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ARTICLE

Examining EFL Students' Perceptions and Experiences with AI-driven Metaverse Environments for Developing Communication Skills

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ABSTRACT

This study examines the development of oral communication skills in a second language (L2) context. This research employs an orally given text-based generative AI (GenAI) model as its methodology. The population in this study was 505 students at teaching and educational science faculties in universities. The demographics and sample for this study consisted of 25 undergraduate students who are majoring in Indonesian language education and 26 students who are from the Pancasila education and public health study program at Al Asyariah Mandar University, Indonesia in the 2022 academic year. They were selected via a purposive sampling method. The instruments utilized in this quantitative research are a questionnaire and observation. The research results indicated that the students' choice of interactions with virtual robots continued to improve their English communication skills, including vocabulary, intonation, gesture, and fluently dan volume. They also believe that AI can enhance their learning autonomy, critical thinking abilities, and confidence in practicing English effectively and quickly. This research contribution provides insight into the importance of using AI-robot technology so that participants achieve learning outcomes, making learning more enjoyable, the importance of soft skills for the cognitive process of language acquisition, and collaboratively foster communicative competencies in the 21st century.

Keywords: EFL; AI; Communication Skills; Metaverse; EFL

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1. Introduction

Nowadays, it is very important for people to be able to communicate in more than one language. Becoming fluent in English is very important. University graduates in Indonesia will have this skill so they can compete with foreign and local workers. This is in line with the aim of education in Indonesia to produce graduates who are superior, rich in character and competitive in the ASEAN region and globally, to improve the quality, relevance, and competitiveness of education in general.

The current metamorphosis of learning and teaching English as a Foreign Language (EFL) continues to seek innovative approaches to improve the acquisition of communication skills, including in higher education in Indonesia. Digitalization in the world of education, with the trend of metaverse environments characterised by immersive virtual worlds, presents new platforms for more flexible language learning [1]. A primary focus for English as a Foreign Language (EFL) students is enhancing their English communication abilities in diverse educational settings, such as universities. To help English as a foreign language (EFL) students improve their oral and written communication skills, integrating new digital tools is becoming increasingly important to enhance interactive approaches in educational development [2]. With these resources, foreign language learners can learn to negotiate meaning in a variety of settings and for a variety of audiences and their learning needs. Previous research has identified various factors in traditional classroom activities that can hinder the progress of English communication. Therefore, digital media or tools have become a great asset in improving communicative competence.

Some examples of research findings include low motivation due to emphasis on exam-oriented approaches, anxiety about oral and written communication [3], few opportunities to practice writing in real life and the absence of individualised feedback [4]. Then, the studies by Mageira et al. and Kim et al. aim to overcome this challenge by integrating AI chatbots into language learning tools to help students overcome them [5,6]. The research shows that these tools are good for students' emotional and linguistic development, including enjoyment, motivation, confidence in learning English, and increasing willingness to communicate [7–9].

Research using chatbots shows promising results, but most of them rely on retrieval-based models, which have limitations. A number of studies show that chatbots have limitations in terms of creating unique content, responding authentically, understanding many words at once, plagiarism and being bound by the amount of data available [10–12]. Lai and Khang et al. suggest that EFL students could greatly benefit from the introduction of more complex AI platforms such as AI-Robot Tutor, which uses algorithms [13,14].

In response to the growing interest in AI-powered tools, we have demonstrated various ways to incorporate these tools and suggested new ways to use them in the classroom. AI plays an increasingly important role in English language teaching [15]. Moreover, in light of the increasing prevalence of digital technology (such as computers, electronic whiteboards, GPS, etc.), it is imperative for both students and teachers in the 21st century to possess a comprehensive understanding of these tools [16]. The aim of this article is to provide pedagogical recommendations for enhancing students' English as a foreign language (EFL) learning repertoire by leveraging the results of empirical investigations and a comprehensive review of retrieval-based AI-Robot Tutor (AI-Tutor Andi) and advanced AI-enabled tools. This study investigates students' perceptions and experiences with artificial intelligence (AI)-powered interactions in a metaverse environment. This research aims to elucidate potential paths for developing L2 communication practices through the utilization of advanced AI platforms in the creation of metaverse learning environments.

2. Objective of the Study

Following the ACTFL World Readiness Standards for Language Learning [17], this study focuses on the development of oral communication skills in a second language (L2) context. A text-based generative AI (GenAI) model presented orally is the strategy used in this research. Therefore, our primary concern is to provide language teachers with tools that enable them to enhance their students' language learning experience using AI-powered technology both inside and outside the classroom.

