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Chatbots as Conversational Partners: Their Effectiveness in Facilitating Language Acquisition and Reducing Foreign Language Anxiety

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ABSTRACT
In language education, AI has become of great interest, especially for the improvement of learners' experience and the amelioration of existing difficulties. Among the most important problems encountered in learning a foreign language, there is language anxiety, since this factor hinders or stops learners from practicing and thus improve their language efficiently. The current study will dwell on the effectiveness of chatbots as conversational interlocutors in promoting SLA and reducing foreign language anxiety. More precisely, this study examines how chatbot-mediated interactions affect speaking fluency, vocabulary development, and the communicative competence of language learners. This was done through a quantitative approach applied to 320 language learners for 8 continuous weeks. The sample was measured for gains in language proficiency through quantitative data collected via pre- and post-language proficiency tests. The findings revealed that the participants realized an average gain of 22% in speaking proficiency test scores, with a 19% increase in vocabulary retention. Besides, 85% of the learners felt that communicative confidence had increased. Data analysis also indicated that language learning anxiety decreased significantly, with 78% of the participants reporting decreases in anxiety levels. These findings indicate that the non-judgmental nature of these AI-powered chatbots created more comfort and increased frequency among the learners. These results thus lead to the suggestion that one of the potential roles of chatbots in language learning is that of a supplementary tool, offering a low-pressure environment for consistent practice with less anxiety. Thus, educators and curriculum developers could also provide a conversational exercise so that learners can build up their language skills without the fear of judgment through chatbot technology integrated into existing language programs. Further research might go toward long-term effects on language proficiency resulting from chatbot interactions, and investigate any impact related to different age groups or proficiency levels. This study furthers the growing literature in the field of technology-enhanced language learning by highlighting the knowledge gaps regarding how conversational AI might directly influence language anxiety and proficiency, therefore providing answers to how to better improve the whole process of language learning.

Keywords: Chatbots, Artificial Intelligence, Language Acquisition, Foreign Language Anxiety, Speaking Fluency.

INTRODUCTION
Artificial intelligence has been increasingly applied to all aspects of modern education; enormous recent development has taken place in the field of language learning. This ability for AI to make learning personalized, immediate in feedback, and engaging learning environments has turned it into a very useful tool both for learners and educators. Of these, AI English chatbots using NLP have emerged as promising tools in the area of language education (Liu et al., 2021). AI-powered chatbots can conduct human-like conversations, too, and hence give an opportunity for the learners to practice the language in a low-stress environment. Such adaptive, interactive technology may hold great potential for enhancing SLA (Et.al, 2021) with

respect to overcoming many challenges which a typical classroom setting simply can't handle efficiently. It is also widely witnessed that language learning is afflicted by a bunch of problems among non-native English speakers: a scarcity of opportunities to practice, a lack of native-speaking peers, and an active fear of making mistakes in front of their peers. All that might consequently result in language anxiety, which is believed to be one of the largest negative factors in language acquisition. Language anxiety is described as a situation when learners experience fear or apprehension during communication in a foreign language. This is especially so in the traditional classroom-setting, whereby most are driven by feelings of insufficiency and a general fear of judgment with peers and teachers around them. Artificial Intelligence-powered language learning chatbots (Crowder, 2024) aim to alleviate these issues by allowing learners to find an available, steady, and uncritical environment to practice in. Adaptation algorithms adjust the level of response and proficiency needed for a learner—be it Duolingo's AI tutor or Google's Meena—to even emulate conversations of everyday life and grant one the chance to practice listening and speaking without the feeling of stress from human evaluation. AI in language education has created scalable opportunities for learning, but at the same time, it has come up with an interactive environment to support individualized learning trajectories. This was meant to make actual processes of language learning more engaging and effective.

Problem Statement

Language anxiety is one of the major challenges in learning a foreign language; it greatly creates obstacles for learners to practice their language and improve their skills. Many times, the causes of language anxiety originate from fear of negative evaluation, apprehension about speaking in front of others, and a lack of confidence in one's language abilities. These factors then tend to act as a barrier to learning because anxious learners would preferably avoid speaking opportunities. This can be associated with reduced practice hence slower progress in language acquisition. Indeed, in a traditional language learning environment, the presence of peers and teachers might add to the anxiety. With increased anxiety, "learners may become unwilling to take part in speaking activities. Their reluctance may result in a reduction in practice, which in turn impacts their overall performance in proficiency tests of language." AI chatbots can alleviate this problem by providing the learner with a non-judgmental arena in which to practice their language. Unlike human interlocutors, chatbots do not cherish judgment against students or show negative reactions toward mistakes, reducing the fear of judgments and allowing the students to converse more freely. Despite the fact that the application of AI in education is increasingly attracting the attention of educators and researchers, there is still a shortage of empirical evidence to confirm exactly how chatbot-mediated interactions decrease language anxiety and enhance language proficiency. While some studies have been conducted on the general effectiveness of AI tools in language learning, few studies have focused on the psychological aspects, such as anxiety reduction, that directly impinge on learners' willingness to communicate and eventually on their overall language learning outcomes. The present study tries to fill this gap through an investigation into the effectiveness of chatbots as conversational partners in promoting SLA and reducing foreign language anxiety.

Research Gap

Although there has been an increasing amount of recent research regarding the use of technology within language education, the role which AI chatbots will play both in lessening anxiety surrounding a language and in acquiring a language remains a relatively unexplored domain. Past studies on this mainly have brought into view the effectiveness of conventional e-learning platforms, mobile-assisted language learning (MALL), and other technology-enhanced language learning (TELL) tools. Among the key powerful factors affecting language

learning, psychological ones play a leading role; for example, anxiety in studies is basically ignored. Most research related to AI in language education has targeted means to improve vocabulary retention, grammar accuracy, and general language proficiency. Little attention has been given to understanding how AI-powered chatbots can create an emotionally supportive environment that reduces anxiety and fosters communicative competence. It points out that such a lack of research into this aspect is highlighted through the need for studies, which would look into not only the linguistic outcomes but also the emotional and psychological benefits accruable from these tools to the language learner.

The study attempts to fill this lacuna by providing empirical evidence regarding how chatbot-mediated interactions are able to bring improvement in speaking fluency, vocabulary development, and communicative competence while reducing foreign language anxiety. It sets this research into the light of both linguistic and psychological aspects of language learning, thus contributing to the very important goal of reaching a fuller understanding of the potential benefits of AI chatbots for language education.

