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Development of a Drill-and-Practice Chatbot for Enhancing English Pronunciation through Interactive Dialogue Exercises

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Abstract: This study aims to implement a drill and practice-based chatbot to improve English speaking skills, particularly in the aspect of pronunciation. The research employed a mixed-methods approach by combining the Research and Development (ADDIE) model with a quasi-experimental design using a pretest-posttest control group pattern. The participants consisted of 76 eighth-grade students from SMPN 5 Cirebon, divided into experimental and control groups. The instruments used included a pronunciation assessment rubric based on the Cambridge English Linguaskill Speaking Global Assessment Criteria, observation sheets, and student perception questionnaires. Data analysis was conducted through normality tests, the Wilcoxon Signed Rank Test, the Mann-Whitney U Test, and N-Gain calculation, complemented by qualitative analysis from observations and questionnaires. The findings revealed that the use of a drill and practice-based chatbot had a positive impact on improving students' pronunciation skills, although the improvement achieved remained merely in the low category, with an N-Gain score of 0.25. The chatbot was proven to provide broader, more flexible, and personalized practice opportunities for students, as well as facilitate instant feedback that is difficult to obtain in conventional learning. These results indicate that chatbots can serve as an effective supplementary medium in English language learning, particularly for practicing pronunciation both independently and in integration with classroom learning, suggesting the potential for further development and integration of chatbot technology in language education.

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Introduction

Speaking skill is one of the key competencies essential in English language learning, particularly in the current era of globalization (Harmer, 2015). The ability to communicate orally in an effective and fluent manner is highly required in academic, professional, and social contexts (Harahap et al., 2024; Suardika et al., 2023; Živković, 2014). However, speaking instruction is often confronted with various challenges, such as insufficient time for adequate practice, the lack of instant feedback, and limited opportunities to interact with native speakers or even fellow learners outside class hours (Abdolhosseinzadeh Amini et al., 2024; Alaraj, 2024; Kralova & Tirpakova, 2019). In the context where English is considered a foreign language (EFL), Indonesian students often have little or no opportunity to communicate in English in their daily lives and experience a mental burden when using the language (Fachrunnisa & Nuraeni, 2022).

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Vol. 12 No. 4 : October 2025
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pp. 1185-1197

In conventional classroom settings, opportunities for each student to practice speaking individually are very limited, given the ratio of students to teachers (Brown, 2006). This situation is exacerbated by anxiety and the fear of making mistakes, which frequently hinder students from participating actively in conversations (Horwitz et al., 1986). Consequently, many students graduate with suboptimal speaking proficiency, creating a gap between curricular targets and actual achievements. This gap highlights an urgent need for innovative solutions that can provide learners with safe, personalized, and efficient environments to enhance their speaking skills independently. Teachers also face difficulties in consistently providing instant and detailed feedback on each student's pronunciation. Such limitations create a significant gap between students' need for intensive practice and the available resources, leading many students to graduate with underdeveloped pronunciation skills.

A growing body of research has examined the use of technology to address these challenges. The integration of artificial intelligence (AI), particularly chatbots, has demonstrated significant potential in supporting English language learning (Huang et al., 2020). Studies have shown the effectiveness of chatbots in improving reading and writing skills (Hidayat, 2024), as well as in developing vocabulary and grammar competence (Alia Sa'ad Eldin AbuSahyon et al., 2025). Chatbots have also been effective in enhancing pronunciation, intonation, and stress. These improvements are evident when learners perform two speaking tasks: "reading texts aloud" and "responding to questions" (Kim et al., 2021). oreover, chatbots have proven to enhance speaking skills while reducing EFL students' speaking anxiety, owing to the flexible, safe, and feedback-driven practice opportunities they provide (Ding & Yusof, 2025). Consistent with this trend, the integration of technology in language learning continues to grow and shows promising results across various aspects.

More specifically, several recent studies have focused on the implementation of chatbots for pronunciation training. In the study (Abimanto & Sumarsono, 2024), the Google Read Along application, powered by AI Speech Recognition, was found effective in improving pronunciation, primarily due to its instant feedback and user flexibility. However, its effectiveness was still at a moderate level, with limitations in sample scope, variable control, and the exploration of broader speaking aspects. Similar findings were reported by (Hoang et al., 2023), who demonstrated that the AI-based chatbot MissionFluent was effective in improving vocational students' pronunciation through routine practice, instant feedback, and interactive learning experiences. Nevertheless, its effectiveness remained influenced by factors such as practice duration, frequency, technical readiness, and research design limitations. Likewise, (Wu et al., 2023) showed that SpokenBot served effectively as a self-learning medium for improving non-native learners' speaking skills, particularly through vocabulary practice, free conversation, and reward systems. However, technical challenges in AI, evaluation design, and methodological limitations constrained the generalizability of findings.