3. Background of the Study

In the metaverse era, the relationship between humans and machines has received increasing attention in recent decades. An integral part of modern life is the conscious application of technology, especially in this era of software culture. The use of language shapes it and opens up new social interaction possibilities. It influences all aspects of human behaviour and thinking and challenges the conventional categories people use to understand the world [18]. The use of technology has a significant impact on many things that are important for the human dimension. New forms of online communication "deconstruct local spaces and conceptions of teaching materials, redefine them, and delocalize them globally" because of advances in communication technology [19]. Modern and intelligent technology has seeped into every field of study, reshaping our understanding of the world through improved physical and mental functioning. In the digital transformation of education today, media and technology function as tools and bridges that can be moved to connect with students and lecturers and from humans to machines, allowing us to build and strengthen significant relationships and collaboration without limits. Inventions like this are artefacts of human creativity, which in turn become a human tendency to always improve their abilities. Tools like these serve a social purpose in society by fulfilling a basic human need—the desire to communicate—that is clear and personal. All communication boils down to the need to feel part of a community of people who share the same values and who work together to achieve a common goal—such as ensuring the continued existence of a species—which is what drives people to communicate, both consciously and subconsciously, sharing concepts, ideas, and knowledge through the process of "pooling" information, which is processed according to predetermined rules [20].

Technology can fulfil the innate human desire to communicate, so its use has become important in many fields, especially in the field of education. A communicative revolution has resulted from its use, which has caused problems in the fields of education and teaching [21]. The incorporation of media resources in educational situations has made dialogic discourse more participatory. This phenomenon, known as "digital communication," has caused a shift away from traditional and virtuous education. As a result of the incorporation of technological tools into classroom teaching, students are transformed from mere recipients of information to active participants in the creation and consumption of value-added services [22]. This is the context in which educational informatics, a field that studies how educational theories interact with information technology, operates.

Many IT-based educational solutions, including AI-social robots, virtual reality, massive open online courses (MOOCs), cloud computing, and the Internet of Things (IoT), have proliferated because of the digitalization of learning. Student engagement with online learning platforms generates a wealth of data. By utilising learning analytics, this data can be structured and managed in a variety of ways, including but not limited to: improving the quality of pedagogical interventions; creating more engaging learning for students; identifying and helping at-risk students; and measuring psychological impact. and motivational aspects that influence students' ability to complete [23]. This is possible with the use of artificial intelligence (AI) in the EFL classroom.

One of the newest technologies created for almost every element of human need is artificial intelligence. Artificial intelligence enables communication between humans and machines, computers, or robots. AI chatbots are programmes that can be used to communicate as if talking to real people. Foreign language learners usually don't get many opportunities to utilise the language they are learning. Therefore, chatbots play a role in solving this problem. Chatbots are useful tools for language practice anytime and anywhere [24]. Artificial intelligence (AI) technology is already being used for various purposes. There are several robot-like figures, also called chatbots, which can be downloaded for free from the internet, used publicly, or installed on cellphones to carry out dialogue that is downloaded via the Google Play Store application. It's like having a spoken or written conversation with a person, and chatbots can answer your questions right away. This means, if native speakers are not available or too expensive, practicing speaking with artificial means is considered a good and affordable substitute. Online AI chatbots, or in this study, using AI robot tutors, have the potential to help students who need a way to practice their language skills anytime

and almost anywhere. The most famous achievement of a computer programme that can have a meaningful textual "conversation" with a person, in the view of technologists, is artificial intelligence relating to language and the various activities involved with it.

Low involvement and ineffective forms of English instruction are prevalent issues in spoken English classes in Indonesia. An uninspiring and inflexible pedagogical style, along with disengagement, fear, and diminished student confidence, inevitably leads to subpar English proficiency. In fact, this is a big problem nowadays. In addition, students often struggle with problems such as inappropriate intonation, inadequate vocabulary, facial expressions, voice volume, and gestures. Many Indonesian English teachers face the same problems as those mentioned above. This occurs because English is neither their first nor secondary language; it remains a foreign language to them. Incorporating international professors into the Merdeka (KURMA) curriculum would improve students' understanding of cross-cultural communication, which is presently deficient. However, the one-to-many teacher-student ratio and short class time will not help students' oral expression in the long term and will cause mental fatigue, so interest in learning English does not increase significantly. As relations between countries become closer, society will benefit from English language learners whose articulation and semantics are consistent with those of non-native English language learners.

The metaverse is enabling increased cross-cultural vocal communication by creating a language environment that allows for connectedness across time and location. In the virtual simulation classroom created by the metaverse, students can practice speaking the target language through standard imitation and practice settings with the help of a robot tutor. In order for students to become more fluent in English, imitation is a very important tool. Because they have better innate knowledge of how non-native English speakers pronounce and accent words than traditional English speakers, students in metaverse classes are able to imitate standard, natural speech patterns and learn more personally. A diverse, intuitive, and colourful subset of spoken language that belongs to the metaverse. Students' natural inclination to engage in spoken English is fostered in an immersive and engaging learning environment. Student pronunciation can be improved through extensive practice with "real" conversational discourse, resulting in greater accuracy and fluency and reducing teacher burden. The goal of the metaverse is to break down geographic barriers and achieve connectivity across time and space. In the metaverse, students can have one-on-one conversations with friends from around the world and their AI or robot tutor friends.

