**Assessing the Effectiveness of ArticuBot in Enhancing Pakistani ESL Communication Skills**

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**Abstract**

**Title: Assessing the Effectiveness of ArticuBot in Enhancing Pakistani ESL Communication Skills**

This study examines the effects of ArticuBot, an AI-powered language learning tool, on the oral communication skills of ESL students at the National University of Modern Languages (NUML) in Islamabad, Pakistan. Using a quasi-experimental mixed-methods design, the research involved 100 undergraduate students over 8 weeks, focusing on enhancing fluency, coherence, and interactional competence through regular classroom activities with the tool. To assess its impact, the study utilized both quantitative and qualitative methods, including an oral communication test administered before and after the intervention and a learner perception questionnaire. The speaking evaluations were rated by two independent raters based on fluency, coherence, and interactional competence, with results analyzed using paired sample t-tests. The findings revealed significant improvements in students' oral communication skills, averaging increases of 2.8 points in fluency, 2.3 in coherence, and 2.6 in interactional competence. Student feedback highlighted ArticuBot's role in promoting learner autonomy, reducing communication anxiety, and enhancing classroom interaction. This research contributes valuable insights into the integration of AI in ESL teaching, particularly in under-resourced settings like Pakistan.

**Keywords:** ArticuBot, ESL learners, communication skills, Pakistani classrooms, digital pedagogy.

**1. Introduction**

Integrating Artificial Intelligence (AI) into language learning has profoundly transformed English as a Second Language (ESL) education. AI-powered tools, including chatbots and voice assistants, are gaining recognition for their remarkable capacity to replicate real-life conversation scenarios, encourage learner autonomy, and deliver tailored educational experiences that cater to individual needs (Wang & Vasquez, 2021; Reinders & White, 2023).

In Pakistan, large classroom sizes and limited opportunities for meaningful teacher-student interaction impede effective language acquisition (Ali, 2021). In this context, AI-based tools such as ArticuBot offer an innovative solution to these pedagogical hurdles. By utilizing advanced algorithms and natural language processing capabilities, ArticuBot provides learners with consistent opportunities for speaking practice, fostering fluency and confidence. Furthermore, by allowing students to engage in conversational practice at their own pace, these tools enhance language proficiency and empower learners to take charge of their language journeys. This represents a shift towards more interactive, personalized learning environments, making AI an invaluable asset for effective ESL education.

As educational institutions in Pakistan confront the challenges of digital inequality and inadequate infrastructure (Ashraf, Kanwal, & Bashir, 2023), the need for innovative and cost-effective solutions becomes increasingly pressing. Among these solutions, technologies like ArticuBot an AI-powered tool designed to enhance language learning have the potential to improve students’ engagement and speaking proficiency significantly.

This study investigates the effectiveness of ArticuBot in enhancing communication skills among undergraduate ESL (English as a Second Language) learners at the National University of Modern Languages (NUML). Specifically, it focuses on three key areas: fluency, coherence, and interactional competence. By assessing the impact of this AI tool, the study seeks to determine whether its integration into resource-constrained classroom settings can lead to meaningful improvements in students’ oral proficiency.

Through a combination of qualitative and quantitative assessments, this research aims to provide insights into how AI tools can enrich students' learning experiences, ultimately equipping them with the necessary skills to navigate academic and real-world communication challenges effectively.

Classrooms in Pakistan often face issues such as overcrowding, insufficient personalized instruction, and limited chances for verbal interaction, all of which impede the growth of English-speaking skills among students (Ali, 2021; Mahboob, 2020). Conventional ESL teaching in Pakistan still focuses heavily on rote memorization, grammar exercises, and teacher-led approaches, which frequently leave learners with inadequate opportunities for engagement or practical communication (Rahman, 2022). Despite reforms in the curriculum and a greater understanding of communicative language teaching (CLT), a majority of undergraduate students still struggle to express themselves fluently or confidently in real-life scenarios. These institutional challenges are further exacerbated by assessment systems that prioritize exams, teachers who lack training in communicative approaches, and a scarcity of authentic English-language resources (Khan, 2021).