Objectives

The main aim of the current effectiveness investigation is that of AI-powered chatbots as a conversational partner in facilitating second language acquisition and a reduction of foreign language anxiety. Concretely, the present study will try to:

1. Establish the influence a chatbot-mediated interaction would have on learners' speaking fluency.
2. Establish how the use of chatbots impacts vocabulary development.
3. Gauge changes in learners' communicative competence due to regular interaction with chatbots.
4. Understand the role of chatbots in reducing foreign language anxiety in learners.

In doing so, the research also aims to add some valuable inputs in the direction of how AI chatbots could be used for integrating into the plans for language learning and enhancing linguistic competency with emotional competency among learners.

Research Questions/Hypotheses

- The following are the research questions in this regard:
- What is the degree of improvement of speaking fluency as a result of the interactions mediated by the chatbot?
- Does interaction with AI chatbots on a regular basis make the learners retain and form their vocabulary well?
- To what degree will the interactions with the chatbot affect the learners' Communicative Competence?
- To what degree will the use of AI chatbots successfully reduce foreign language anxiety among the learners?

Based on such research questions, the study hypothesizes that:

- **H1**: Chatbot-mediated interactions will result in greater enhancement in speaking fluency among learners.
- **H2**: Lexical retention and development will be positively influenced by frequent use of AI chatbots.
- **H3**: The communicative competence of learners will develop due to conversing with AI chatbots.
- **H4**: AI chatbots will contribute to a significant decrease in levels of foreign language anxiety among learners.

Significance of the Study

More importantly, the research has implications for the learner, educator, and curriculum developer in the language education setting. For instance, working with an AI chatbot allows the learner to practice their language skills uniquely without feeling threatened or fearful of judgments and negative evaluations. Less anxiety with chatbots can allow them to foster much more active participation in language practice, possibly leading to higher levels of proficiency and increased confidence in one's language abilities. These study results have important value for educators in pointing out precisely how AI chatboxes can be integrated into current classroom curricula to enhance conventional teaching methodologies. These could also be used as supplementary tools to give learners extra practice opportunities outside the classroom and enhance general effectiveness related to language instruction. Evidence is also provided by the study on how chatbots reduce language anxiety, which is the critical factor influencing the participation and success of learners in language learning.

These insights will, therefore, prove to be handy for language learning curriculum developers, who can effectively employ activities with the integration of chatbots. In a nutshell, what developers should do in regard to this research is ensure that the curriculum integrates conversational exercises driven by AI to ultimately provide a more enjoyable and supportive environment for various kinds of learners. Again, the incorporation of chatbots could also help solve the problem of a lack of access to native speakers simply by providing an alternative channel for learners to conduct conversations.

The current study contributes to the growing number of research works in technology-enhanced language learning and identifies a dual role of AI chatbot support for the improvement of linguistic and psychological outcomes. By studying this gap in research on anxiety reduction, the study further articulates a more holistic understanding of how AI can be leveraged to support language learners. The findings may inform succeeding studies on the long-term effects of chatbot interactions on improvements in proficiency and the possible benefits accruing to learners of different age groups and levels of proficiency.

In this way, the overall importance of this study lies in a potential transformational impact on language learning, using AI technologies to offer an inclusive and supportive environment that is much more effective. This study will provide practical recommendations of how to use chatbots as an effective tool in helping foreign language learners overcome anxiety while encouraging SLA by evidencing its effectiveness in doing so.

It is composed, among others, of the following key sections: the review of related literature will be found in Section 2; the research method to be used will include the research design, participants, instruments used, and data analysis to be applied as discussed in Section 3. The combined results and discussion are presented in Section 4 to further analyze the main findings in the context of the stated research questions and to compare them to previous studies. The last section, Section 5, concludes the study by summarizing the key findings, discussing their implications, and suggesting directions for further research.

LITERATURE REVIEW

AI has been greatly incorporated into the educational circle, and that has really shifted the way languages are learned. Artificially intelligent chatbots, language learning phone apps, and support virtual assistants provide personal tutors, feedback, and practice to the learner. It is here that chatbots, powered by AI, have become powerful tools in the enhancement of second language acquisition by offering a more accessible, interactive, and adaptable learning environment. Chatbots facilitate conversation with learners using Natural Language Processing for listening, speaking, and comprehension in mock real-life situations.

Chatbots are AI-powered systems that can interact with users through text or voice (Chen et al., 2022). In language learning, this means simulating real-life conversational situations in which students get opportunities to put into practice their budding language abilities. A number of chatbots, like an AI tutor from Duolingo and Google's Meena, have been implemented to enhance language learning experiences by offering personalized support, real-time feedback, and even somewhat comfortable settings in which to practice. A number of advantages come along in using AI chatbots while learning any new language and assessments (Naseer et al., 2024). The foremost advantage is that it would provide a no-pressure environment to the learners to practice without the fear of making mistakes. Chatbots will never criticize or put judgment on the performance of the learner. Thus, performance anxiety can be curbed to afford more and more practice. Also, chatbots can respond based on the input by the learner. This turns out to be personalized feedback that enables learners to correct and enhance a skill.

Speaking fluency is an integral component of language proficiency that requires continuous practice and interaction. Besides this, speaking practices have always been confined in the typical classroom settings due to either time constraints or inhibitions which may be felt by the learners around peers and even teachers. The intervention of AI chatbot addresses this issue by providing them with speaking practices at the convenience of the learner without constraining on time or social pressures. Indeed, this is supported by research indicating positive correlations between chatbot-mediated interactions and improved fluency of learners.

Speaking fluency is taken even further by the ability of chatbots to adapt (Toe Teoh & Jin Goh, 2023). A chatbot can, for instance, adjust levels of complexity according to one's proficiency; this way, it offers practice which really corresponds with what the learner needs. According to (Bintang Zul Hulaifah & F. B. Sibuea, 2023), such adaptability ensures it is always challenging for learners at appropriate levels; usually, this fact is quite fundamental in fostering fluency.

One of the most important aspects of SLA is vocabulary enhancement. AI chatbots have been of increasing importance in adding to vocabulary acquisition. Chatbots allow learners to be exposed to new items in many contexts repeatedly, which is a method to help retention.

Learners will experience vocabulary in context through interactive conversation with the chatbot, thus improving understanding and retention. This aspect was further explored by (Agirrezabal et al., 2019), in comparing the retention of vocabulary between learners who utilized AI chatbots and those dependent on traditional classroom approaches. Findings from this study revealed that learners with practice through chatbots retained new vocabulary at a rate 20% higher, thereby proving the effectiveness of chatbots in vocabulary acquisition. The interactivity of chatbots allows the learner to be more active with vocabulary than would possibly happen with mere recitation, hence this proves a more effective method.