4. Previous Study

Previous research confirms that AI can significantly improve EFL students' ability to express themselves using the target language. Learners who received feedback from the system showed considerable improvements in pronunciation compared to those who did not receive feedback, according to research conducted by Shafiee Rad [25], who examined the efficacy of an AI-powered speech recognition system in improving students' pronunciation. These results are in line with research by Zou et al. [26], who found that students' speaking skills improved when they used virtual robot tutors supported by artificial intelligence. The rapid development of technology and the need to acquire English listening and speaking skills also have brought opportunities and challenges to university students [27].

Zdravkova and Zou et al. also looked into the overall effectiveness of using AI-based English learning applications to enhance students' speaking abilities [28,29]. Their research shows that students who use the app improve their public speaking skills and feel more comfortable expressing themselves in authentic settings. Overall, these findings support the idea that virtual tutors, or Totor-Robot AI and speech recognition systems, are useful tools to help ESL students significantly improve their oral communication skills.

Nonetheless, it is known that there are major pedagogical consequences to incorporating AI into language learning. Zheng examined the educational advantages of an artificial intelligence-driven adaptive learning system, which are distinct for each learner [30]. Students' progress and engagement can be significantly improved through the use of adaptive testing and personalised feedback, according to research. Furthermore, Zhang et al. and Muthmainnah et al. investigated chatbots powered by artificial intelligence and their function in language acquisition [31,32],

demonstrating their capacity to offer interactive, real-time opportunities for language practice. By engaging in natural language discussions and receiving personalised feedback, chatbots increase students' motivation and engagement. These results highlight the educational benefits of AI technology in encouraging student agency and developing personalised learning pathways. The use of AI in language acquisition has clear potential benefits, but there are ethical issues that need to be addressed. In the results of their study on an AI-based language learning system, Xu and Yuan emphasise the importance of privacy protection [33]. To guarantee the safe handling of students' personal information, they emphasise the need for transparent data protection policies and consent procedures.

Additionally, Buolamwini and Gebru have highlighted the problem of algorithmic bias in AI systems [34]. Their research uncovered biases in facial recognition algorithms, drawing attention to possible biases in AI-powered language learning systems. To promote equity and inclusivity in AI-based language learning environments, it is important to address bias and ensure fair and unbiased access to language learning resources and assessments.

Despite the many benefits of AI integration in the EFL classroom, there are still several gaps and opportunities for future research, although current research provides useful insights into the role of AI in strengthening English language learners' communication skills. For example, many studies have looked at how AI affects language learning in the short term, but we need longitudinal studies to see how AI affects students' ability to learn languages in the long term. Further studies are also needed to determine the optimal effects of AI and learning models that incorporate AI into the English classroom. To make the most of AI in language learning environments, it is important to think about pedagogical strategies that integrate AI with successful teaching methodologies, the suitability of the material, and designing appropriate learning activities [35]. Concerns around privacy, security, bias, and transparency in AI-based language learning must also be addressed with comprehensive ethical frameworks and standards. To protect learners' rights and advance equitable access to high-quality language learning opportunities, it is important to ensure the responsible and ethical implementation of AI technology as AI technology advances.

This study focuses on consistent findings on how AI can help EFL students improve their communication skills. Learner autonomy and personalised learning experiences are two aspects of education that are highlighted. To integrate AI technologies in language learning environments in a responsible and inclusive manner, this study also identifies future research directions and ethical considerations. Educators and lawmakers can use AI to help students learn languages and improve their communication skills if they consider these factors.

5. Research Methodology

This research uses a quantitative design through collecting quantitative data from survey results and observed behavior. AI-Chatbot My Virtual Dream Friend is a device or application used as a research instrument. Additionally, to measure students' feelings, researchers used a questionnaire that asked about their interactions with the chatbot and how they thought the tool helped them speak better in English. The procedure consists of several steps that students are expected to complete based on research as follows:

1. Students use a web browser to access the internet.
2. Students use the Google Play Store search engine to search for chatbot software on their smartphone called My Virtual Dream Friend.
3. Students engage with the chatbot and record their interactions using screenshots.
4. Students complete a survey about the use of chatbots.
5. The researchers examined the exchange results to measure the participants' English communication proficiency.
6. They examined responses to student surveys to ascertain how students felt about using My Virtual Dream Friend AI chatbots.

5.1. Participants

The population in this study was 505 students at teaching and educational science faculties in universities. The demographics and sample for this study consisted of 25 undergraduate students majoring in Indonesian language education and 26 students in the Pancasila education

and public health study program at Al Asyariah Mandar University, Indonesia, in the 2022 academic year. They were purposively selected. The sample size was restricted to students who utilized the AI tool for English learning and volunteered for this research project. As a result, a survey was conducted to measure their opinions regarding English learning and undergraduate students' attitudes towards AI-driven oral communication skills. Look at **Figures 1–3** provided for the sake of clarification [36–38].