The emergence of AI-based educational tools like ArticuBot has created new possibilities for altering language classrooms by providing personalized, engaging, and scalable language learning experiences. Nevertheless, most research surrounding these tools concentrates on student learning outcomes and tends to take place in technologically advanced or Western settings (Reinders & White, 2023; Darasawang & Reinders, 2022). In Pakistan, where the integration of technology in education is still developing and digital literacy among educators varies greatly, it is uncertain how language teachers view and adapt to these tools. There are still unanswered questions regarding the practicality, cultural significance, usability, and educational value of incorporating AI chatbots in local ESL environments, especially in higher education institutions like NUML.

Moreover, the function of teachers in mediating and guiding the application of AI tools in the classroom has largely been overlooked in the Pakistani context. Teachers' attitudes, readiness, and perceptions of digital language assistants can greatly impact the effectiveness of such innovations. Without the support and commitment of educators, the implementation of AI tools might end up being superficial or underutilized (Zehra & Bilal, 2022; Gul, Shah, & Jabeen, 2022). This study aims to bridge this gap by examining how ESL instructors at the National University of Modern Languages (NUML) in Islamabad perceive and engage with the use of ArticuBot. Gaining insights into their viewpoints is crucial for developing effective training programs, teaching strategies, and policies that facilitate meaningful technology integration in ESL education throughout Pakistan.

**1.2 Objectives**

1. To measure the impact of ArticuBot on ESL learners’ communication skills.
2. To explore learners’ perceptions and engagement with ArticuBot.
3. To evaluate the practical feasibility of integrating AI-based tools in Pakistani ESL classrooms.

This study is crucial for educators, language policymakers, and curriculum developers who aim to incorporate Artificial Intelligence (AI) into English language education. As Pakistan continues to grapple with challenges in English language instruction—such as large class sizes, limited resources, and a focus on grammar-based instruction—there is a growing need for innovative, technology-based approaches that can address these systemic issues (Mahboob, 2020; Ali, 2021). By evaluating the effectiveness of ArticuBot, an AI-powered chatbot, this research provides empirical insights into how digital tools can support English as a Second Language (ESL) pedagogy. Such insights are especially significant in under-resourced and linguistically diverse environments where traditional teaching strategies often fail to engage learners effectively (Gul, Shah, & Jabeen, 2022).

The findings from this study can guide the strategic integration of AI into classroom practices, promoting more personalized, interactive, and inclusive language instruction. In contemporary ESL classrooms where learners come from diverse linguistic and cultural backgrounds, traditional one-size-fits-all methodologies may not address individual learning needs (Reinders & Benson, 2017). AI tools like ArticuBot offer opportunities for differentiated instruction, allowing students to engage in authentic conversations, receive real-time feedback, and build communication skills at their own pace. These features align with modern pedagogical goals that emphasize learner-centered approaches, digital competence, and communicative competence (Warschauer & Healey, 2021). For Pakistan, a country striving to enhance the global competitiveness of its graduates, the adoption of such tools could significantly improve the quality and accessibility of English language education.

Moreover, this study contributes to the broader theoretical and pedagogical discussions surrounding digital pedagogy, learner autonomy, and posthumanist approaches to education. In digitally mediated learning environments, AI-based tools are not merely instructional supplements but are reshaping the nature of teacher-student interaction and learning itself (Braidotti, 2013; Reinders & Darasawang, 2022). By exploring teachers' perceptions and experiences with ArticuBot, the study also addresses concerns related to the ethical, cultural, and practical dimensions of AI integration. This is particularly important for developing countries like Pakistan, where the adoption of educational technology must be contextualized within local sociolinguistic realities, institutional capacities, and pedagogical beliefs (Zehra & Bilal, 2022). The study’s findings can therefore inform policy frameworks, teacher training programs, and future development of AI-enhanced language tools that are culturally responsive and pedagogically sound.

**2. Literature Review**

Recent academic research highlights the increasing role of AI in language acquisition. Reinders and White (2023) assert that AI tools boost learner independence by offering prompt, context-aware feedback. Lai and Lin (2022) discovered that students engaging with AI chatbots showed enhanced motivation and confidence in speaking, thanks to the personalized and non-critical nature of the interactions with the bots.

