which is also known as rote learning (Yang & Dai, 2011). In the same vein, Word memorization, according to Chen et al. (2020), is highly dependent on the setting in which new words are learned. Moreover, Dialogflow is defined by Atif (2013) as a platform that facilitates the development and integration of conversational user interfaces into a range of systems and applications that aim to understand natural language.

English for Specific Purpose (ESP) and Technology Need

Technology's rapid digital advancement plays a significant and crucial part in ESP. It significantly aids in developing high-quality, immersive environments for constructing diverse ESP projects and designing customized curriculums. The necessity of English for particular contexts has resulted in the widespread adoption and significance of English for Specific Purposes (ESP) across various fields and settings. Numerous ESP initiatives have been developed based on needs assessment. Technology has enhanced ESP by offering educational content that focuses on building courses and giving actual real-life situations. Several studies have demonstrated the significant impact of Computer-Assisted Language Learning (CALL) technology on ESP education, particularly in teaching, planning, developing, and assisting ESP learners.

Technology and ESP incorporation proved fruitful, as demonstrated by Y.-C. Wang (2015). Dashtestani & Stojkovic (2016) suggested that ESP teachers should utilize various technologies in their courses to increase student involvement and interest in language acquisition. Technology in ESP education can create an engaging and interactive environment, enhancing learners' participation and

involvement, particularly when utilizing a Course Management System in the ESP field. Technology in current situations allows learners to become more independent and provides ample opportunities for interaction with both teachers and peers.

Prior to the aforementioned crucial need of AI Dialog Chatbot, this current study addresses the following research question: Does AI Dialog Chatbot impact the students' vocabulary in learning ESP?

Method

The current research was conducted in Semarang, Indonesia, at the Universitas PGRI Semarang. Undergraduates enrolled in the Science Department who also declared an interest in English were the subjects of this research. Participants enrolled in an English class as part of their program requirements. Their academic, professional, and specialized domains depend on their command of the English language, and this course set out to give them just that. All of the participants were Indonesian speakers. Then, one group used chatbots and the other used more conventional methods of instruction; the courses were randomly assigned to each. Twenty people took part in the study; twenty others served as controls. The first group was an experiment that used chatbot dialogue to teach the course for 16 weeks. The second group served as control group received conventional method. In this case, the control group were taught without chatbot. Both groups' members were equally proficient in English.

Both the experiment and control groups were given language knowledge pre-tests because this research is based on an experimental investigation. Each group had the same sample number of individuals (η=20). All of the research participants received the same amount of time and rigorous academic instruction. For both groups, student meetings occurred once weekly. The experimental group's members were instructed to utilize chatbots exclusively for classroom activities and duties, as well as for assignments completed outside of class. At the end, both groups were given follow-up examinations 16 weeks later to examine the impact of chatbot use.

Vocabulary tests were utilized as the means of data collection. The researchers developed the vocabulary test by consulting student textbooks. Participants' utilization of chatbots to acquire new Science English phrases was the intended focus of the test. An acceptable value for Cronbach's alpha was 0.80. Twenty items comprised the test. Although they were used in different situations in the post-test, identical terms were used in the pre-test. The participants were instructed to utilize a Chatbot for ESP vocabulary learning in order to select the correct answer. Each sentence that had the proper selection received one point. The test had a total of 20 points.

The participants confirmed their consistency in skill level by completing a pre-test before the trial began. After that, they split into two groups, one to engage in 16 sessions of testing and the other to serve as a control. During the initial session, participants in both groups completed the pretest. Furthermore, the experimental group participants utilizing chatbots were given information about the software's functionality. Following this, each group received instructions for a total of sixteen sessions. In the control group, people were instructed on how to use a chatbot. Throughout each session, participants were required to use chatbots for both in-class and outside-of-class tasks and activities. The traditional approach was

used to impart the same lesson to the control group. Even without the chatbot, the participants were given instructions on the same subject. The current session included a post-test to measure the benefit of the chatbot for practicing and testing ESP vocabulary. Two groups of participants were given the test.

Statistical Package for the Social Sciences, version 22, was used to analyse the data. Initially, descriptive statistics like standard deviation and mean were calculated for every group. To compare the two groups' performance, an independent-sample t-test was utilized. To examine the changes in learners' performance from the first test to the second, we used a paired-samples t-test.

Findings

The main objective of this study highlights the investigation of utilizing the chatbot had a notable impact on acquiring ESP vocabulary. For that reason, descriptive statistics were computed as the initial step in analyzing the data. Table 1 displays the results. In order to determine whether there was a significant difference between the two groups prior to the experiment, a t-test analysis of the pre-test was conducted. Table 1 explained the statistics result of the students' pre-test performance before the utilization of chatbot in their ESP learning.

Table 1 Descriptive Statistics of Pre-test Result

					Levene's test for equality of variances		**t-test for equality of means**				
Group	**N**	**Mean**	**SD**	**Std. Err. Mean**	**F**	**Sig**	**t**	**Df**	**Sig. 2-tailed**	**Mean Diff.**	**η2**
Exp. Group	20	9.02	3.655	0.8146	0.000	1.000	-0.221	38	0.836	-0.3001	0.032
Cont. Group	20	9.21	4.163	0.9026							

Table 1, the analysis showed that there was no significant difference in the level of the two groups (p= 0.812). moreover, the mean difference was 0.3001, indicating a small effect size of 0.032. To add, the mean and standard deviation of the participants' performance across postings indicated variation in the improvement of learning English due to the chatbot intervention. The results are displayed in Table 2.