In another study, (Vančová, 2023) eviewed various works involving participants from diverse backgrounds, ranging from middle school students to university learners and professionals. The focus on pronunciation varied, covering accuracy (e.g., consonants, intonation, silent letters), intelligibility, comprehensibility, and the role of AI in reducing speaking anxiety and increasing motivation. Regarding tools, most studies employed AI-powered learning apps with chatbots (9 studies), followed by intelligent personal assistants (5 studies) and AI-based spell-checkers (1 study). Almost all studies reported significant improvements, both in segmental aspects (specific sounds such as th or silent letters) and suprasegmental features (intonation, stress, rhythm). Despite these promising results, several

Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

weaknesses were highlighted. The number of studies analyzed was relatively limited (only 15), indicating that research in this area remains underexplored compared to other aspects such as grammar or vocabulary. Furthermore, most of the studies were short-term, leaving the long-term impacts of AI use uncertain. Technical issues also emerged, such as AI's difficulty in recognizing non-native accents, resulting in inaccurate or inconsistent feedback. Moreover, many studies lacked comparisons between AI tools and traditional teacher-led methods, making their relative effectiveness less conclusive. Ethical and technical concerns, such as data privacy, risk of over-reliance on technology, and limited accent diversity in AI models, also remain challenges. From a pedagogical perspective, few studies have truly integrated AI into formal curricula, with most being limited trials.

One pedagogical model that aligns well with chatbot use is the drill and practice approach (Dennis, 2024; Hoang et al., 2023). Rooted in behaviorist learning theory, drill and practice emphasizes repeated exposure, structured exercises, and reinforcement (Du & Daniel, 2024), which are highly relevant in developing speaking fluency and automaticity. According to (Alfira et al., 2024), the Drilling Communication technique can help senior high school students practice pronunciation. When integrated with chatbot systems, this model can provide learners with broader opportunities to practice pronunciation, sentence patterns, and conversational routines in a more personalized way (Klímová & Ibna Seraj, 2023; Koç & Savaş, 2024; Xodabande et al., 2025). Such integration is expected to improve accuracy and fluency in oral production, which are essential components of communicative competence.

Therefore, this study aims to develop and implement a drill and practice-based chatbot focusing on pronunciation through interactive dialogue exercises. The objectives include: (1) designing a chatbot that offers systematic repetition practice with instant feedback, (2) evaluating the effectiveness of the chatbot in improving pronunciation outcomes in speaking, and (3) comparing the performance improvement with a control group using conventional practice methods.

Research Method

In this study, a systematic literature review was conducted to strengthen the theoretical and methodological foundations for the development of a drill and practice-based chatbot, as illustrated in Figure 1. The process began with formulating search keywords related to the main topics, such as chatbot for language learning, pronunciation training, drill and practice method, and computer-assisted language learning (CALL). To ensure the validity and comprehensiveness of the findings, a triangulation method was applied by combining quantitative analysis, qualitative interpretation, and observational insights.The literature search was carried out through Google Scholar due to its wide accessibility, with more than 80% of the publications ranging from 2020 to 2025. The selected literature was limited to articles written in English or Indonesian, published in journals, and focusing on studies involving data analysis in language learning.

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Vol. 12 No. 4 : October 2025
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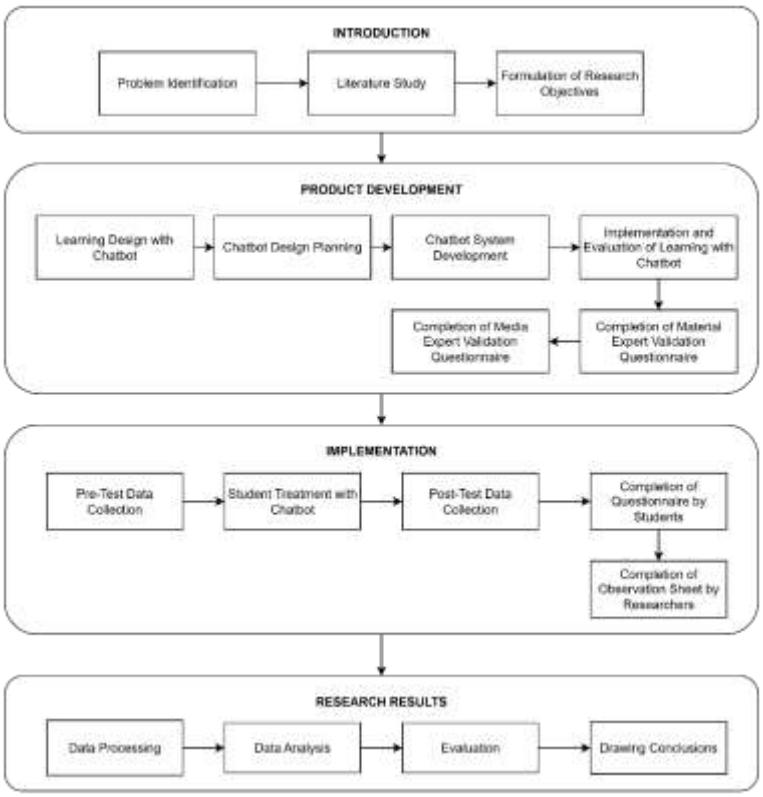

