Ranking Potential AI Tools for Spoken ESL Improvement in Pakistan: A Fuzzy TOPSIS Approach

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Abstract

The use of AI-based tools is imminent in learning the English language. This investigation aimed to explore the effectiveness of potential AI-based English-speaking tools in Pakistan. This study employed the Fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), a Multi-Criteria Decision-Making (MCDM) method, to rank AI-based English-speaking tools for ESL learning in Pakistan. A ServQual questionnaire (Pursan, 2024) including 44 items was circulated to the target population of ESL teachers of Pakistan n=105. The results showed that the top alternative had the largest distance difference of 0.577 between the positive (3.76) and negative (5.13) values. In comparison, the lowest alternative had the smallest distance difference of 0.45 between the positive 5.12 and negative 5.11 values. The results ranked AI Chatbots, the Speak Google facility, and online games higher for speaking the English language. This study signified the golden future of AI-based speaking tools and highlighted the implications of pedagogical achievement through the Fuzzy TOPSIS approach.

***Keywords*:** *AI Tools, Spoken English, ESL, TOPSIS approach, Pakistan*

1. Introduction

In an era of technological advancements, AI-based academic English-speaking tools are often considered more effective in validating ESL speaking in developing countries like Pakistan in South Asian context. Since the ruling of making English an MOI (Medium of Instruction), there has often been a huge struggle in achieving English Language Speaking proficiency worldwide. Under immense pressure, English has been incorporated into the syllabus of South Asian schools as a major subject since the primary level. Giving ESL students the language skills necessary to communicate effectively in everyday contexts is the main objective of English language instruction. However, in South Asian

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countries, English-speaking learning frequently fails to produce positive results, especially regarding college ESL learners' speaking abilities (Khurshid et al., 2024). Undeniably, even after graduation, ESL learners find it difficult to converse and use all four language skills in English. A major reason is that the examination system emphasizes rote memorization more than using the language in real-world situations.

As a result, different tools and strategies like role-plays and learning through TPACK and DTPACK models have been explored and evaluated for their efficiency in the Pakistani context (Shoukat et al., 2024). Still, improving ESL students' speaking abilities is difficult despite much research, so adequate AI-based English language speaking tools must be widely adopted to address such issues (Riaz & Kausar, 2024). The commencement of computer-assisted learning has driven a profound interest in exploring the likeability and efficiency of AI-based speaking tools and strategies.

In light of the current scenario, the problem was understanding and ranking the efficiency of potential AI-based speaking tools for ESL speakers in the Pakistan. The exploration and ranking of such AI-based tools was required to elaborate on what grounds facilitation for the improvement of speaking skills and learning of ESL Pakistani speakers for future implementation of AI-based tools in academic settings is required.

1.1 Objectives of the Study

Objectives of the study were to;

1. explore the effective AI-based English-speaking tools.
2. re-evaluate the effectiveness of such tools in the Pakistani context.
3. rank the highest and least effective potential tools in the same context.

1.2 Research Questions

The study has been conducted to answer the following research questions;

1. Which AI-based tools are most suitable for improving spoken English proficiency among ESL learners in Pakistan?
2. How do the selected AI-based tools rank according to the Fuzzy TOPSIS approach?
3. Which AI-based tool demonstrates the highest and lowest overall suitability for spoken ESL improvement in Pakistan?

1.3 Significance of the Study

Apart from filling the literature gap, this study intended to signify the current speaking capabilities of Pakistani adult ESL learners. This study has drawn the attention of academicians towards the use and effectiveness of AI-based English language speaking tools to improve the existing speaking state of ESL learners.

2. Literature Review

Since electronic learning and Artificial Intelligence have been the new dawn of the world, they are intended to be incorporated into every field of life (Xu & Nazir, 2024; Sahar & Shahbaz, 2023). In the previous decades, the primary focus of English instruction in Pakistan was on reading and writing abilities. However, speaking and listening abilities are now far more important than in the past. Ali (2016) claims that 'speaking' has become progressively more important in second/foreign language contexts in recent years. So, AI-based tools have been efficiently applied in the global academic setting, especially for improving speaking skills and boosting confidence. The internet helps their pupils speak global languages, especially English, more fluently. As a result, Rahimi and Fathi (2022). attempted to evaluate electronic-tandem learning, where two languages impact the language skills of ESL learners. Likewise, Rahimi and Fathi (2022) have reconnected E-Tandem language learning as a tool for EFL learners to speak effectively in English. Applying AI-based tools that are prominent in the real-world academic setting can be studied through the DEMATEL approach (Hu, 2023).