Xu and Wang (2023), through a study conducted in a classroom setting, demonstrated that chatbots such as ArticuBot greatly enhanced students' fluency in speaking and their ability to take turns in conversation. Likewise, Wang and Vasquez (2021) highlighted the significance of interactional competence in AI-supported learning, pointing out that students who participated in repeated conversations with bots exhibited noticeable improvements in coherence and the use of pragmatic language.

From a Pakistani viewpoint, research conducted by Ali and Yasmin (2023) and Gul et al. (2022) shows that although students are open to using AI tools, there is still an absence of organized application in ESL environments. Their results indicate that the successful integration of AI depends on user familiarity, educator training, and the adaptability to specific contexts. Furthermore, Reinders and Darasawang (2022) support aligning AI tools with socio-constructivist teaching methods, highlighting the significance of interaction, scaffolding, and learner autonomy in language learning contexts.

A recent trend in AI-assisted language learning is the movement towards multimodal learning environments. As noted by Chen and Liu (2023), platforms driven by AI now integrate various sensory modes, including audio, text, visual elements, and speech recognition, which together boost learner engagement and understanding. These technologies create an immersive language-learning experience that reflects genuine real-world communication situations. For instance, AI voicebots and chatbots designed to replicate actual service interactions, like ordering food or addressing customer complaints, have proven to enhance pragmatic awareness and context-specific language use. ArticuBot, featuring task-oriented modules (such as job interviews and restaurant conversations), illustrates this multimodal capability by facilitating both listening and speaking practice in real-world contexts.

Additionally, AI tools have been recognized for promoting learner-centered teaching approaches, especially in large ESL classes. A study conducted by Sharma and Dizon (2021) found that incorporating chatbots enabled students to participate in differentiated learning activities without overwhelming teachers. The AI systems offered feedback customized to students’ proficiency levels, which minimized the need for continuous teacher support. This aligns with the idea of micro-learning, where learners engage with small, AI-curated language tasks at their convenience. ArticuBot’s adaptability in providing brief, goal-oriented interactions makes it an effective option for overcrowded or resource-limited ESL classrooms in Pakistan.

Additionally, research has examined the emotional aspects of integrating AI, focusing particularly on student anxiety and confidence levels. Liang and Tran (2023) discovered that learners tend to feel less judged when engaging with AI-driven bots rather than human teachers. This observation aligns with the responses from participants in the current research, who indicated a decrease in the fear of making errors while communicating with ArticuBot. Given that anxiety is a recognized obstacle to achieving oral proficiency in ESL contexts (Young, 2020), AI applications such as ArticuBot provide a more psychologically secure environment for continuous practice and self-correction, thereby facilitating ongoing oral skill development.

The pedagogical structure of AI tools has also been analyzed using the framework of Technological Pedagogical Content Knowledge (TPACK). Nguyen and Sulaiman (2022) point out that the effectiveness of teachers in integrating AI tools depends on their capacity to combine technology with suitable teaching strategies and language content. Without a strong grasp of TPACK, the potential of AI tools may not be fully realized or may be applied incorrectly. In the context of Pakistan, it is vital to train teachers to utilize ArticuBot effectively through workshops and digital literacy initiatives to enhance its effectiveness. Educators need to comprehend not only the technical components but also how to align chatbot interactions with curricular objectives and the needs of learners.

There is an increasing demand for AI tools in language education that are localized and culturally appropriate. According to Khan and Aslam (2024), the majority of AI chatbots are designed within Western frameworks, which may not resonate with the communication styles or learning preferences of South Asian students. ArticuBot, which is built using content tailored to the NUML curriculum, fills this void by integrating culturally relevant themes, accents, and social contexts. This contextual modification boosts student connection, improves engagement, and guarantees that learning outcomes are significant both linguistically and culturally.

**3. Methodology**

**Research Design**

This investigation utilized a quasi-experimental mixed-methods design within a classroom context to assess the effects of ArticuBot on the oral communication abilities of undergraduate ESL students. The choice of a quasi-experimental design was considered suitable as it involved using existing classroom groups rather than randomly chosen samples, which ensured ecological validity in a genuine educational environment. The mixed-methods approach facilitated both the quantitative assessment of enhancements in learners’ communication skills and the qualitative examination of their experiences and perceptions regarding ArticuBot.