Figure 1. Research Design

All articles obtained were then categorized based on research objectives, research subjects, language skill focus, approaches/tools used, supporting or psychological factors, research methods, and educational contexts. This categorization aimed to map the variations of approaches relevant to the development of chatbot-based learning media. For instance, studies focusing on pronunciation tended to emphasize the use of speech recognition techniques and automated feedback, while other studies on language fluency highlighted aspects of contextual interaction.

Data Collection

Data collection in this study was conducted in stages using four techniques: teacher interviews, pronunciation tests, classroom observations, and student questionnaires. Teacher interviews provided insights into classroom conditions, students' challenges in mastering pronunciation, and served as triangulation to strengthen other findings. Pronunciation tests, administered as pre- and post-tests with rubrics adapted from the Cambridge English Linguaskill criteria, measured improvements in accuracy, stress and intonation, articulation, and fluency. Classroom observations documented student participation, interactions with the chatbot, and technical challenges during the learning process. Finally, student questionnaires captured perceptions regarding ease of use, usefulness, motivation, satisfaction, and feedback from the chatbot, offering qualitative insights into students' acceptance of this learning medium.

Research Procedure

The research procedure was conducted in four stages: preliminary study, product development, implementation, and research results. The preliminary study involved identifying problems in English learning, particularly pronunciation, followed by a literature review to establish the research objectives. In the product development stage, the drill-and-

practice-based chatbot was designed by determining learning strategies, materials, interaction patterns, and chatbot structure, which were then developed into a functional system, validated by experts, and tested in a limited trial. The implementation stage was carried out in the classroom, including pre-tests, chatbot-based pronunciation practice, post-tests, questionnaires, and observations to capture student responses and classroom dynamics. Finally, the research results stage involved processing and analyzing data from tests, observations, and questionnaires using statistical methods such as the Wilcoxon Signed Rank Test, Mann–Whitney U Test, and N-Gain, followed by interpretation and conclusion drawing to evaluate the effectiveness of the chatbot in improving pronunciation skills.

Participants

The population of this study comprised all eighth-grade students at SMPN 5 Cirebon. From this population, two classes were selected as the research sample, with one class assigned as the experimental group and the other as the control group. Each class consisted of approximately 38 students, resulting in a total of 76 participants. The sample was determined using purposive sampling, as class selection was adjusted based on teacher availability and the suitability of the learning schedule. This number of participants was considered adequate to provide sufficient statistical power for quantitative analysis.

Research Scenario

The learning process began with preliminary activities, in which the teacher first delivered a listening session related to the topic being studied. This activity aimed to provide linguistic context, introduce sentence patterns, and model correct intonation and pronunciation. It also functioned as scaffolding, ensuring that students had a language model before practicing independently with the chatbot.

After the introductory stage, students were directed to practice pronunciation using the chatbot. The teacher invited students to come forward one by one to interact with the chatbot. This process was carried out using a device connected to a projector, allowing the pronunciation scores to be displayed and viewed collectively. Such a mechanism provided transparency of results, motivated other students to participate, and enabled the teacher to give real-time explanations regarding pronunciation errors. If no students volunteered, the teacher actively nominated students to ensure that everyone had a fair opportunity to practice. This direct participation at the front of the class also provided an authentic learning experience, allowing students not only to practice pronunciation but also to build confidence in speaking before others. Thus, the implementation of the chatbot functioned not only as an individual learning tool but also as a collaborative classroom medium. The teacher acted as a facilitator who guided, motivated, and reinforced student learning outcomes, while the chatbot provided instant feedback, measurable scores, and repetitive practice to strengthen students' understanding and pronunciation skills.