Moreover, incorporating "Massively Multiplayer Online Games" (MMOGs) and their implications for second language (L2) acquisition are the prime factors for evolving speaking skills pedagogy around the globe. Jabbari and Eslami (2019) discuss that to determine which facets of L2 learning have been examined, how they were examined, and what the results imply for L2 learning opportunities and outcomes, both inside and outside of MMOG environments should be analyzed.

Such games are exemplary assets of Voice Conversation Agents (VCAs); similar technology has been replicated through chatbots (Lin & Mubarok, 2021). Likewise, introduction of ARELE-bot within an inclusive approach in the field of language pedagogy for improving speaking skills is a supplemental educational tool with the goal of offering a personalized, easily accessible language learning environment free from bias (Hajahmadi et al., 2024, p.83). However, the majority of their research has concentrated on the cognitive or affective effects of using these agents, ignoring issues such as how language learners view agents as conversation partners who are similar to humans and what characteristics of agents produce the social interaction schema needed for language acquisition (Kawinkoonlasate, 2019). In many South Asian countries, however, ESL learners have been using AI-powered assistants more and more recently. Much familiar with Google, Asian students use of Speak Google, which facilitates students to polish speaking more interactively, which aids in their English language development (Morrison, 2022; Nurmayasari, 2024). Thus, for teaching and

practicing English speaking, Speak Google can assist ESL students in their global language learning. Through reading and listening, experimental studies investigate the effects of AI-based applications, particularly "Read lee" and "@Voice Aloud Reader," as mobile applications for improving language speaking (Riaz & Kausar, 2024).

Human-Machine Intelligence (HMI) now needs to demonstrate social behaviors common in human-human communication due to the increasing developments in AI-based technological development of voice-enabled VCA (Bailey, 2019) connecting chatbots for virtual assistants. Chatbots are considered highly suitable for evaluation through Fuzzy TOPSIS because they perform well across multiple criteria such as responsiveness, conversational flow, adaptability, and learner engagement (Ilieva, 2025). Dhivvya and Karnati (2024) introduced BuddyBot Chatbot, which was created using Google Text-to-Text Transfer Transformer (FLAN-T5) and Open AI Generative Pre-Trained Transformer 2 (GPT-2) models. This system uses a variety of datasets for specialized tasks and fine-tuning in English language learning. Meanwhile, Hidayatullah (2024) discusses that AI conversational agents have a beneficial effect on enhancing university students' English speaking.

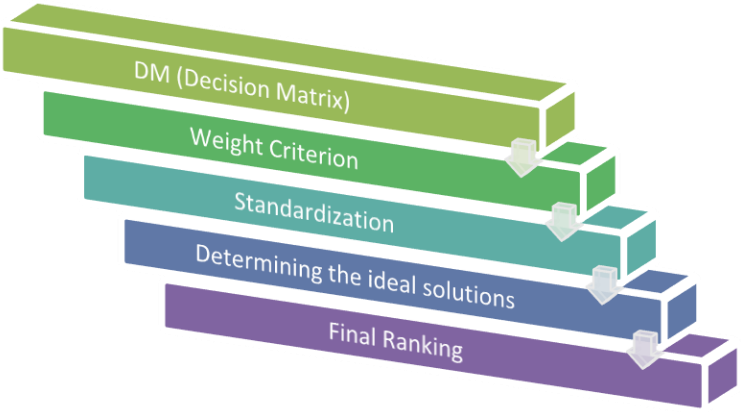
Fuzzy TOPSIS has been increasingly applied in Language research for ranking complex human-centered variables based on multiple criteria. For instance, Eti and Baş (2026) employed TOPSIS to assess social exclusion levels among international students, demonstrating its suitability for handling subjective and multidimensional data in educational contexts. Similarly, Wirawan and Basri (2026) applied the TOPSIS method to evaluate public speaking skill levels among secondary school students, highlighting its relevance in assessing language-related competencies. These studies indicate that TOPSIS is an effective decision-making tool for evaluating performance-based and skill-oriented constructs in education, making it appropriate for ranking AI-based speaking tools in ESL contexts.