Table 2 Descriptive Statistics of Post-test Result

					Levene's test for equality of variances		**t-test for equality of means**				
Group	**N**	**Mean**	**SD**	**Std. Err. Mean**	**F**	**Sig**	**t**	**Df**	**Sig. 2-tailed**	**Mean Diff.**	**η2**
Exp. Group	20	14.21	3.618	0.8225	0.000	1.000	2.94	38	0.006	3.108	0.419
Cont. Group	20	11.61	3.270	0.6481							

Table 2 shows that there was a statistically significant difference in mean scores between the experimental and control groups after receiving the treatment (t= 2.94, *p*= 0.0006, two-tailed).

Discussion

The purpose of this research was to examine how ESP vocabulary may be taught using a chatbot. Following the implementation of a chatbot to aid with English language acquisition, the results demonstrated that the experimental group outperformed the control group. The results of this study agree with those of other recent and older studies. A recent study by Bailey & Almusharraf (2021) looked into how well chatbots work for L2 learning. Researchers looked at how students felt about interacting with a digital storytelling chatbot and how the system was integrated. The results showed that story bots increased student engagement and helped them reach their second language learning goals. In addition, Heller et al. (2005) looked into how chatbots can improve efficiency, accessibility, learner motivation, and skill development in the classroom. The findings also revealed that the participants were enthusiastic and enhanced their learning due to the utilization of this Chatbot application as a means of practicing English at any time and location. a feature serves as a platform for storytelling, idea exchange, and even venting to an Artificial Robot. Indirectly, it can enhance pupils' English vocabulary. This chatbot application is an artificial intelligence program that is capable of comprehending and analysing user inquiries, and delivering suitable responses accordingly. The 'bot' has the ability to imitate human conversations using both text and speech on many platforms such as Facebook, WhatsApp, Twitter, and others.

Chatbot assistance has demonstrated that integrating digital software and applications can enhance comprehension of ESP vocabulary and language abilities, as well as improve ESP materials. Hamzah et al. (2021) emphasized the significance of integrating technology with English for Specific Purposes (ESP) to enhance course design and development. Chatbots helped students acquire ESP words and phrases, and they allowed teachers to access a wealth of digital and online resources to help their students become more proficient in their second language (L2) or ESP classes. Additionally, this research also elucidated that students have a preference for engaging in silent practice when reading conversational texts as they acquire English language abilities, with some opting to simply commit them to memory. Due to the prevalence of digital technology among today's learners, the manner in which students acquire knowledge has transitioned from traditional methods to digital ones, as technology has become an integral part of their literacy development. This novel viewpoint advocates for the utilization of technology in the acquisition of language, particularly in the context of English for specific purposes. A great number of research have demonstrated that the utilization of technology to improve ESP learning is effective. Wikis, for instance, have a positive effect on ESP instruction, leading to students' active participation in the acquisition of ESP patterns (Alvi et al., 2021; Sasabone et al., 2022).

In addition, blogs have proven to be effective and beneficial in learning ESP textbooks and enhancing ESP knowledge due to its communication features, such

as chatbots (Rebenko, 2021). Similarly, utilizing blogs proved beneficial in learning ESP, particularly in enhancing classroom communication skills and fostering autonomous learning among students (Vonog et al., 2022). A chatbot's potential as a useful supplementary tool for administrative and academic tasks, as well as for improving communication between faculty and students, has been demonstrated by an assessed process for its development (El Shazly, 2021). In conclusion, this study confirms the arrival of smart tools and software that use advanced AI technology. These are anticipated to transform learning, academic research, and internet applications like as chat GPT.

Conclusion

This present study has discussed the application of AI Chatbot in ESP vocabulary learning. Using ESP vocabulary in a technology context, namely a chatbot, had a significant impact on ESP learners. When comparing the two groups' performance on the ESP vocabulary test, the experimental group showed significant improvement in their ability to remember new words by the end of the course. This study proves beyond a reasonable doubt that using chatbots improves and facilitates the learning of ESP vocabulary. ESP teachers should utilize chatbot applications and other digital and remote technologies to teach ESP vocabulary and enhance student engagement in learning.

Chatbots provide numerous advantages for both language learners and educators. The study presents recommendations for enhancing language learning through the use of chatbots. Tasks involving interaction that require negotiation of meaning appear to significantly aid learners in advancing their second language lexical development. A chatbot creates a stimulating atmosphere to encourage such encounters. Based on the notion of noticing and attention, the study suggests that cognitive traits such as depth of processing and attention are critical for improving foreign language vocabulary learning through synchronous interaction tasks with chatbots. Additional research with an expanded sample size in EFL and ESL settings would be beneficial for emphasizing and evaluating the favourable educational effects of utilizing chatbots to improve vocabulary acquisition and English proficiency.

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