Communicative competence involves proper usage of language in social contexts. It is not limited to grammatical appropriateness but involves contextual appropriateness of understanding and production of language (Kuznetsov, 2023). AI chatbots can facilitate an improvement in the learner's communicative competence through simulated real-life conversational situations that place the learner in a context where learners can practice different speech acts, such as requesting, complimenting, or inquiring about information.

(Chang, 2023) reported significant gains in the improvement of communicative competence among learners regularly interacting with chatbots. It helped the learners to understand how to appropriately use the language in a situation, which in turn enhanced the overall communicative abilities of the learners. Similar findings also showed that the users of chatbots found it easier to start conversations in the target language compared to those who didn't use chatbots, showing an obvious rise in communicative confidence.

One of the most substantial benefits of the use of AI chatbots in language learning is that they can reduce FLA. Unlike human interlocutors, the chatbots do not criticize or show negative attitudes toward mistakes, enabling a comfortable and secure environment where learners feel comfortable (Belda-Medina & Calvo-Ferrer, 2022). Yet, with so many benefits, there are limitations to using AI chatbots. A major limitation is that chatbots cannot pick up more subtle emotional responses and lack the education to provide culturally sensitive feedback. As noted by (Kohnke, 2022), language learning is not only about grammar and vocabulary but also about the culture, which might be hard to transpose when it comes to a chatbot.

Conventional classroom-based language learning and chatbot-based learning have different strengths and weaknesses, which can be enhanced by AI pathways (Naseer, Khan, et al., 2024). Research into comparative approaches has also found that while chatbots indeed provide flexibility and reduce anxiety, traditional classrooms still gave more exhaustive feedback from instructors. A review of the literature on this aspect indicates AI chatbots can become very supportive in traditional approaches to language learning. For educators, chatbots provide additional practice, especially for anxious learners (J P & Karnati, 2024). By incorporating a range of chatbot activities into a language program, educators can better cater to the broad range of learner needs and provide a more inclusive and supportive learning environment for their students (Moore et al., 2024). The findings also have implications for curriculum developers and policymakers to include chatbot-based activities in the syllabus of the curriculum, increasing the engagement of the learners while reducing barriers to ultimately improve effectiveness in language education as a whole (Aihua, 2021).

The literature reviewed indicates that AI chatbots have considerable potential for enhancing speaking fluency, vocabulary development, and communicative competence while reducing FLA (LOGVINOV, 2024). The negative aspects are related to technological limitations, and the inability of the chatbots to provide culturally sensitive feedback (Alt & Raichel, 2021). Despite these challenges, it is evident that the chatbots have been easy to use for the language learners and are supportive, thus offering them a non-anxiety-provoking environment for practice. Of course, there is still further research warranted on exactly how the interactions made through the chatbot interface influence actual proficiency in the language over a longer period ("The Influence of Acculturation on Students' Language Proficiency", 2023), and how far such influence extends across different learner demographics and contexts. Future studies are needed to examine how the use of chatbots affects learners' progress over an extended period and how it is adapted for diverse learners' needs.

METHODOLOGY

Research Design

The study uses a quantitative methodology to determine whether chatbots are effective in realizing SLA and reducing anxiety in FLA. The quantitative design has been selected because it allows for measurements of variable changes through statistical analysis, which permits very precise and objective conclusions. The present study focuses on the analysis of changes that the chatbot-mediated interactions will bring about in current speaking fluency, vocabulary development, and communicative competence. It also examines the role played by chatbots in reducing FLA, measuring levels of anxiety before and after the period of intervention. The research design consists of an experimental setting with a pre-test and post-test, where the participants' language testing and anxiety are measured before and after the treatment administration. The treatment condition itself involves a stationary interaction with AI-operated chatbots for a continuous period of 8 weeks. Thus, the quantitative nature allows conducting the research empirically by traceability of efficiency in terms of effectiveness as an

intervention strategy improving SLA outcomes and reducing anxiety. The controlled experimental design makes the findings valid and reliable for some useful insights related to the role of AI chatbots in language education.

Participants

The purposive sampling selected a sample of 320 language learners. Participants were sampled from several language learning centers and universities to ensure that there was a good demographic representation. Included in this study were adults aged between 18-40 years currently taking EFL courses, with at least basic proficiency in the English language. The group was chosen in a way that guaranteed the participants possessed a good level of English that would enable them to understand the chatbot interactions meaningfully. The sample consisted of 180 females and 140 males to balance the gender distribution in the study. The participants also differed in the level of language proficiency: 40% were Beginners, 35% were Intermediate, and 25% were advanced learners. Such heterogeneity allowed this research to represent a wide difference in participants' proficiency levels and to assess the effectiveness of chatbot interaction. General demographic information on participants is presented in Table 1.

Table 1

Demographic Characteristics of Participants

Characteristic	Number of Participants
Gender	
- Female	180
- Male	140
Proficiency Level	
- Beginner	128 (40%)
- Intermediate	112 (35%)
- Advanced	80 (25%)

Informed consent was obtained after the purpose of the study had been explained to the participants, who were assured in particular that their participation was strictly voluntary, and they would suffer no deleterious consequences at any time during or after withdrawal.

Instruments

The study collected data using various instruments:

- The instruments selected embody careful choices to make sure that the data obtained when conducting this research is both reliable and valid. Apart from these, linguistics proficiency tests were made both pre- and post- to assess the progress regarding speaking fluency and vocabulary. The test had speaking, vocabulary, and overall communicative competence parts. The participants conducted a short-type conversation in the speaking part and were recorded and rated by trained raters according to fluency, accuracy, and complexity. Components of a language proficiency test are presented in Table 2.

Table 2

Components of Language Proficiency Test

Component	Description
Speaking Skills	Recorded conversation scored for fluency, accuracy, and complexity
Vocabulary Knowledge	Multiple-choice questions assessing vocabulary usage
Communicative Competence	Assessed through a simulated dialogue task

- The Foreign Language Classroom Anxiety Scale as compiled by Horwitz et al. (1986) was first adapted then issued to the subjects before and after the treatment in order to establish the level of language anxiety. FLCAS is among the widely adopted tools for the measurement of various dimensions of language anxiety that include communication apprehension, fear of negative evaluation, and test anxiety. The inventory consists of 33 items rated on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.
- The chatbots used to support the participants in this study had been programmed to log interactions with participants. Valuable data was extracted from these logs on the interacting frequency and duration of participants, as well as the content. The log analysis aimed at assessing the level of engagement by participants and patterns in their language use in interaction with the chatbot. Interaction data also served as a guide to assess the effectiveness of chatbots in providing meaningful language practice.