Additionally, it was proposed that primary school students can be encouraged to practice speaking through AI-based role-playing (Hussain et al., 2023; Zahid et al., 2024). A study conducted in Karachi by Zaman et al. (2023) explained that electronic role play can be the primary tool for promoting efficient spoken English skills among Pakistani graduates. Similarly, ICT and artificial intelligence tools are considered to accelerate the speaking skills of ESL learners. Madhavi et al. (2023) investigated the advantages of utilizing ICT and AI technologies to help students enhance their spoken communication abilities and the elements that lead to speaking difficulties. Their study highlighted three categories of communication issues: linguistic, social, and affective. Although several steps have been taken to unlock the majesty of AI for improving English

language skills in South Asian countries, little has been incorporated in Pakistan (Khurshid et al., 2024). Thus, in the light of previous literature, it is evident that little work has been done to rank and evaluate the English-speaking AI-based tools, so there is a need to figure out the effective tools to be used in the Pakistani context in compliance with AI in pedagogical settings.

The Fuzzy Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) has been selected for this investigation. It is a multi-criteria decision-making method that ranks alternatives based on their proximity to an ideal solution. It assists in ranking and choosing options according to how near the "ideal" solution exists and how far away they are from the "negative-ideal" solution. Although TOPSIS originated in engineering and operational research, its application has expanded considerably in educational research, educational technology evaluation, language learning technologies, and social science decision-making contexts (Hang et al., 2024). Researchers have increasingly used TOPSIS to evaluate educational interventions, e-learning systems, technology adoption, and pedagogical innovations because it allows the simultaneous assessment of multiple criteria and stakeholder perceptions. In this study, ESL teachers evaluated AI-based speaking tools across several service-quality dimensions; therefore, TOPSIS was considered an appropriate method for prioritizing and ranking alternatives based on multiple educational criteria.

Figure 1
Conceptual Framework



3. Research Methodology

3.1 Research Design

For this study, a quantitative approach has been chosen in order to methodically examine the research problem and offer quantifiable insights. The study's goal of gathering empirical data to examine trends, correlations, and statistical significance among variables is in line with the survey research design selection (Creswell & Creswell, 2018).

3.2 Population and Sample

The population of this study comprised ESL teachers teaching English at the higher secondary (Intermediate) level in public and private institutions across Punjab, Pakistan. These teachers were selected because they have direct experience with learners at this level who frequently use AI-based tools to improve their spoken English skills. A sample of 105 ESL teachers was drawn to ensure that participants possessed relevant teaching experience and familiarity with technology-assisted language learning. Their professional insights were considered appropriate for evaluating and ranking AI-based English-speaking tools within the Pakistani educational context using the Fuzzy TOPSIS approach.

3.3 Sampling Technique

The sampling technique chosen for this study was simple random sampling, as Emerson (2015) considers it as the most effective sampling technique for survey research. However, a sampling criterion has been set for the target population. Keen interest has been taken to select the target population according to the pupils they teach. The following criterion has been opted for them;

- ESL/EAL Teachers (with 18 years of qualification)
- Teacher of non-English family background students
- Teachers (not enrolled in specified English-speaking programs ever)
- Age limit (23-45)

3.4 Instrumentation

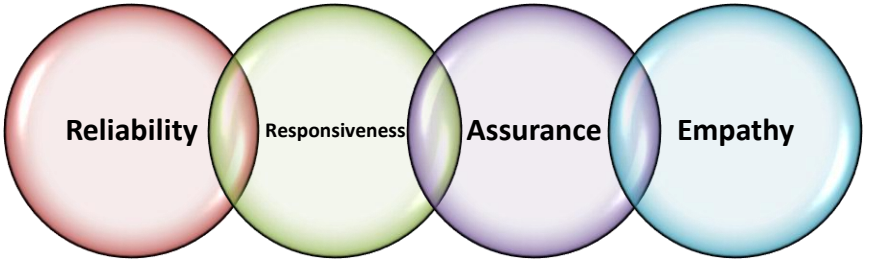
Through an in-depth literature review, a draft data sheet was initially created prior to the implementation of the research tool, including the maximum number of potential AI-based speaking tools. However, prominent AI-based speaking tools that were considered appropriate in the subcontinent context, were approved.

Questionnaire ServQual by Pursan (2024) was adapted for this study. The study employed a modified SERVQUAL instrument rather than the original five-dimensional model. The Tangibility dimension was excluded because unlike traditional service environments, AI-supported teaching tools are primarily digital in nature (Elliott, 2019), where physical facilities, equipment appearance, and other tangible aspects have limited relevance to users' perceptions of service

quality. The Cronbach alpha score was 0.781, making this questionnaire reliable. It includes 44+5 demographic items. It has four facets that measure the effectiveness of the AI-based English-speaking tools, thus answering research question 2 of this study.