**Research Context and Participants**

The study was carried out at the National University of Modern Languages (NUML) in Islamabad, using a purposive sample of 100 undergraduate students who were enrolled in the Bachelor of Science in English Language and Literature program. The participants were between the ages of 18 and 24 and were identified as having intermediate proficiency in English, based on placement tests given by the department prior to the research. This group was chosen because students at this academic level often encounter ongoing difficulties with productive language skills (speaking and writing), even though they have a foundational grasp of English. Additionally, the sample accurately reflects a typical ESL learning environment within higher education in Pakistan.

**Intervention Procedure**

The intervention was carried out over a duration of four weeks. Throughout this period, ArticuBot, a specially tailored conversational chatbot built using Google Dialogflow, was incorporated into the weekly speaking activities of the students and was available for additional practice outside of class on both mobile and desktop devices. The design of the chatbot aimed to:

• Mimic real-life conversational scenarios such as academic discussions, workplace exchanges, and casual conversations.

• Involve learners in role-playing exercises that necessitated spontaneous replies.

• Provide interactive vocabulary exercises with contextual applications.

• Ask open-ended questions to stimulate critical thinking and maintain discussions.

• Give corrective feedback on grammar, sentence structure, and pronunciation.

• Deliver targeted vocabulary assistance, aiding learners in broadening their word choice in context.

This combined approach of integrating activities in class and offering supplementary use outside of class allowed students to enhance their oral communication abilities both with teacher guidance and on their own, promoting increased learner independence.

**Data Collection Instruments**

To capture both quantifiable learning results and personal learner experiences, the research utilized two primary tools:

1**. Oral Communication Pre- and Post-Tests**

* Conducted in person before and following the intervention.
* Students were assessed using a standardized rubric that evaluated three essential aspects of oral communication:
* ▪ Fluency (the fluidity, rhythm, and spontaneity of speech),
* ▪ Coherence (organization of thoughts and logical connections), and
* ▪ Interactional Competence (the ability to maintain conversation, respond suitably, and manage turn-taking). Each aspect was rated on a scale from 1 to 10, with a highest possible score of 30.
* To guarantee inter-rater reliability, performances were evaluated by two separate raters, and any differences were addressed through discussion and agreement.

2. **Learner Perception Questionnaire**

* Administered to all 100 participants after the intervention.
* Consisted of 10 items using a Likert scale (ranging from Strongly Disagree to Strongly Agree).
* Items examined learners’ views on:
* ▪ Engagement (motivation, interest, and involvement stimulated by ArticuBot),
* ▪ Autonomy (perceived capability to practice independently with the chatbot), and
* ▪ Effectiveness (perceived influence of ArticuBot on communication abilities).

The questionnaire was filled out anonymously to promote sincere and open feedback..

**Data Analysis**

**•** Quantitative Analysis: Paired-sample t-tests were performed on the results from pre- and post-tests to determine statistically significant enhancements in oral communication skills.

• Qualitative Analysis: Descriptive statistics (including frequencies, means, and standard deviations) were employed to evaluate the responses to questionnaires, underlining learner attitudes, perceived advantages, and areas for improvement.

• The mixed-methods approach guaranteed that the analysis assessed language improvements objectively while also capturing the students' personal experiences, yielding a comprehensive understanding of the intervention's effectiveness**.**

**Ethical Considerations**

Ethical standards were rigorously upheld throughout the research process. Participants received detailed information regarding the study and provided informed consent prior to their involvement. They were assured that participation was voluntary and that choosing not to participate would not impact their academic status. Data collection and reporting were conducted anonymously to protect the confidentiality of participants**.**

**4. Findings**

## **4.1 Quantitative Analysis**

The quantitative data obtained from the oral communication assessments conducted before and after the intervention provided strong evidence of ArticuBot’s efficacy in improving ESL learners’ communication abilities. A paired sample t-test indicated a highly significant enhancement (p < 0.001) in all three assessed areas: fluency, coherence, and interactional competence. In particular, the average fluency score increased from 5.1 (SD = 1.2) to 7.9 (SD = 1.1), coherence improved from 4.8 (SD = 1.3) to 7.1 (SD = 1.0), and interactional competence was raised from 5.0 (SD = 1.1) to 7.6 (SD = 1.2). These results suggest that the participants became more skilled not only in speaking clearly and fluently but also in forming coherent discussions and managing turn-taking processes.