Pronunciation practice with the chatbot was then continued at home as part of an extended learning activity. To enable teacher monitoring, each student was required to enter a class referral code before selecting a conversation topic on the chatbot application. Through this mechanism, students' practice data—including the levels achieved, the number of conversations completed, and their average scores—were directly linked to the teacher's account. This allowed the teacher to monitor individual progress effectively.

Research Instruments

The research instruments consisted of two main components. First, a pronunciation assessment rubric based on the Cambridge English Linguaskill Speaking Global Assessment Criteria (Management & Resource, 2020) was used, covering aspects such as pronunciation

Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

clarity, sound accuracy, fluency, stress, rhythm, and intonation. Assessment was conducted by the English subject teacher. The content validity was established through expert judgment by the English teacher at SMP Negeri 5 Cirebon, while the validity of the chatbot media was confirmed through evaluation by English lecturers from Universitas Gunung Jati Cirebon.

Second, additional instruments included questionnaires and observation sheets to record student engagement, their ability to follow digital-based instructions, and interactions with the chatbot. The questionnaires were designed using a Likert scale to measure students' motivation, perceived ease of use, and satisfaction after using the chatbot.

Evaluation

The evaluation was carried out both formatively and summatively to measure the effectiveness of the chatbot in enhancing students' speaking skills. It involved expert validation of the chatbot, pre- and post-tests of speaking ability, student response questionnaires, and researcher observation sheets to record engagement and classroom dynamics. The collected data were then analyzed to assess the chatbot's functionality and served as the basis for potential revisions to improve its design.

Results and Discussion

- **Development Stage**

This study was motivated by the increasing demand for mastery of English speaking skills, which emphasizes not only fluency but also pronunciation accuracy. Based on interviews with an English teacher at SMPN 5 Cirebon, speaking instruction has been designed in a structured manner, including setting learning objectives, selecting relevant topics, and employing interactive methods such as role-play and discussion. However, several challenges remain, particularly limited instructional time, a lack of diverse media, and internal student factors such as low motivation, limited vocabulary, and low self-confidence.

Regarding media innovation, the teacher expressed a positive view of the potential use of a drill and practice-based chatbot, as it could provide opportunities for practice outside the classroom, offer immediate feedback, enrich vocabulary, and enhance speaking fluency. Nevertheless, the main challenges that need to be addressed include limited internet access and ensuring that the chatbot's features align with students' abilities. The teacher suggested that the chatbot development should be simple, interactive, and adaptive to the needs and conditions of the students.

To address these issues, the researcher designed a learning medium in the form of a drill and practice-based chatbot, tailored to the applicable curriculum. Figure 2 illustrates the conversation flow designed to take place within the chatbot.

During the development process, the researcher used the Django Framework as the backend to manage the application structure, data flow, and system logic. Student data, conversation history, and scores were stored using PostgreSQL as a relational database. To support fast and real-time communication, Redis was employed as a cache and message broker.

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Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

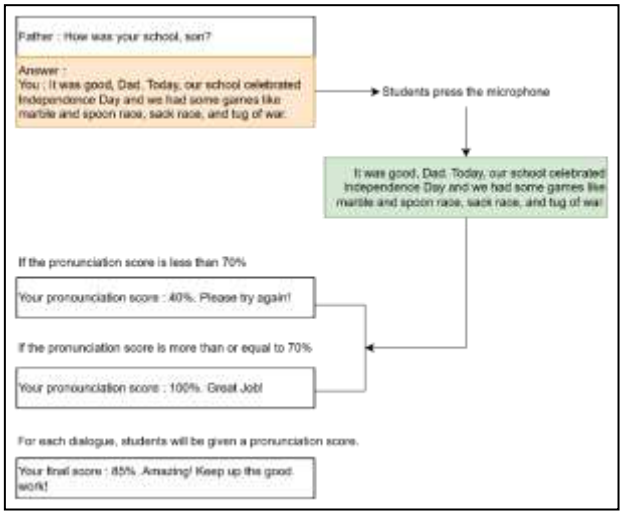

Figure 2. Chatbot Conversation Flow Design

For the artificial intelligence component, OpenAI Whisper was used to convert students' speech into text, while PyTorch handled data processing and the implementation of machine learning logic. On the front-end, HTML, CSS, and JavaScript were used to create a user-friendly interface for students. To ensure stable application deployment, Docker was used to create containers, and Gunicorn served as the application server in the production environment. Additionally, Django Channels enabled WebSocket-based communication, allowing real-time interactions between students and the chatbot.

After students complete the registration, log-in, and chat room creation process. At the top of the interface, there is a field for entering the teacher referral code, which functions as a tool for monitoring and control. Through this code, teachers can track students' practice activities online, including when students practice independently at home.