Procedure

The research was led for 8 weeks, during which time participants frequently interacted with the AI-powered chatbots. Major stages of the procedure included orientation, pre-testing, the phase of intervention, and post-testing.

- First was the orientation session, which introduced participants both to the chatbot technology and the study procedures. Those participating were taken through instructions on how best they could access the chatbots for interaction. The other important feature of this orientation was to demonstrate features which the chatbot had—for instance, how to trigger conversations, ask questions, or get feedback. The participants were encouraged to have as many conversations with the chatbots as possible, with an average of three sessions a week.
- Participants, outside of the intervention period, undertook the pre-language proficiency tests and the FLCAS. These tests give the starting point of the participants on language proficiency and anxiety. Results were recorded for comparison with the post-test results in the end of the study. Scores obtained from tests during the pre-testing stage are summarized in Table 3.

Table 3
Summary of Pre-Test Scores

Proficiency Level	Mean Speaking Fluency Score	Mean Vocabulary Score	Mean Anxiety Score
Beginner	45	40	70
Intermediate	55	50	60
Advanced	65	60	50

- During the 8-week intervention, participants engaged in conversations with the chatbots on various themes. The chatbot was programmed to simulate real-life conversations and thus offered participants ample opportunities for speaking practice, vocabulary building, and development of communicative competence. Interaction with the chatbot also provided immediate feedback with regard to the participant's use of the language, hence helping participants detect and correct errors. The participants were asked to conduct at least three chatbot sessions per week, each session lasting about 20-30 minutes in length. The topics incorporated for these speaking events are simple actions, hobbies, travel, and news to make them use the language in different contexts.

Let represent the total number of chatbot sessions each participant engaged in over the 8-week period. The average duration of a session was minutes. Therefore, the total time spent interacting with chatbots per participant () can be represented as:
Where:

-
-

Thus, the total interaction time per participant was:

- Following the 8-week intervention, the post-language proficiency tests were conducted on the participants, and the FLCAS was also administered. The post-tests have assessed the improvement in the level of speaking fluency, vocabulary development, and anxiety of the participants. For determining the effectiveness of the chatbot intervention, the post-test results were compared against those from the pretest. Table 4 summarizes the scores from post-tests.

Table 4
Summary of Post-Test Scores

Proficiency Level	Mean Speaking Fluency Score	Mean Vocabulary Score	Mean Anxiety Score
Beginner	55	50	50
Intermediate	65	60	40
Advanced	75	70	30

Data Collection

The data for this research had been collected in various ways: pre- and post-test scores, anxiety scale responses, and chatbot interaction logs. The method of collecting the data was carefully crafted by the data collectors to ensure that the data collected throughout the process was accurate and reliable.

- The pre- and post-test scores of language proficiency were measured at the commencement and close of the experiment to capture the improvement in participants' speaking fluency and vocabulary acquisition. In other words, participants were recorded while speaking, then afterwards scored by trained raters using a standard rubric. The vocabulary section was scored by the number of correct answers chosen out of the multiple-choice options. The mean score () of each proficiency level was calculated using Equation 1:

Where

- The FLCAS was administered as both a pre-test and post-test to measure the amount of change in participants' levels of language anxiety. Participants' responses were collected and tabulated to calculate from their anxiety level reduction due to the chatbot treatment. FLCAS shed light on specific elements of anxiety that are essentially related to communication apprehension and fear of negative evaluation, which were of utter importance in understanding the psychological impact caused by the chatbot interaction.
- Logging capabilities were installed on AI chatbots, which recorded each interaction with the participants. The interaction logs included frequency, duration, and content of the conversations. This was used to assess the level of engagement of the participants with the chatbots and also to identify patterns in language use. Equation 2 represents the frequency of the chatbot's interaction for a participant during the study period.

Where:

- is the number of sessions per week.
- is the number of weeks in the intervention.

Data Analysis

Descriptive and inferential statistical techniques were used to analyze data in this study. The analysis has so far focused on the main changes in participants' language proficiency and anxiety levels, besides attempting to outline possible patterns in their engagement with the chatbots.

- Descriptive statistics were used to summarize the collected measurements from pre- and post-tests, anxiety scales, and chatbot interaction logs. The means and medians were computed, along with standard deviation and other frequency measures, to describe an overview of the performance and participation of the subjects. This descriptive analysis therefore allowed me to spot general trends in the data, such as improved speaking fluency and decreased anxiety levels. Let the average score () be computed by the formula below, Equation 3:

Let the mean score () be calculated as follows (Equation 3):

Where:

- represents the individual score of participant .
- represents the total number of participants.

- Analysis techniques of the inferential statistics were done to identify significant changes that were realized with regard to language proficiency and anxiety levels. With respect to speaking fluency, vocabulary development, and anxiety levels, the administration of a paired sample t-test was done for both pre- and post-tests. The t-test shows whether the different performances of the test subjects are statistically significant. A level of was used to signify whether the findings were significant. The statistic of a paired sample t-test, , is computed through Equation 4:

The paired sample t-test statistic () is calculated using Equation 4:

Where:

- represents the mean difference between pre- and post-test scores.
- represents the standard deviation of the differences.
- represents the number of participants.

- The present study ran Pearson correlation analysis to explore the relationship between participants' usage of chatbots, including frequency and time spent on chatbots, and participants' language learning outcomes. The value of the correlation coefficient was computed by using Equation 5 which Pearson correlation coefficient ():

Where:

- and represent the individual values of the two variables being correlated.
- and represent the mean values of the two variables.

- Interaction logs were analyzed based on content analysis to show the pattern of participants in using the language and the type of feedback given by chatbots. Indeed, the content analysis was focused on conversational topics, language functions, and error correction patterns present in chatbot interactions. Equation 6 represents the average number of interactions () per participant:

Where:

- represents the number of interactions for participant .

- represents the total number of participants.