Figure 3

Four facets of quality



3.5 Data Collection

The selected teachers were requested to recall their classroom environment, institute infrastructure, students' behavior and personal teaching experience before fulfilling the questionnaire. The data were collected in January, 2026. To gain maximum participation, an online survey link was generated and circulated through Internet. However, the questionnaires which did not fall under the sampling criterion were discarded. This study has followed all primary ethics, including voluntary participation, anonymity, and fair ranking.

4. Data Analysis and Interpretation

The collected data were first codified in linguistic expression to set a rating criterion, shown in Table 1. The data were then analyzed using the Fuzzy TOPSIS approach through 8 peculiar steps mentioned in Pavić and Novoselac (2013).

Table 1

Rating Criterion

Linguistic abbreviations	Linguistic Terminology	Function of Membership
VG	Very Good	(7,9,9,7)
G	Good	(5,7,9,9)
F	Fair	(3,5,5,7)
P	Poor	(1,1,3,5)
VP	Very Poor	(1,1,1,3)

5-point Likert scale (strongly agree to disagree strongly) has been replaced by the linguistic abbreviations (Very Good to Very Poor) to associate with the function of the membership.

4.1 Identification of AI-Based Speaking Tools

In step.1, a decision matrix has been constructed that Identified the alternatives and criteria mentioned in Table.1. The Formed matrix includes rows that represent alternatives and columns represent criteria. To create the weighted matrix, each normalized value has been multiplied by its corresponding criterion weight. The weighted data matrix has been calculated using the following equation:

$$e = \omega_J r_{i_j}$$

Where $\mathbf{w}_j$ is the weight of the criterion.

Table 2 represents the calculated weights of each of the four items referring to the sub-facets of the ServQual questionnaire.

Table 2
Calculated weights of the alternatives

		CB	SG	ICT	MOG	ERP	CA	ETA	VA
Reliability	Students need	0.03	0.63	0.793	0.03	0.038	0.972	0.723	0.234
	Teachers appropriate	0.31	0.45	0.729	0.87	0.73	0.79	0.045	0.008
	Applicability	0.76	0.87	0.02	0.32	0.290	0.68	0.39	0.065
	Replicability	0.35	0.09	0.79	0.39	0.47	0.568	0.78	0.45
Assurance	Confidence	0.38	0.346	0.091	0.354	0.731	0.46	0.021	0.77
	Technical support	0.352	0.59	0.032	0.974	0.47	0.93	0.334	0.434
	Vocabulary	0.921	0.76	0.379	0.73	0.279	.69	0.239	0.992
	Accent	0.012	0.34	0.68	0.29	0.521	0.29	0.344	0.004
Empathy	Trusted	0.11	0.46	0.903	0.96	0.79	.244	0.28	0.98
	Question support	0.987	0.55	0.45	0.93	0.38	0.982	0.79	0.55
	Human-like	0.88	0.003	0.932	0.021	0.37	0.45	0.94	0.334
	Emotionality	0.76	0.457	0.73	0.834	0.658	0.783	0.89	0.07
Responsiveness	Faster response	0.467	0.456	0.739	0.101	0.02	0.82	0.40	0.67
	Accessibility	0.23	0.849	0.753	0.901	0.20	0.937	0.28	0.34
	Directness	0.33	0.763	0.980	0.34	0.33	0.322	0.049	0.43
	Competence	0.743	0.43	0.032	0.67	0.21	0.23	0.97	0.56
Function of membership (mean score)		7,9,9,7	7,9,9,7	1,1,3,5	5,7,9,9	3,5,5,7	5,7,9,9	1,1,1,3	3,5,5,7
Linguistic value		VG	VG	P	G	F	G	VP	F

Step.2

The data matrix has been calculated.

$$\mathbf{R= (e)\ m\ x\ n}$$

Forty-four instrument items have been codified as 11 sub-facets (S1, S2…..Sn) based on the four sub-facets. The calculated values of the data matrix have been utilized to reconsider the data values of all 11 sub-facets.