In the middle section, students can choose conversation topics organized into three difficulty levels: easy, medium, and hard. A locking system is applied to ensure structured learning progress. Students can only access the next level after completing at least two topics at the previous level. For example, the medium level becomes available after completing two easy-level topics, and the hard level unlocks after finishing two medium-level topics. This strategy is designed to provide structured learning stages in accordance with the principles of scaffolding.

Additionally, the system provides an input field for custom topics, allowing students to enter conversation themes according to their needs or interests. This feature offers flexibility while aligning with the school curriculum, enabling practice topics to be consistent with formal learning materials. Therefore, the chatbot serves not only as a general speaking practice tool but also as a medium that can be contextually integrated into classroom learning.

After students select a conversation topic, the interaction automatically begins through the chatbot system, as shown in Figure 3. At the top of the screen, the sentence that students are required to pronounce is displayed, and they respond by pressing the microphone button. If students wish to hear the correct pronunciation, a Play button is available to listen to the model pronunciation. Once students provide a spoken response, the system automatically presents feedback, including a score, the number of correctly pronounced words, mispronounced words, omitted words, and additional words. If the score is below 70%, the chatbot prompts the student to repeat the sentence. However, if the score reaches 70% or higher, the conversation progresses to the next dialogue.

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Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

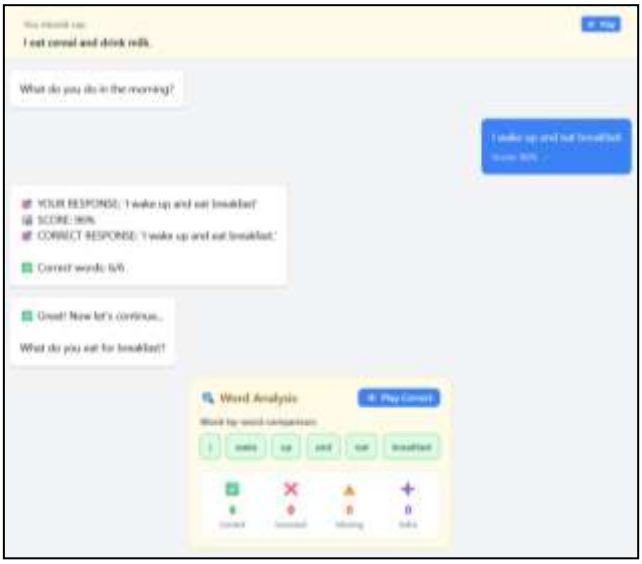

Figure 3. Chatbot Interface – Conversation Flow

- **Improvement of Student Learning Outcomes**

Based on the results of quantitative and qualitative data analysis, the researcher concluded that the implementation of a chatbot in English speaking instruction had a moderately positive impact on students' learning outcomes. A summary of the statistical analysis is presented in Table 3.

Table 1. Summary of Statistical Analysis Results

Analysis	Control Class	Experimental Class	Interpretation
Mean Pretest Score	78,39	79,70	Initial conditions relatively equal
Mean Posttest Score	82,80	84,00	Both increased, experimental slightly higher
Normality Test (Sig.)	< 0,05	< 0,05	Data not normally distributed → non-parametric test required
Wilcoxon Test (Sig.)	0,000	0,000	Significant difference between pretest and posttest in both groups
Mann–Whitney Pretest (Sig.)	0,108	0,108	No significant difference between groups before treatment
Mann–Whitney Posttest (Sig.)	0,017	0,017	Significant difference between groups after treatment
N-Gain	0,21 (Low)	0,25 (Low)	Low improvement in both classes, but experimental slightly better

In the control class, the pretest average score was 78.39, while the experimental class scored 79.70. This indicates that the experimental class initially had slightly higher speaking proficiency. For the posttest, the control class achieved an average of 82.80, showing improvement compared to the pretest, although with a narrower variance. Meanwhile, the experimental class reached an average posttest score of 84.00. The improvement from pretest

Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

to posttest in the experimental class was slightly lower compared to the control class, likely due to greater heterogeneity in students' initial proficiency levels in the experimental group.

Overall, both the control and experimental groups showed improvement from pretest to posttest. However, while the experimental class displayed slightly lower gains compared to the control class, the use of chatbot-based learning media demonstrated potential to positively impact students' English speaking ability. Nonetheless, the improvements remained modest and uneven across individuals, suggesting that chatbot integration may complement but not fully replace conventional methods.