A detailed examination of subgroup performance revealed a steady enhancement across all participants, irrespective of gender, prior familiarity with digital tools, or initial language skills. Notably, the cohort that had the lowest self-confidence in speaking English showed the greatest progress, especially in terms of fluency and interactional skills. This improvement may be linked to the supportive atmosphere created by the AI platform, which enabled learners to practice speaking repeatedly without the worry of feeling embarrassed. These findings align with those of Liang and Tran (2023), who observed that language learners using AI-based conversation tools experienced lower levels of anxiety.

With regard to inter-rater reliability, the agreement between the two independent evaluators was verified by computing Cohen’s kappa (κ = 0.82), which indicates a strong level of agreement. This enhances the reliability of the assessment findings. The combination of significant statistical results and consistent ratings from the evaluators confirms the strength of the evaluation tools used and underscores the effectiveness of classroom-based quasi-experimental designs in assessing real-world learning outcomes (Nguyen & Sulaiman, 2022).

## **4.2 Qualitative Insights**

The qualitative aspect of the study included focus group discussions and reflective journals from students, which offered deeper understanding of learners' experiences and attitudes toward ArticuBot. Numerous participants indicated that interacting with the AI was less intimidating than conversing with human teachers or classmates. A repeated theme was the notion of a "safe learning environment," where students felt free to make errors without the fear of being judged. One student remarked, “I wasn’t worried about making mistakes or being laughed at. The bot simply listens and assists.” This highlights the emotional advantages of engaging with AI, especially in fostering student confidence and involvement.

Students also emphasized that the constant availability of ArticuBot encouraged learner independence and regular practice. The opportunity to obtain immediate feedback and revisit exercises as necessary enabled learners to enhance their oral communication skills. Many students noted not only advancements in language skills but also in their capacity to structure their thoughts and respond coherently in spontaneous circumstances. One participant commented, “It felt like a genuine conversation, and I had to think quickly yet clearly.” These observations are consistent with the ideas behind task-based learning and self-regulated learning, both of which align with post-humanist educational methods (Bayne & Jandrić, 2020).

Nonetheless, several challenges were noted. A small group of students reported shortcomings in the chatbot's cultural awareness and suitability for specific contexts. For instance, the bot sometimes misunderstood casual or idiomatic expressions. Furthermore, while ArticuBot provided organized prompts and feedback, it occasionally lacked the emotional richness and nuanced replies that human conversations offer. These issues emphasize the necessity of adapting AI tools to reflect the cultural realities of ESL learners in particular settings, such as Pakistan (Khan & Aslam, 2024).

## **4.3 Results and Findings**

The comprehensive assessment of both quantitative and qualitative data clearly shows that ArticuBot successfully enhanced ESL students' communication abilities. The utilization of AI tools resulted in observable improvements in fluency, coherence, and interactional competence. The most notable advancements were seen in fluency, indicating that providing repeated, low-pressure speaking experiences is essential for the development of spoken language skills. These results align with research conducted by Xu and Wang (2023) and Wang and Vasquez (2021), which highlight the significance of regular oral practice in achieving proficiency in a second language.

From an educational perspective, ArticuBot enhanced learner involvement by providing interactive and customized language experiences. The chatbot's ability to modify prompts and repeat interactions established a support mechanism akin to Vygotsky's Zone of Proximal Development (ZPD). Within this framework, learners functioned slightly beyond their existing abilities but still within the reach of proficiency, aided by a responsive AI system instead of a human instructor. This approach to digitally assisted support aligns with socio-constructivist principles, where knowledge is jointly created through interactions—not only with individuals but also with intelligent systems (Reinders & White, 2023).