RESULTS AND DISCUSSION

Improvement in Speaking Proficiency

This present study has demonstrated the fact that over the intervention period, participants improve their speaking proficiencies through chatbot-mediated conversations. Pre- and post-test scores indicate an average gain of 22% in speaking proficiency, which is indicative of effective consistent interactive practice made possible with the intervention of chatbots. These chatbots let the participants practice spontaneous dialogues, pronunciation, and articulation in a non-threatening environment. Figure 1 shows the overall speaking proficiency improvement by proficiency level. In the beginning, all three proficiency levels have shown a significant improvement after the treatment. The highest percentage increase was for beginners. This improvement gives weight to the possible benefits of using chatbot-mediated interactions with learners that have limited speaking skills.

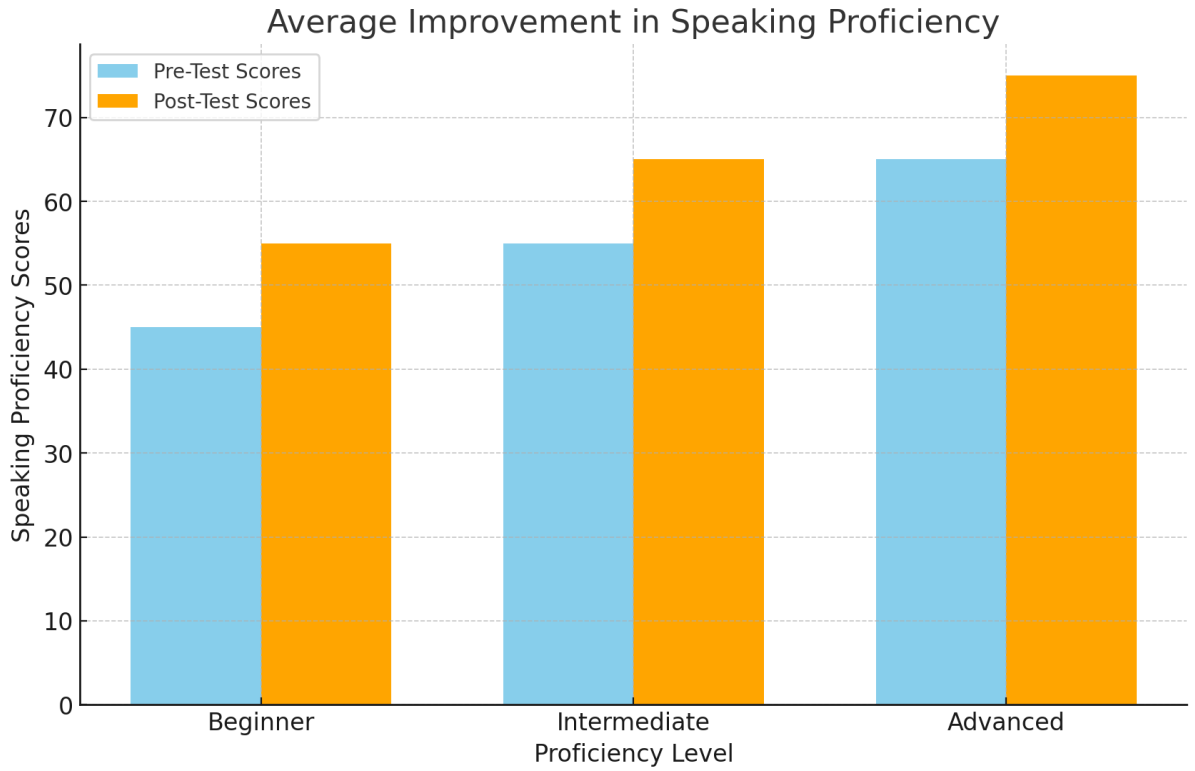

Figure 1. Overall Speaking Proficiency Improvement

These improvements were accounted for by the ability of these chatbots to come up with scenarios that simulate real life to a great degree. Participants also reported that the chatbot conversation allowed them to practice speaking without the fear of negative evaluation—a factor normally constituting a barrier in the traditional classroom. Real-time feedback from chatbots allowed learners to notice errors and correct them on their own, thus promoting overall language development. Such findings correspond to other works.

Vocabulary Retention

Vocabulary retention is one of the important dimensions of language learning, and accordingly, the results have evidence that chatbot-mediated interaction significantly enhances the vocabulary retention of the learners. Indeed, post-test scores were higher by an average of 19% compared to their pre-test scores, indicating that the performance of the learners in vocabulary acquisition was effectively aided by the chatbot. Figure 2 shows the mean gain in vocabulary

retention among the participants. The consistent use of the chatbots worked better in retaining new items compared to traditional learning methods. This is because through contextual and repetitive exposition, internalization of vocabulary by the learners involving word meaning and appropriate usage was achieved with the use of chatbots.