The results of the N-Gain test in Table 1 indicate that the improvement in students' performance in both groups remained within the low category. In the control group, the average pretest score of 78.4 increased to 82.8 in the posttest, yielding an N-Gain score of 0.21. Meanwhile, in the experimental group, the average pretest score of 79.7 increased to 84.0 in the posttest, with an N-Gain score of 0.25. These findings suggest that both the control and experimental groups experienced improvement in learning outcomes, but the increase was relatively small. The low N-Gain scores indicate that the learning intervention, including the use of the chatbot in the experimental group, has not produced a significant improvement in students' speaking skills. Although there was a difference in the posttest mean scores between the experimental and control groups, both remained within the low improvement category.

The low N-Gain scores may be attributed to several factors. First, the relatively short duration of chatbot use did not allow students to become fully accustomed to the drill-and-practice learning pattern. Second, the chatbot's limited features, particularly in terms of exercise variation and evaluation formats, may have affected the intensity and quality of students' interactions with the system. Third, individual learning motivation and readiness also played a role, as some students might have only followed instructions without further exploration. Finally, the blended learning condition that combined chatbot use with face-to-face classroom activities may have positioned the chatbot more as a supplementary tool rather than the primary medium.

Thus, although the use of the chatbot contributed positively to improving learning outcomes, its effectiveness still needs to be enhanced through design improvements, the addition of more features, and more intensive and continuous implementation strategies.

The distribution of learning gain categories shows that in the control class, all students were classified into medium (2 students) and low (36 students) categories, with none reaching the high category. Meanwhile, in the experimental class, 13 students were in the medium category and 25 students in the low category, also with no students achieving a high level of improvement. These findings carry several important implications. First, both the control and experimental classes did not demonstrate high learning gains after the treatment. This confirms that the applied learning approach, including the use of chatbots, has not yet provided an optimal impact in improving students' abilities. Second, the proportion of students in the medium category was higher in the experimental class (13 students) compared to the control class (2 students). This indicates that the use of chatbots contributed more positively than conventional learning, even though the improvement was still limited to the medium level.

Although the drill-and-practice approach has strong theoretical support for improving language accuracy and fluency, the findings of this study revealed relatively low gains in pronunciation learning. This discrepancy can be explained by several pedagogical factors. First, drill-and-practice activities tend to emphasize repetition and mechanical accuracy,

Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

which, while useful for habit formation, may not be sufficient to foster deeper communicative competence or long-term retention if not combined with meaningful interaction. Second, the limited duration of the intervention (only three sessions) did not allow sufficient time for habituation, which is crucial in pronunciation training. Third, the chatbot itself was still in the developmental stage with restricted features and occasional technical issues, which reduced its effectiveness in providing rich and adaptive feedback. These factors suggest that the theoretical potential of drill-and-practice can only be realized when supported by sustained practice, reliable technology, and integration with communicative tasks.

Despite the modest gains, this study provides several pedagogical insights. Teachers can integrate drill-and-practice chatbots as supplementary tools to increase opportunities for pronunciation practice outside classroom hours, especially in EFL contexts where exposure to spoken English is limited. However, drill-and-practice should not stand alone; it needs to be complemented with communicative, peer-based activities to balance accuracy with fluency and confidence building.

- **Student Questionnaire Results**

Based on the questionnaires filled out by students after the implementation process, most students stated that the chatbot helped improve their speaking confidence and pronunciation, although some weaknesses were identified, such as occasional errors or bugs in the chatbot. These issues indirectly affected the quality of the learning experience, especially for students who required more intensive guidance.

- **Researcher Observation Results**

The observations revealed variations in students' active engagement during chatbot-assisted learning. Some students appeared enthusiastic and voluntarily came to the front of the class to use the chatbot. However, others still needed encouragement from teachers or researchers to participate. Regarding student responses to chatbot feedback, a high level of enthusiasm was observed. Students became excited each time they received feedback, especially when they achieved high scores, which even sparked cheers and support from their peers. This phenomenon shows that chatbot feedback not only functioned as individual evaluation but also increased motivation and fostered a healthy competitive atmosphere in the classroom.

- **Comparison with Previous Studies**

The findings of this study indicate that the implementation of a drill-and-practice-based chatbot positively contributed to the improvement of speaking skills, particularly in pronunciation. This aligns with previous studies, such as Ding & Yusof (2025), which emphasized the reduction of speaking anxiety and the increase of students' confidence, as well as Fathi et al. (2024), who reported the effectiveness of AI-based interactive speaking activities in enhancing broader oral communication skills. However, this study concentrated more specifically on technical aspects of pronunciation, thus providing deeper insights into the pedagogical effectiveness of this approach.