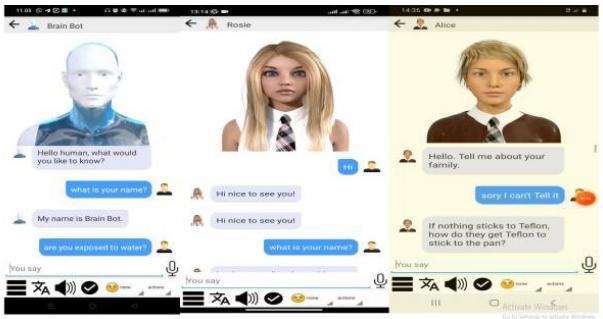

Figure 1. AI-Chatbot: My Virtual Dream Friend.

Source: Google Play Store Application [36].

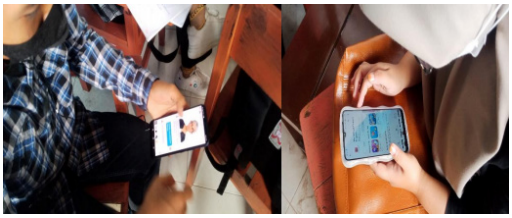

Figure 2. My Virtual Dream Robot Friend for EFL.

Source: Research documentation [37].

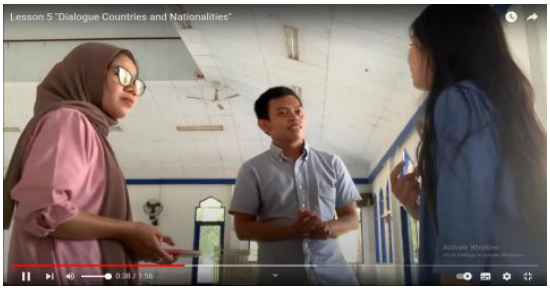

Figure 3. Students' Oral Communication Skills.

Source: Research documentation [38].

5.2. Data Collection

Data was collected through an online questionnaire administered via Google Forms and distributed via WhatsApp. The aim is to understand the challenges and difficulties faced by English language learners and identify the effects of AI on practicing their second language. The sampling methodology employed was a purposive simple sampling technique. This survey is available for a short duration, specifically from December 13, 2022, until January 13, 2023. The survey questions are designed in the form of closed, multiple-choice questions to allow quantitative analysis of the collected data. Certain questions provide the opportunity to include additional comments, while others include multiple choices to account for the possibility of multiple applicable answers. The survey involved a total of 51 participants, who were classified into several age groups according to their educational attainment. This age category includes undergraduate students. An inherent obstacle to this research is its reliance on self-reported data, which is a common practice in other social science research [39,40]. Nevertheless, the researchers explicitly stated anonymity at the beginning of the questionnaire to reduce this concern. A test-retest approach was used to confirm the validity and reliability of the questionnaire, which assesses the consistency of results when the same test is administered at different periods. The questionnaire was then administered again and verified for the consistency of the findings.

To collect data for comprehensive analysis, this study used a testing component consisting of a 20-question multiple-choice questionnaire given to undergraduate students in the Indonesian language education study program and the civic education study program. Some of the questionnaire statements are as follows: I am extremely satisfied with the AI-based metaverse environment's effectiveness in improving communication skills. I am very satisfied with the AI-based teaching model to improve communication skills. Learning EFL with AI has improved my comprehension of English as spoken by non-native speakers. The aim of this careful evaluation is to find out what they think after learning English using the AI Chatbot My Virtual Dream Friend and the perceived effect on their oral communication skills. Furthermore, the same multiple-choice questionnaire was given using the Google Form application at the final meeting to assess the progress and improvement of undergraduate students' learning outcomes. Utilization of a cyclic testing approach facilitates a thorough understanding of the efficacy of the interventions

implemented during the study. Apart from test instruments, psychomotor examinations are also carried out as non-test assessments. This complete technique that integrates test and non-test instruments is applied to obtain a deep and comprehensive understanding of various aspects of student learning outcomes. After careful use of these instruments and the acquisition of related data, as well as validation of the instruments' validity and alignment with the research objectives, a series of advanced data analysis procedures were performed. The aim of this study was to gain some perspective on the complexity of the research findings, ensuring a thorough and comprehensive assessment of the interventions implemented and their impact on student learning outcomes with exposure to AI in the classroom. The students' response toward the AI-driven ELT proposed by Gay et al. was presented in **Table 1** below [41].

Table 1. Students' Response Toward AI-Driven for EFL.

Interval Score	Categories
90–100	Very Good
70–80	Good
60–70	Fairly
50–60	Low
<40	Very Low

In this study, a Likert scale is employed as a widely used instrument in surveys to assess the opinions and attitudes of participants. The scale comprises a sequence of statements or inquiries accompanied by five response alternatives, namely "strongly agree," "agree," "neutral," "disagree," and "strongly disagree." Although the scale effectively represents a spectrum of viewpoints and implies a hierarchical arrangement (with strong agreement indicating a higher level of positive sentiment compared to agreement), it is important to note that the gaps between each option may not be uniform. Hence, it is not possible to interpret the data as indicating equal disparities in viewpoints. Given the ordinal character of the Likert scale (**Table 2**), it is imperative to conduct further statistical analysis that is appropriate for this dataset [42].