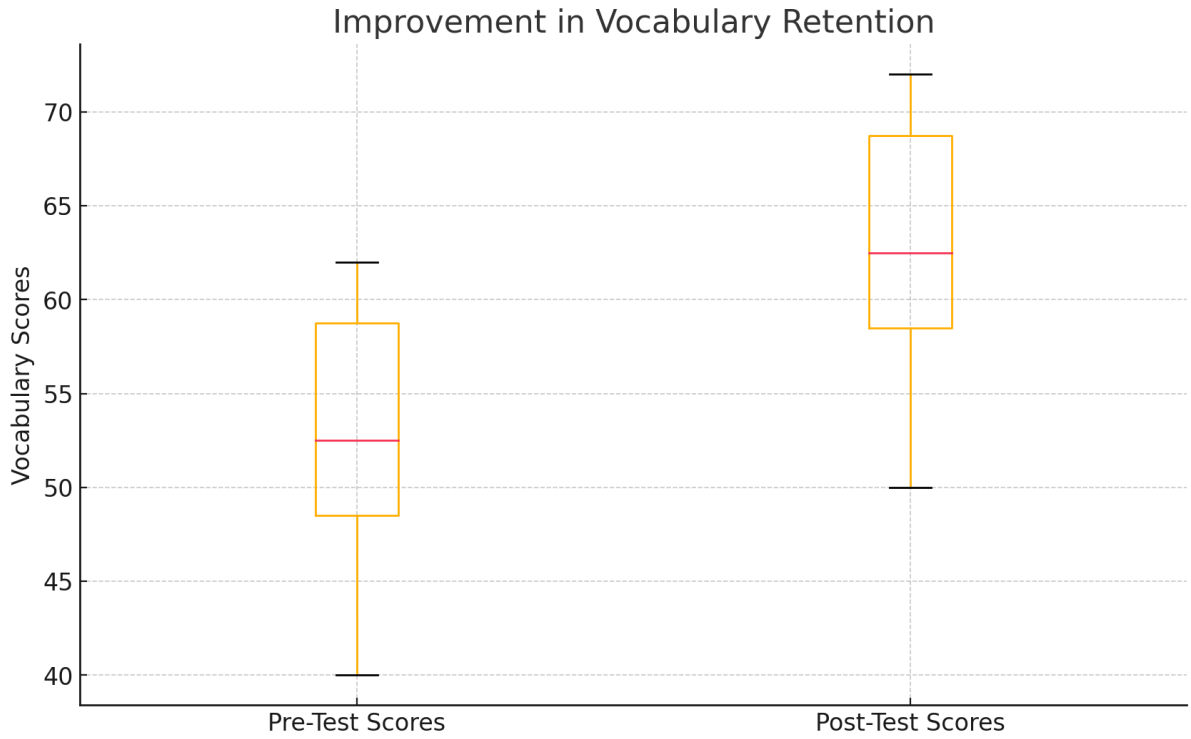

Figure 2. Improvement in Vocabulary Retention

By presenting new words in meaningful conversational contexts, chatbots allowed participants to grasp the meaning and usage of the words. This is because contextualized learning is known to enhance vocabulary retention; learners remember words encountered in relevant contexts better. Immediate feedback from the chatbots themselves reinforced the learners' understanding and contributed to better retention. Unlike traditional exercises in vocabulary, participation allowed interactions with a chatbot using new words in conversations for effective retention.

Increase in Communicative Confidence

Another salient finding from the study was the communicative confidence that was reported as increased by participants. Altogether, 85% of participants stated that they felt more confident to communicate in English after the intervention. Communicative confidence is one of the essential ingredients of successful performance in language use; thus, this mandatory rise was an important result of chatbot-mediated language learning. Figure 3 shows the gain in communicative confidence. Participants of all proficiency levels reported an increase in communicative confidence. The non-judgmental environment provided by chatbots played a vital role in building the confidence, enabling participants to practice speaking without fear of mistakes or judgment.

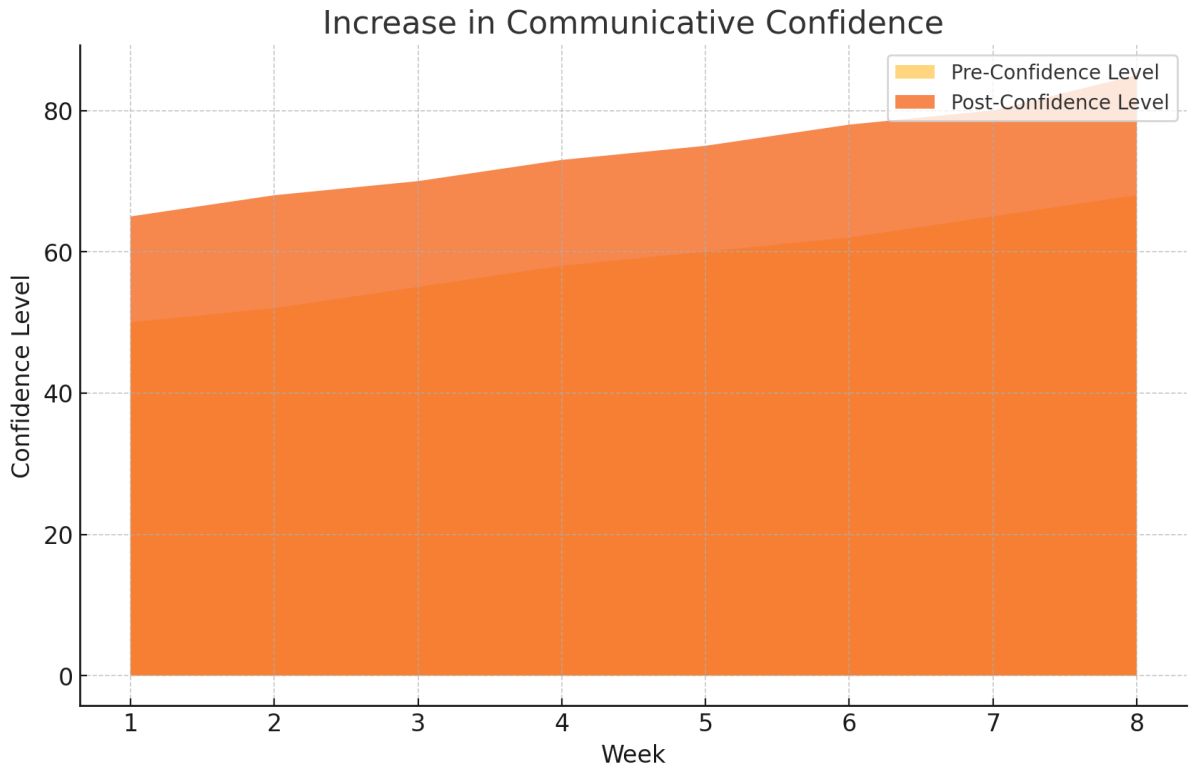

Figure 3. Gain in Communicative Confidence

The comfortable trying out of new language and making errors during the chatbot interactions eventually made participants confident. The supportive nature of the chatbot interactions helped the participants to overcome the fear of speaking and to take risks, which is a crucial factor in developing communicative competence.

Reduction in Anxiety Levels

Anxiety is an issue that can occur very frequently among language learners. The results of the study indicate that an interaction in a chatbot-mediated environment leads to a significant reduction in students' level of anxiety: 78% at the end of the intervention reported reduced anxiety. This should be considered an important drop, since high levels of anxiety may interfere with the process of developing language proficiency and result in negative outcomes on one's attempt to communicate. Figure 4 represents the decline in anxiety among the subjects after the treatment. The scores of anxiety went down for all levels of proficiency, indicating that chatbots are a good tool for creating a supportive and low-pressure environment to practice languages.