A comparison with Abimanto & Sumarsono (2024) shows differences in outcomes, where their study achieved a higher N-Gain score (65.73%) compared to this study (0.25). This discrepancy was due to variations in technology, duration, and learning mechanisms. Their use of Google Read Along, supported by speech recognition, provided instant phonetic feedback and gamification features that encouraged greater training intensity. In contrast, the chatbot in this study is still in the development stage with limited features, a shorter intervention duration, and several technical issues, leading to less optimal improvement in pronunciation. Nevertheless, the main contribution of this research lies in developing an

Vol. 12 No. 4 : October 2025
E-ISSN: 2722-4627
pp. 1185-1197

innovative learning medium in the form of a teacher-monitored drill-and-practice chatbot, relevant to the secondary education context in Indonesia.

Conclusion

This study demonstrates that a drill-and-practice-based chatbot can be an effective tool for improving English speaking skills, particularly pronunciation. By combining repetitive practice with instant feedback, the chatbot offers flexible, personalized, and autonomous learning opportunities that enhance pronunciation accuracy and speaking confidence. The findings align with behaviorist learning principles and the CALL framework, addressing key limitations of traditional instruction, such as limited practice time and lack of individualized feedback.

However, challenges—including technical limitations, short intervention duration, and varied student motivation—restricted the overall impact, with learning gains remaining modest. Future implementations should focus on improving chatbot functionality, extending practice duration, and integrating more advanced AI features to maximize learning outcomes.

Recommendation

Teachers and educational practitioners are encouraged to integrate drill-and-practice-based chatbots as supplementary media in speaking instruction. Chatbots can provide additional practice opportunities outside the classroom, thereby addressing the limitations of face-to-face time and the lack of oral practice. To create a more balanced learning experience, teachers should combine chatbot-based exercises with communicative activities and peer interaction.

For students, chatbots can serve as a tool for independent practice to improve pronunciation accuracy. Regular and consistent use will strengthen proper linguistic habits while also fostering confidence in speaking. However, students should recognize that chatbots are not a substitute for human interaction, but rather supportive media to enrich oral practice. Meanwhile, educational technology developers need to enhance the quality of speech recognition and feedback systems to provide more natural and native-like pronunciation correction, as well as incorporate gamification elements to increase students' motivation and engagement.

For future researchers, it is recommended to investigate the effectiveness of drill-and-practice-based chatbots in other speaking skills, such as intonation, stress patterns, and discourse management. Studies involving more diverse populations, including university-level learners or bilingual contexts, will enrich the perspective on the effectiveness of this model. Longitudinal studies are also necessary to assess the sustainability of chatbot use in developing speaking skills. In addition, developing chatbot-based assessment features and integrating them with other learning platforms, such as LMS, Google Classroom, or Moodle, opens opportunities for chatbots to function not only as speaking practice media but also as integral components of a more comprehensive digital learning ecosystem.

References

Abdolhosseinzadeh Amini, M., Kruger, C. G., & Nel, C. (2024). Self-regulated EFL learning through productive feedback in Iranian private language institutes: a case for sustainable lifelong learning outcomes. *Discover Education*, *3*(1). https://doi.org/10.1007/s44217-024-00374-6

Abimanto, D., & Sumarsono, W. (2024). Improving English Pronunciation with AI Speech-

Recognition Technology. *Acitya: Journal of Teaching and Education*, *6*(1), 146–156. https://doi.org/10.30650/ajte.v6i1.3810

Alaraj, M. M. (2024). Effective Strategies to Overcome EFL Speaking Difficulties. *International Journal of Social Science and Human Research*, *07*(10), 7467–7474. https://doi.org/10.47191/ijsshr/v7-i10-14

Alfira, N., Rum, E. P., & Azis, A. (2024). the Effect of Drilling Communication Technique in Teaching Students' Pronounciation At Sma Negeri 19 Gowa. *English Language Teaching Methodology*, *4*(2), 216–225. https://doi.org/10.56983/eltm.v4i2.529

Alia Sa'ad Eldin AbuSahyon, Abdelhadi Alzyoud, Omar Alshorman, B. A.-A. (2025). AI-driven chatbots in second language education: A systematic review of their efficacy and pedagogical implications. *Ampersand*, *14*(May), 100224. https://doi.org/10.1016/j.amper.2025.100224

Brown, H. D. (2006). PRINCIPLES of LANGUAGE LEARNING AND TEACHING. In *The Ultimate FE Lecturer's Handbook*. https://doi.org/10.1017/cbo9781139062398.015

Dennis, N. K. (2024). Using AI-Powered Speech Recognition Technology to Improve English Pronunciation and Speaking Skills. *IAFOR Journal of Education*, *12*(2), 107–126. https://doi.org/10.22492/ije.12.2.05

Ding, D., & Yusof, A. M. B. (2025). Investigating the role of AI-powered conversation bots in enhancing L2 speaking skills and reducing speaking anxiety : a mixed methods study. *Humanities and Social Sciences Communications*, *2025*, 1–16.