CB= Chatbots
GS=Google Speak
MOG= Multiplayer online games
ERP=Electronic role play
CA= conversation agents
ETA= E.tandem Applications
VA= voice applications

4.2 Effectiveness of selected AI-based Speaking Tools in Pakistani contexts

The next step includes figuring out the ideal best solution that consists of the highest values for benefit criteria and the lowest for cost criteria. Meanwhile, the ideal worst solution consists of the lowest values for benefit criteria and the highest for cost criteria. The highest value for the sub criterion has been calculated.

$$\mathbf{\sum^{n} = max\ (S1, S2…..Sn)}$$

Step.4

The lowest value for the sub-criterion has been calculated

$$\mathbf{\sum_{J} = min\ (S1, S2…..Sn)}$$

Step.5

Step 5 includes the calculation of the closest Euclidean distance from the ideal best solution. Positive values of the alternatives have been calculated with the following formula.

$$\mathbf{d^{+}=\sqrt{\sum_{J=1}^{n}(e-r_I)^2}}$$

Step.6

Step 6 includes the calculation of the farthest Euclidean distance from the ideal best solution Negative values of the alternatives have been calculated

$$\mathbf{d^{-}=\sqrt{\sum_{J}^{n=1}(e-r_I)^2}}$$

4.3 Ranking of the AI-Based Speaking Tools

In step.7, The coefficient of closeness, represented by $CC_{i,}$ has been computed. It explains the extent of closeness between the negative and positive values of the sub-facets. A higher CCi value indicates a better alternative.

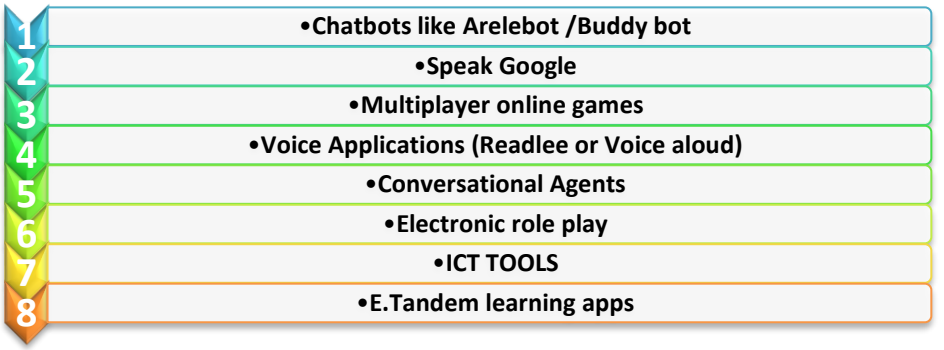
$$\mathbf{CCi = \frac{d^{-}}{d^{-}+d^{+}}}$$

Table 3
Closeness Coefficient

	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}	S_{11}
CC_i	0.48	0.47	0.56	0.50	0.43	0.45	0.54	0.577	0.53	0.43	0.44
D^+	3.67	5.55	5.41	5.21	5.30	5.12	3.81	3.76	3.43	3.23	3.41
D^-	3.74	5.16	4.31	5.53	5.21	5.11	5.43	5.13	5.22	5.24	5.34

The table 3 includes closeness coefficient values of the facets of the ServQual along with the positive and negative values to critically evidence the closeness among the facets. More specifically, it shows that CC_i for S1 has a mean value of 9.81, where d^+ and d-are 3.67 and 3.74, respectively. S8 represents the highest difference of distance (0.577) between the negative (5.13) and positive (3.76) values of the alternative, while S6 gives the lowest difference of distance (0.45) between the positive (5.12) and negative (5.11) values of the alternatives, where n alternatives = 8.

Figure 3
Ranking of the Potential AI-Based English-Speaking Tools



Step.8

All sub facets have been ranked according to the CC_i scores in descending order. The values have then been collectively calculated for each alternative and ranked following the ranking criterion mentioned in Table 1.

5. Discussion and Conclusion

The results of this study showed that they are highly effective and best suited for the Pakistani context as they are empathetic toward learners and tangible, with higher responsiveness.

Answering the first research question, the findings identified several AI-based tools as effective for improving spoken English proficiency, although their effectiveness varied across pedagogical functions. Conversational chatbots emerged as the most promising category because of their ability to simulate authentic interactions, provide immediate feedback, and sustain learner engagement. These findings are consistent with Hapsari and Wu (2022) who reported that AI-powered chatbots facilitate language learning by creating interactive conversational environments that support fluency development. In particular, tools such as Arele-Bot and BuddyBot demonstrated complementary strengths. While Arele-Bot promoted adaptive learning and real-time conversational practice, BuddyBot provided a more structured learning pathway through lessons, quizzes, and grammar-focused activities (Dhivvya & Karnati, 2024). Other tools, including Google Speak, MMOGs, Read Lee, and voice-based applications, were also found to contribute positively to speaking development by supporting pronunciation practice, oral interaction, and exposure to authentic