Table 2. Likert Scale.

Score	Categories
5	Strongly agree
4	Agree
3	Neutral
2	Disagree
1	Strongly disagree

5.3. Data Analysis

This research uses survey data and uses quantitative methods, and the results will be analysed using IBM SPSS 26 software. This analysis aims to gain valuable insights from the information collected after undergraduate students are exposed to AI. Descriptive statistics will be used to summarise the main characteristics of the data, including central tendency (mean or median) and variability (spread around the mean). Additionally, exploratory data analysis will be conducted to identify key trends and patterns in the data, including potential outliers and any relationships between variables. This initial analysis provides a comprehensive understanding of the data and lays the foundation for further statistical tests, where possible.

In terms of the open responses provided by the sample, the following are some of their opinions on the acquisition of English with the AI chatbot in a metaverse environment: (1) The AI employed unfamiliar terminology, prompting me to conduct research. (2) In class, there's time pressure and judgment. The AI gave me a safe space. (3) The AI helped me prepare better for real class discussions. (4) Absolutely! It's fun, flexible, and really helps with speaking.

6. Results

Descriptive statistics pertaining to student communication skills, as evaluated by a questionnaire centred on AI-based learning, are presented in **Table 3**.

Table 3. Students Questionnaire Mean Score.

	N	Minimum	Maximum	Mean	Std. Deviation
Communication skills through AI	51	60	99	85.1176	10.06508
Valid N (listwise)	51				

The study of the data encompassed a total of 51 participants. The scores show a range from the minimum value of 60.00 to the maximum value of 99.00. The mean score obtained was 85.12, suggesting a predominantly favourable opinion about the enhancement of communication skills through the utilisation of artificial intelligence. The presence of a standard deviation of 10.07 indicates the existence of variety in individual scores, hence em-

phasising the possibility of both significant and minor improvements in communication skills when employing this approach. The research results obtained from the questionnaire answered by the students were presented in **Table 4**.

This dataset contains the opinions of 51 people who took part in an artificial intelligence (AI)-powered metaverse course to improve their communication abilities while learning English as a foreign language (EFL). After using the AI-driven metaverse environment to improve their English as a foreign language (EFL) learning experience, participants generally expressed high levels of enjoyment (M = 4.2941, SD = 0.67213) and satisfaction (M = 4.0392, SD = 0.66214). In addition, there was considerable agreement among participants that the AI-based environment improved their conversational English skills (M = 4.2549, SD = 0.68828) and boosted their confidence in using English for communication purposes (M = 4.3725, SD = 0.59869). In addition, the participants believed that the AI-based EFL learning environment adequately prepared them for real-world communication situations (M = 4.1569, SD = 0.67446) and were satisfied with the variety of activities and communication scenarios offered (M = 4.4706, SD = 0.61165). There is a lot of agreement in the dataset on how useful and desirable it is to use AI-driven technologies in EFL classrooms to help students enhance their communication abilities.

Table 4. Descriptive Statistics.

No.	Statements	N	Minimum	Maximum	Mean	Std. Deviation
1	Overall, the experience of learning EFL in an AI-based metaverse environment to develop communication skills is very enjoyable.	51	3.00	5.00	4.2941	0.67213
2	I believe that the AI-driven metaverse environment has enhanced the English as a Foreign Language (EFL) learning experience to the max.	51	3.00	5.00	4.0392	0.66214
3	I am extremely satisfied with the AI-based metaverse environment's effectiveness in improving communication skills.	51	3.00	5.00	4.3725	0.59869
4	I feel the AI-driven metaverse learning environment has increased my confidence in using English for communication purposes.	51	3.00	5.00	4.2549	0.65858
5	In an AI-driven metaverse environment, learning EFL has a positive impact on conversational English abilities.	51	3.00	5.00	4.2549	0.68828
6	I feel happy learning AI-based EFL language in a simulation of real-life communication scenarios (my virtual dream friend-AI).	51	3.00	5.00	4.3333	0.68313
7	I believe the AI-driven metaverse environment helps overcome communication barriers typically encountered in traditional EFL classrooms.	51	3.00	5.00	3.9608	0.69169
8	I believe that integrating AI facilitates collaborative learning experiences in English communication.	51	3.00	5.00	4.3137	0.67794
9	I am very satisfied with the AI-based teaching model to improve communication skills.	51	3.00	5.00	4.1961	0.66392
10	I feel the AI-driven metaverse environment increases motivation to practice and improve English communication skills.	51	3.00	5.00	4.4314	0.60844
11	I believe that AI-driven metaverse environments are very effective in developing cross-cultural communication skills.	51	3.00	5.00	4.4314	0.67097
12	I see the value of AI in developing non-verbal communication skills in English.	51	3.00	5.00	4.451	0.61037
13	EFL language learning with the AI-My Virtual Dream Friend application helps express EFL language performance efficiently.	51	3.00	5.00	4.2353	0.7096
14	Learning EFL AI has improved my pronunciation and intonation when speaking English.	51	3.00	5.00	4.451	0.61037
15	I believe that the AI-driven metaverse environment has created an opportunity for personalized English practice tailored to individual learning needs.	51	3.00	5.00	4.3333	0.6532