The research also highlighted the potential of utilizing AI in classrooms with limited resources, where the scarcity of teachers and time restrictions frequently hinder opportunities for enhancing oral language skills. ArticuBot provided a scalable approach that could complement traditional teaching, enabling students to engage in practice outside of school hours. It also alleviated some of the burdens on educators while ensuring that learners received regular feedback and exposure to the language. This finding is especially important given the context of universities in Pakistan, where class sizes are often large and the integration of technology is still in its early stages (Ali & Yasmin, 2023).

Ultimately, the research underscores significant implications for policy and curriculum design. The effective use of ArticuBot indicates a necessity to revise ESL curricula to incorporate AI-assisted resources that address the needs of contemporary learners. Furthermore, teacher training programs need to adapt to include digital teaching methods and proficiency in AI. The addition of intelligent systems should be viewed as a way to enhance educators' roles rather than replace them, broadening their capabilities and facilitating more tailored and individualized instruction. The results provide actionable recommendations for the future integration of AI in linguistically diverse and technologically evolving areas.

 **5. Discussion**

The findings support the idea that AI tools such as ArticuBot can significantly improve ESL communication abilities, particularly in resource-limited and crowded environments like those found in Pakistani universities. The statistically significant gains in fluency, coherence, and interactional competence correspond with earlier studies by Xu and Wang (2023) and Wang and Vasquez (2021), confirming that frequent, customized, low-stakes interactions with AI bots promote the development of oral skills.

From a socio-constructivist viewpoint, the implementation of ArticuBot aligns with Vygotsky’s notion of the Zone of Proximal Development (ZPD), wherein learners progress by engaging with more competent "others"—in this instance, the AI bot enhancing their language learning journey (Kozulin et al., 2003). Additionally, ArticuBot seems to lower the affective filter by creating a non-threatening atmosphere, which is in harmony with Krashen’s theory of language acquisition.

The qualitative data presents a complex perspective. Although the majority of students had a favorable view of the intervention, particular difficulties, like digital fatigue and the lack of personalized feedback, were highlighted. These results align with the observations made by Lai and Lin (2022), who found that while AI can boost engagement, it should be paired with human support and awareness of the context.

In classrooms in Pakistan, teachers frequently find it challenging to provide individual speaking opportunities because of the large number of students and limited time (Ali, 2021), making AI-powered tools an effective solution. The progress noted among students who are not technologically savvy also indicates that the accessibility and ease of use of the interface can have a considerable impact.

An intriguing element of the results is the decrease in speaking anxiety noted among the participants. Students who had previously been reluctant to speak in front of their classmates or teachers reported feeling more at ease when engaging in conversations with ArticuBot. This corresponds with the findings of Liang and Tran (2023), which indicated that learners interacting with AI-powered chatbots experienced reduced language anxiety and enhanced spontaneous speaking skills. The bot's non-critical feedback and round-the-clock availability were specifically highlighted as motivating factors that promoted consistent practice, enabling students to explore language usage without the fear of public embarrassment.

Additionally, students emphasized that ArticuBot's adaptive feedback mechanism was crucial in enhancing their oral performance. While the tool is not yet as proficient in providing nuanced feedback as a human instructor, many learners found the immediate corrections and rephrased responses beneficial for recognizing grammatical mistakes and improving their sentence structure. This aligns with Reinders and White (2023), who stress the significance of immediate and interactive feedback in AI-driven language education. Learners valued the chatbot's ability to reframe their replies in real-time, demonstrating more precise language use and supporting self-correction.

Interestingly, students perceived ArticuBot as a source of motivation that aided them in developing personal learning routines. The gamified design and interactive prompts instilled a sense of challenge and accomplishment, especially for those getting ready for job interviews or presentations. This is consistent with Munday (2022), who discovered that the use of AI bots in ESL environments enhances learner autonomy, engagement, and a sense of ownership over tasks. Several participants noted revisiting conversations beyond classroom hours, indicating heightened intrinsic motivation and self-directed learning behaviors.