language use. Collectively, these findings suggest that effective AI-based English-speaking tools are those that combine interactive communication, timely feedback, learner engagement, and opportunities for repeated speaking practice. Addressing the second research question, the results indicated that the effectiveness of AI-based speaking tools in Pakistan is closely associated with their responsiveness, reliability, empathy, and ability to accommodate learners' needs within a technology-mediated environment. Pakistani ESL learners often face limited opportunities for authentic English communication and may experience anxiety when speaking in formal settings. In this regard, AI-powered tools provide a supportive environment in which learners can practice without fear of embarrassment or negative evaluation. Google Speak was found to be particularly effective because of its sophisticated speech-recognition capabilities, pronunciation correction features, and integration with widely used Google services. Its familiarity among Pakistani users further enhances accessibility and usability. Similarly, MMOGs and voice-based applications create opportunities for meaningful interaction and language exposure, especially among younger learners. However, factors such as internet connectivity, regional accents, and variations in spoken English across Pakistan may influence the effectiveness of these technologies. The findings therefore suggest that AI-based speaking tools are most beneficial when they offer accurate feedback, adaptive support, and user-friendly interfaces while remaining sensitive to the linguistic and technological realities of the Pakistani educational context.

Supporting Morrison (2022), the ranking results indicated notable differences in the suitability of AI-based tools for spoken ESL improvement in Pakistan. Chatbots achieved the highest ranking because they demonstrated strong performance across multiple evaluation dimensions, particularly responsiveness, reliability, learner engagement, and conversational support. Their ability to imitate authentic dialogue, provide immediate feedback, and maintain structured interaction makes them highly suitable for speaking development. Google Speak was ranked second due to its accuracy in speech recognition and pronunciation assessment, although its limited capacity for emotional support and individualized interaction reduced its overall effectiveness compared to conversational chatbots. MMOGs, Read Lee, and voice-based applications occupied middle-ranking positions because they support language exposure and practice but provide fewer opportunities for personalized guidance and structured learning. In contrast, electronic role plays, ICT-based approaches, and E-tandem learning received the lowest rankings.

Although these approaches demonstrated certain strengths, particularly in fostering interaction and empathy, they were perceived as less reliable and less

aligned with the expectations of contemporary technology-oriented learners. Consistent with Sayeg-Sánchez et al. (2024), these approaches may require integration with advanced AI functionalities to meet the evolving needs of language learners. Overall, the ranking outcomes suggest that highly effective tools for spoken ESL improvement are those that combine responsiveness, reliability, adaptability, and sustained learner engagement within authentic communicative environments. It has been concluded that AI-based English-speaking tools offer significant potential for supporting spoken ESL development in Pakistan by providing learners with accessible, interactive, and learner-centered opportunities for language practice. The findings suggest that these technologies can help address persistent challenges faced by Pakistani ESL learners, including limited exposure to authentic English communication, lack of speaking confidence, and restricted opportunities for meaningful oral interaction. The study further revealed that AI-driven tools are particularly effective when they provide immediate feedback, adaptive support, and engaging conversational experiences that encourage continuous speaking practice. Through features such as real-time interaction, pronunciation support, and simulated communication environments, these technologies enable learners to develop fluency and confidence in a supportive setting. Moreover, the ranking outcomes indicate that the most effective tools are those that demonstrate high levels of responsiveness, reliability, and learner engagement. Therefore, AI-powered speaking technologies can serve as valuable educational resources for enhancing spoken English proficiency when aligned with the linguistic, pedagogical, and contextual needs of Pakistani ESL learners.

6. Recommendations

Based on findings of study following recommendations have been drawn;

1. This study confirmed that at least 8 AI-based English-speaking tools are potentially effective for Pakistan. Therefore, it is recommended that the appropriateness of these and other AI-based tools may be explored further to make the best possible use of them in an academic context.
2. The results ranked chatbots as the highest, so it is suggested that in addition to recommending the additional incorporation of AI technology in the English language teaching curriculum, Talkpal. AI', Arele-Bot, and BuddyBot may be implied as efficient tools for assisting English language learning in higher education institutions.
3. The results ranked E.Tandem applications, ICT and role plays as the least efficient; hence, it is recommended to either apply the advanced modified versions of these tools or inform the academic stakeholders to spread awareness of other AI-based tools as a replacement. Aligning with Sahar, Ali

and Hussain (2024), government policies and both government and private school practices should be reviewed to incorporate better tools for language skills.

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