Table 4. *Cont.*

No.	Statements	N	Minimum	Maximum	Mean	Std. Deviation
16	I am very satisfied with the variety of activities and communication scenarios offered by the AI-based EFL learning environment.	51	3.00	5.00	3.7255	0.66569
17	Learning EFL with AI has improved my comprehension of English as spoken by non-native speakers.	51	3.00	5.00	4.4706	0.61165
18	In an English-speaking environment, AI-driven language learning has effectively prepared me for real-world communication situations.	51	3.00	5.00	4.2941	0.72922
19	I believe that using an AI-based metaverse environment will improve future English communication skills.	51	3.00	5.00	4.1569	0.67446
20	To develop effective communication skills, I recommend AI-based L2 learning to other EFL learners.	51	3.00	5.00	4.1765	0.71291
Valid N (listwise)		51				

The study assessed 51 people's results on a scale that measured how well they felt their communication skills improved after using AI. There was a wide range of answers given by participants, with scores increasing from 60 to 99. The data-based average score of 85.12 indicates a generally positive view of AI's potential to improve communicative competence. However, a standard deviation of 10.07 indicates that there is dispersion in scores relative to the mean. These variations indicate that although most individuals felt a considerable improvement in their communication skills after using AI, a small number of participants saw negligible or no changes, as illustrated by a histogram to graphically show the distribution of scores. A histogram is a visual representation of the distribution of data from the entire score range and dividing it into smaller intervals that include the distribution of participants' perspectives regarding the efficiency of artificial intelligence in improving communication skills is said to be effective.

Based on data using P-plot in **Figure 4**, it is known that respondents during AI-based EFL language learning shared information about their EFL learning experiences. We plot the observed response against the expected cumulative probability, which we calculate using the mean (M) and standard deviation (SD). We can assume the data to determine whether the responses align with normally distributed categories.

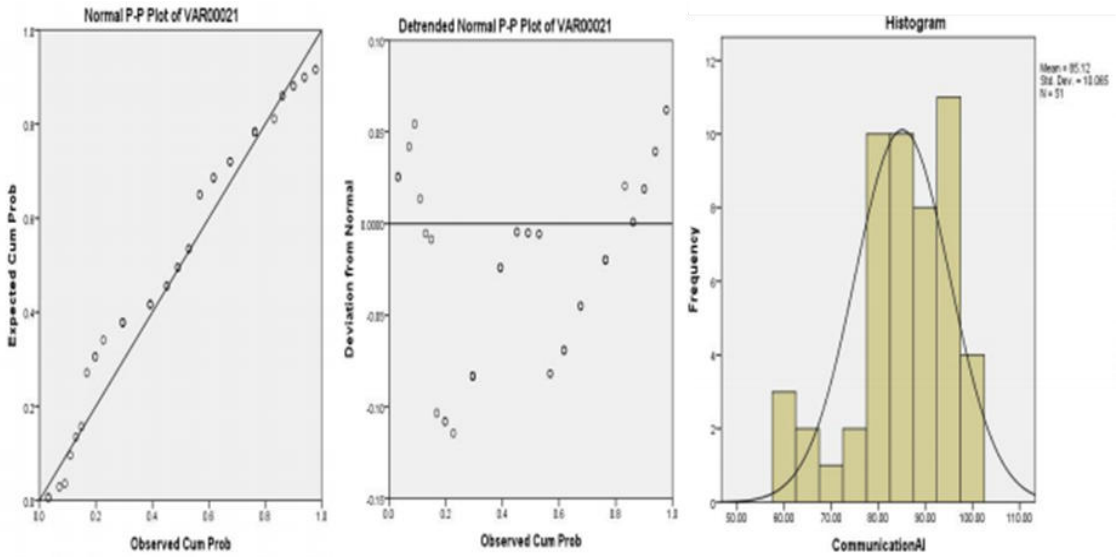

Figure 4. Histogram and Normal P–P Plot for Communication Skill by AI-Driven Environment.

In **Table 5**, the study indicates that the student experience survey exhibits a significant degree of reliability. The measure of internal consistency, Cronbach's Alpha, demonstrates a value of 0.960, surpassing the established benchmark for "excellent" reliability, which is set at 0.9 or higher. The presence of 20 survey questions demonstrates the successful acquisition of reliable and consistent information from the participants, so assuring that the collected data appropriately represents their experiences.

Table 5. Reliability Statistics.