Additionally, ArticuBot's inclusivity and scalability have been acknowledged as significant advantages within the Pakistani setting, where limited teacher-student ratios and insufficient infrastructure often impede educational equity. As noted by Ali and Yasmin (2023), AI tools have the potential to close access gaps in language education, particularly in areas with strained educational systems. The present study reinforces this perspective, illustrating that even in environments with high enrollment, AI initiatives such as ArticuBot can provide impactful, personalized learning experiences without overwhelming teachers.

Ultimately, the results support an instructional approach that combines AI engagement with teacher guidance. While students appreciated ArticuBot for enhancing their fluency and self-assurance, they also expressed a need for human feedback to supplement the automated replies from the chatbot. This aligns with the views of Gul et al. (2022) and Lai and Lin (2022), who promote hybrid teaching strategies where AI supplements, rather than substitutes, traditional methods. Incorporating ArticuBot into the educational framework not only tackled practical issues but also conformed to new global benchmarks in digital literacy and multimodal learning.

**6. Conclusion**

This research provides strong empirical evidence showing that AI-enabled tools, particularly ArticuBot, can significantly enhance English as a Second Language (ESL) communication skills in large, traditional classroom environments. By concentrating on crucial aspects like increased fluency, coherence, and interactional competence, learners improved their language skills and also saw a substantial boost in their confidence and independence in communication.

Participants who used ArticuBot noted a more vibrant and interactive learning atmosphere, which allowed for better practice opportunities beyond the limits of standard classroom interactions. The successful combination of quantitative data highlighting measurable advancements in language abilities alongside positive feedback from students underscores the significant impact that AI integration can have on ESL education. This integration not only fulfills educational goals but also aligns well with students’ preferences, making them more open to technology-enhanced learning methods. Consequently, the results indicate that incorporating AI tools into ESL curricula is not only effective but is also welcomed by learners, leading to a more engaging and fruitful educational experience.

Additionally, the implementation of ArticuBot helped overcome significant challenges commonly seen in ESL classrooms in Pakistan, including the lack of opportunities for personalized speaking practice and limited time for large group instruction. This tool provided opportunities for repeated, self-directed oral engagement, giving learners instant feedback and tailored assistance. As highlighted in research by Xu and Wang (2023), such features are essential for allowing students to practice the language in authentic and relevant settings. By moving part of the speaking instruction to an AI-supported environment, teachers can make more efficient use of classroom time, balancing direct instruction with personalized support.

One significant contribution of the research is its connection to both socio-constructivist and post-humanist theoretical viewpoints. The socio-constructivist approach highlights the importance of learner interaction, scaffolding, and collaborative knowledge creation, all of which were facilitated through students participating in AI-mediated discussions and peer reflections. Concurrently, the post-humanist perspective enabled the investigation of the indistinct boundaries between humans and machines within learning environments. ArticuBot acted not just as a tool but as an engaged participant in the linguistic development of students, illustrating how non-human entities can play a role in human learning (Bayne, 2020). This integration of theories deepens our comprehension of how emerging technologies can transform educational experiences while still aligning with fundamental language learning objectives.

The results highlight the significance of digital literacy as a crucial skill set cultivated through the use of ArticuBot. While learners engaged with the tool's interface, analyzed AI-generated feedback, and modified their speaking techniques accordingly, they acquired essential skills for communication in the 21st century. These skills encompass critical thinking, multimodal navigation, and familiarity with intelligent systems. As noted by Reinders and White (2023), such digital interactions prepare learners for real-world communication situations that are increasingly influenced by AI and automation, equipping them to be proficient global citizens within digitally connected societies.

Ultimately, the favorable response to ArticuBot from students, combined with the notable enhancements in oral communication abilities, provides a compelling argument for its wider adoption. Although issues like technological infrastructure, teacher training, and equitable access must be considered, this research presents a scalable approach for improving ESL teaching in developing regions. In particular, the significance of ArticuBot in Pakistani classrooms stems from its flexibility, cultural neutrality, and its ability to enhance traditional teaching without substituting the instructor. As ESL education continues to progress, the integration of AI-driven tools like ArticuBot can foster more inclusive, customized, and effective language learning settings.

### Conflict of Interest

### The authors declare no conflict of interest in this study.

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