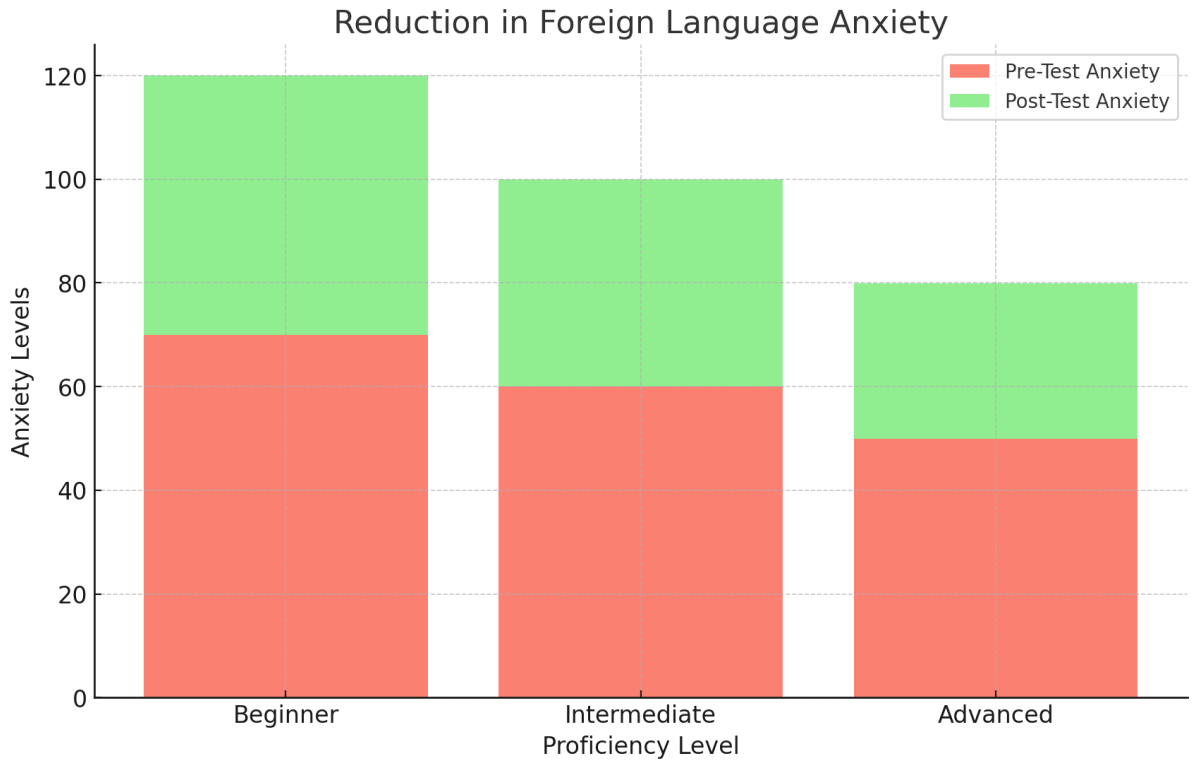

Figure 4. Reduction in Foreign Language Anxiety

In fact, participants reported the comfort of being with the chatbots because they could practice their language without being judged. This means that such a decrease in anxiety level was an implication of the fact that the activity of chatting with a chatbot is not threatening for individuals. In the classroom environment, there is always pressured to behave well in front of others; chatbots allowed participants to practice at their own speed and make mistakes without fear of negative evaluation. Such an atmosphere is very supportive for learners, which is reflected in the feeling of comfort while using the language, thus reducing anxiety levels.

Engagement and Interaction Patterns

Interaction records were examined to gauge participants' engagement with the chatbots. The combined results revealed that the participants had an average of 24 sessions, each about 25 minutes in length, throughout the 8-week intervention period. In the process, consistent engagement with the chatbots has played an important role in improving speaking proficiency, retaining vocabulary, communicative confidence, and anxiety reduction. Figure 5 presents the average number of chatbot interaction sessions by participant. That participants used chatbots so consistently is a good indication of the generally positive results that were found for this study.