Cronbach's Alpha	N of Items
0.960	20

7. Discussion

The results of the statistical analysis data in this study provide a comprehensive understanding of the data obtained from research participants, explaining measures of central tendency and measures of spread in the data set. The research sample size of 51 participants is considered large enough to draw conclusions about a larger population because it is considered representative. The observed scores, which ranged from 60.00 to 99.00, indicated a significant degree of heterogeneity in participants' responses regarding AI-driven improvement of oral communication skills in the EFL classroom, reflecting a wide range of opinions. **Table 3** shows an average value of 85.12, indicating a generally positive perception regarding the effectiveness of artificial intelligence in improving communication skills, which is almost the same as the highest score. However, the presence of a standard deviation of 10.07 highlights the variability in individual responses, indicating that although many participants in this study showed significant progress, others showed only slight improvements or even declines in their communication skills. Therefore, although the mean scores show a largely optimistic perspective, the observed variations in standard deviations underscore the complexity of participants' experiences with AI-powered communication skills improvement and require more creative strategies.

Based on the survey answers shown in **Table 5**, this study aims to assess the efficacy of artificial intelligence robot instructors and metaverse environments in encouraging the English language acquisition process among a sample of 51 undergraduate students. Most participants agreed that the AI robot teacher and metaverse setting were conducive to EFL learning at the university level, resulting in an overall positive view of the AI technology. The application of AI-Robot Tutor-based interaction produces great input, thereby increasing participants' understanding of various English oral communication skills, which is in line with research conducted by Verhelst and Feng [43,44]. Nevertheless, this study revealed that specific areas for improvement include optimizing feedback mechanisms within the metaverse and addressing individual needs for further education such as the importance of strengthening especially in the areas of vocabulary and grammar. Despite these obstacles, there was a slight increase in students' confidence in verbally speaking English, and overall, there was a positive trend towards knowledge gain through the use of AI tutors. The results show that although AI robot tutors and metaverse environments show potential to improve English language learning, additional advances and modifications are needed to overcome the highlighted obstacles and optimize their efficacy.

Based on the findings of this research, it appears that, in general, respondents expressed confidence and trust in AI-driven. The EFL language class has a positive effect on the development of their oral communication skills, as shown by **Table 3**, which shows an average score of 85, which is in the good category, namely in the range of 70–80. Regarding the task of presenting their English skills in dialogue and communicating with peers in **Figure 3**, the results also show an increase in self-confidence in using English, increasing vocabulary, gestures, and grammar. Previous research produced convincing findings regarding the efficacy of chatbots in relation to students' English language competency levels. According to Huang et al. [45], chatbots have proven to be beneficial for students' oral communication skills. As per their statement, robot tutor chatbots are first created to interact with individuals to become fluent in a language, and they may not have the ability or proficiency to detect errors related to pronunciation, spelling, or grammar. Current research reveals that individuals have made greater improvements in their speaking fluency and communication skills, as evidenced by survey results.

This research further supports previous research

that shows the positive impact of robot tutor chatbots on students at the university level. Additionally, considering that the individuals involved in this investigation engaged in voice communication with a robot tutor chatbot. The results of this study further corroborate previous research, which showed that students benefit more from voice chat. According to Hapsari and Wu [9], voice chat is very beneficial for improving speaking skills. Due to the cognitive load voice chat imposes, Çakmak suggested that robot tutor chatbots may be more appropriate [46]. In contrast, Kim et al. provide empirical evidence supporting the positive impact of engaging in conversations with chatbot robot tutors on improving the oral communication skills of English as a Foreign Language (EFL) learners [6]. Simply put, his research reveals that undergraduate students gain greater benefits by engaging in interactions with chatbots. Research reveals that robot tutor chatbots are more beneficial for students and motivate them to practice using their EFL language to the fullest, regarding to pronunciation the results of this study indicate that undergraduate students still need guidance for grammar.

During the learning, the respondents showed good performance and participated in voice chat with the AI chatbot. Engaging in conversational practice with an AI chatbot may prove more effective in improving pronunciation skills in English as a Foreign Language (EFL). Previous research has also pointed out certain limitations regarding the use of chatbots. According to participants in this study, communication breakdowns may arise during interactions with chatbots, and miscommunication could occur due to students' pronunciation errors. Students who are involved in multiple subjects, abruptly switch topics, and encounter disruptions in their interactions may be the cause of this phenomenon. Observations also found that the My Virtual Robot Dream Friend AI chatbot often gave unimportant replies. Additionally, they often provide predictable and repetitive answers. Students experience frustration, surprise, and embarrassment when chatbots provide inappropriate and irrelevant responses. Apart from that, additional weaknesses were also found related to AI chatbots related to error correction. Chatbots do not correct any mistakes undergraduate students make during their written and verbal interactions in their learning. Additionally, the study's findings noted that undergraduate students felt comfortable and concentrated on conversations due to reduced tension, a relaxed atmosphere, and a meaningful experience. Students expressed feelings of speaking to an automated system rather than a human individual, Muthmainnah et al. [32].

8. Conclusions and Recommendations

AI chatbots have facilitated the development of speaking skills among EFL students. There is no doubt that students in the English as a Foreign Language (EFL) sector benefit from engaging with chatbots. First and foremost, conducting speaking exercises with a chatbot is like having a face-to-face conversation, and its advantages in terms of speaking skills are comparable to those observed in face-to-face interactions. The current study offers valuable insights into the effective utilisation of chatbots to improve English as a Foreign Language (EFL) communication skills, taking into account the fact that students actively participate in verbal interactions with AI chatbots. Impact of AI chatbots on English as a Foreign Language (EFL) students' communication skills: Although the technology is still in the development process and is not yet a standalone tool, this research provides insight into its application for efficient language acquisition.

The following are recommendations and obstacles for further research: There are restrictions on the number of participants in this research. Due to the potential for varying results with a larger sample size consisting of individuals from all backgrounds, age groups, and genders, it is not advisable to extrapolate these findings to all English as a Foreign Language (EFL) contexts. The duration of the study can also be seen as a constraint. The duration of the treatment period in this investigation was limited to one semester due to time constraints. The reliability of the findings may be increased by extending the duration of treatment sessions. In addition, this research must also consider student characteristics such as learning styles and student preferences in relation to technology. To take into account the potential impact of these variations on participants' speech learning outcomes, it is advisable to combine the analysis of the affective dimensions of the different subjects and ask a series of questions. Undoubtedly, students can benefit from engaging with AI chatbots in an English

as a Foreign Language (EFL) environment. Considering the ongoing development of AI technology and the fact that chatbots are not yet fully autonomous tools, the results of this study can offer valuable insights to increase their utilisation in EFL language acquisition more practically and effectively. It was also revealed that AI-driven tools such as "My Virtual Dream Friend" can significantly enhance collaborative and cross-cultural English as a Foreign Language (EFL) activities by providing interactive, tailored, and culturally immersive learning experiences.

Recommendations

Based on the results of this research, it is known that English as a Foreign Language (EFL) promises a comprehensive set of tactics aimed at maximizing language mastery in a digitally integrated environment. The proposal to include personalized learning plans conforms to the principles of English as a Foreign Language (EFL), which prioritizes education tailored to meet the needs of different learners. This approach specifically targets improving vocabulary and grammar skills. Additionally, the importance of improving feedback systems in metaverse settings underscores the importance of rapid and appropriate feedback in guiding language acquisition, as highlighted in EFL theory. In addition, the suggestion to include opportunities for native language use in virtual environments is in line with the concept of English as a Foreign Language (EFL), which emphasizes the importance of real-world language situations in developing practical language abilities and effective communication skills. Additionally, the promotion of collaborative learning experiences in a metaverse environment is in line with the principles of English as a Foreign Language (EFL) theory, which emphasizes the benefits of collaborative activities in supporting the acquisition of language skills through authentic communicative contexts. Additionally, the suggestion to offer continuing professional development opportunities for instructors recognizes the importance of skilled educators to successfully incorporate AI technologies into language teaching. This is in line with EFL theory's emphasis on continuous professional development to improve teaching effectiveness and maximize student learning outcomes.

The recommendations presented in this study are designed to maximize the effectiveness of language learning in a technologically integrated setting. These recommendations prioritize personalized instruction, improved feedback mechanisms, the incorporation of authentic language usage, the promotion of collaborative learning experiences, and the provision of continuous professional development opportunities for instructors. These strategies, which are based on English as a Foreign Language (EFL) theory, emphasize the significance of tailored assistance, prompt feedback, genuine language input, cooperative exercises, and ongoing professional growth in promoting language acquisition and improving overall proficiency among learners in the metaverse setting. By incorporating these suggestions, educators have the potential to improve the efficacy of language education, optimize student involvement, and foster significant language acquisition encounters.

Recommendations regarding chatbots in this research are also related to the results of previous research. Recommendations put forward in previous research mostly relate to its efficacy in improving language proficiency. This study suggesting that implementing grammar checks or spelling feedback can be beneficial for students and students can benefit from chatbots that have the ability to engage in conversations. A significant issue that educators are now facing is low student participation. These undergraduate students often lack the confidence to communicate effectively with others in English, hindering their ability to focus in class. Therefore, it is very important to design new methodologies for English language acquisition among students who show a lack of motivation to engage in classroom activities or the overall learning environment. In general, this research shows that their oral communication skills show significant improvements in their pronunciation, intonation, clarity and stress. It can be concluded that most of the students showed improved oral communication skills after interacting with AI.

Author Contributions

Conceptualization, A.N.; methodology, M.; software, A.A.Y.; validation, A.N.; formal analysis, A.A.Y.; investigation, M.; resources, M; data curation, M; writing—original draft preparation, A.N.; writing—review and editing, M.; visualization, A.A.Y. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

The authors declare no conflict of interest.

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