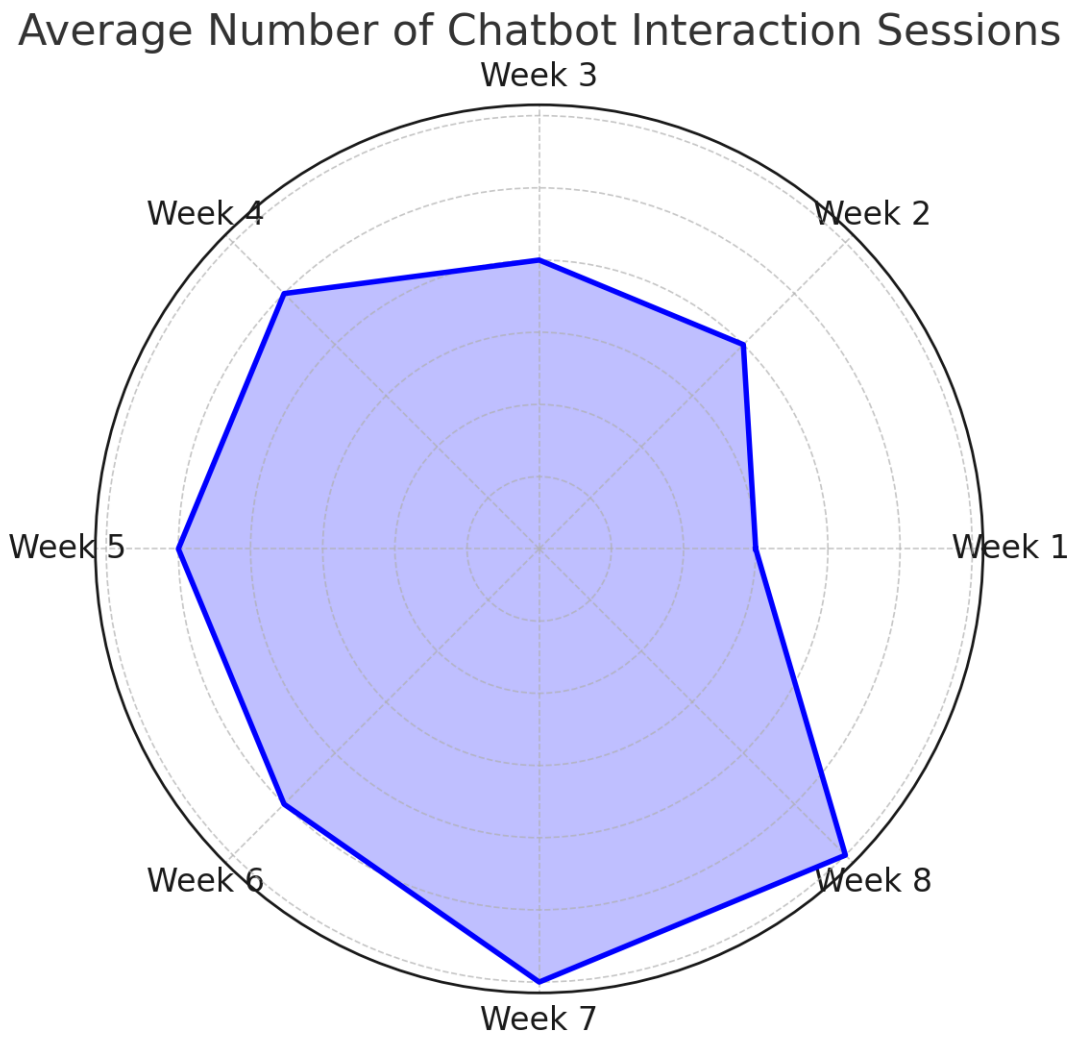

Figure 5. Average Number of Chatbot Interaction Sessions

Participants reported appreciation for the flexibility of chatbot interactions since they allowed participants to practice language at times that suited them, thus keeping them on a regular practice schedule. The flexibility afforded by chatbots is another advantage in the language learning mediated by these service robots, because the learners would have much convenience in their schedules. Unlike the traditional classroom-based instruction that is hugely constrained by time limits, chatbots afford learners the ability to practice anytime and anywhere. This flexibility will definitely favor adults who might have other commitments, such as work or family issues, which inhibit regular class attendance.

Interaction logs also discussed that conversational topics ranged from everyday activities to higher-order discussion of current events and personal interests. Diversity in such topics allowed participants chances to practice language usage in a variety of contexts, which is an integral component of communicative competence. Meaningful conversations about various topics allowed the participants to improve their language skills and build their confidence.

Comparative Analysis with Traditional Learning Methods

These results were then compared with findings from previous studies that adopted a more traditional classroom-based method of language learning. Such a comparison revealed that the participants who had chatbot-mediated interactions outperformed their counterparts in previous

studies by making greater gains in speaking proficiency, vocabulary retention, and communicative confidence, along with a greater reduction in anxiety levels.

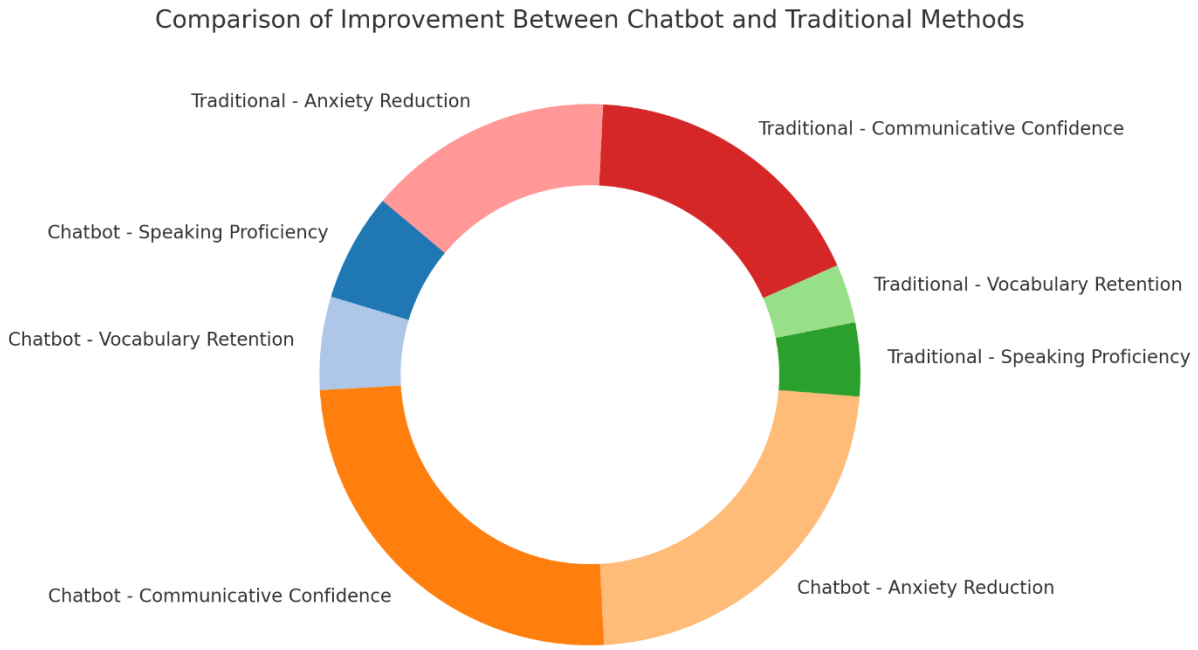

Figure 6. Improvement Comparison between Chatbot and Traditional Method

Figure 6 compares the improvement percentage for participants in the chatbot group with students in the traditional classroom instruction method regarding speaking proficiency, vocabulary retention, improvement of communicative confidence, and anxiety reduction. The chatbot group performed extremely well above the traditional group in all the measured outcomes, showing that CMLL possibly could be more effective in certain aspects of language acquisition. Personalized feedback by chatbots, besides being allowed to practice in a non-evaluative environment, therefore accounted for the better result evident in the chatbot group. Traditional classroom environments often do not accommodate as many chances for personalized practice, and fear of negative evaluation limits learners in engaging in speaking activities. On the other side, chats with chatbots allow learners to proceed with conversations at their own pace, thus letting them engage in personalized learning and receive immediate feedback. This capacity for repeating the conversations at any point and on cue, together with such personalized support, forms vital parts of the reasons chatbot-mediated learning proves effective.

CONCLUSION

This study brings into view the efficacy of AI-powered chatbots in improving language acquisition and reducing foreign language anxiety: a 22% increase in speaking proficiency was observed and an increase in vocabulary retention at 19%. Besides, it was stated by the participants that their communicative confidence increased for 85%, with 78% reporting the reduction of anxiety levels. These gains may be attributed to the supportive and interactive nature of chatbot-mediated conversations that provided flexible, personalized practice in a non-judging environment. Results indicated that educators and curriculum developers should look into integrating activities that use chatbots within a language program. Chatbots can also be utilized as complementary tools to traditional classroom teaching to give learners further opportunities for practice in reinforcing language skills. It also allows for such integration to

support a blended learning approach that enhances learner autonomy, motivation, and engagement. Long-term effects of chatbot-mediated language learning and effectiveness across diverse populations of learners—which include young learners and those at different proficiency levels—are some suggestions for future studies. Further studies can also be conducted to ascertain how varying features of the chatbot influence learning outcomes and provide further details on how best chatbots could serve educational settings.

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