Du, J., & Daniel, B. K. (2024). Transforming language education: A systematic review of AI-powered chatbots for English as a foreign language speaking practice. *Computers and Education: Artificial Intelligence*, *6*(March), 100230. https://doi.org/10.1016/j.caeai.2024.100230

Fachrunnisa, N., & Nuraeni, N. (2022). Speaking Interaction Problems Among Indonesian Efl Students. *ETERNAL (English, Teaching, Learning, and Research Journal)*, *8*(1), 108–120. https://doi.org/10.24252/eternal.v81.2022.a7

Fathi, J., Rahimi, M., & Derakhshan, A. (2024). Improving EFL learners' speaking skills and willingness to communicate via artificial intelligence-mediated interactions. *System*, *121*(January), 103254. https://doi.org/10.1016/j.system.2024.103254

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, *66*(1), 64–74. https://doi.org/10.1119/1.18809

Harahap, S. H., Aprilia, M., & Lubis, N. A. (2024). Pentingnya Menguasai Kemampuan Komunikasi Lisan Untuk Anak. *IJEDR: Indonesian Journal of Education and Development Research*, *2*(1), 375–378. https://doi.org/10.57235/ijedr.v2i1.1780

Harmer, J. (2015). The Practice of English Language Teaching. In *ELT Journal* (Vol. 57, Issue 4, pp. 401–405). https://doi.org/10.1093/elt/57.4.401

Hidayat, M. T. (2024). Effectiveness of AI-Based Personalised Reading Platforms in Enhancing Reading Comprehension. *Journal of Learning for Development*, *11*(1), 115–125. https://doi.org/10.56059/jl4d.v11i1.955

Hoang, N. T., Ngoc Han, D., & Le, D. H. (2023). Exploring Chatbot AI in improving vocational students' English pronunciation. *AsiaCALL Online Journal*, *14*(2), 140–155. https://doi.org/10.54855/acoj.231429

Horwitz, E., Horwitz, M., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal*, *70*(2), 125–132.

Huang, W., Hew, K. F., & Fryer, L. K. (2020). Chatbots for language learning—Are they

really useful? A systematic review of chatbot-supported language learning. *Journal of Computer Assisted Learning*, *38*(1), 237–257. https://doi.org/10.1111/jcal.12610

Kim, H. S., Cha, Y., & Kim, N. Y. (2021). Effects of ai chatbots on efl students' communication skills. *Korean Journal of English Language and Linguistics*, *2021*(21), 712–734. https://doi.org/10.15738/kjell.21..202108.712

Klímová, B., & Ibna Seraj, P. M. (2023). The use of chatbots in university EFL settings: Research trends and pedagogical implications. *Frontiers in Psychology*, *14*(March), 1–7. https://doi.org/10.3389/fpsyg.2023.1131506

Koç, F. S., & Savaş, P. (2024). The use of artificially intelligent chatbots in English language learning: A systematic meta-synthesis study of articles published between 2010 and 2024. *ReCALL*, *37*, 4–21. https://doi.org/10.1017/S0958344024000168

Kralova, Z., & Tirpakova, A. (2019). Nonnative EFL Teachers' Speaking Anxiety: Post-Communist Country Context. *SAGE Open*, *9*(2). https://doi.org/10.1177/2158244019846698

Management, D., & Resource, L. (2020). *Linguaskill Speaking Global Assessment Criteria Linguaskill Speaking Phonological Descriptors for part 2 (read-aloud).* https://www.cambridgeenglish.org/Images/605504-linguaskill-speaking-assessment-criteria.pdf

Suardika, I. K., Arihi, L. O. S., Hadara, A., Hasniah, H., & Ningsih, T. Z. (2023). The Use of Oral Presentation Techniques to Improve Communication Skills in Social Studies Learning. *Ta'dib*, *26*(2), 303. https://doi.org/10.31958/jt.v26i2.9023

Vančová, H. (2023). AI and AI-powered tools for pronunciation training. *Journal of Language and Cultural Education*, *11*(3), 12–24. https://doi.org/10.2478/jolace-2023-0022

Wu, C. H., Lam, H. Y., Kong, A., & Wong, W. L. H. (2023). The design and evaluation of a digital learning-based English chatbot as an online self-learning method. *International Journal of Engineering Business Management*, *15*, 1–22. https://doi.org/10.1177/18479790231176372

Xodabande, I., Shiri, S., & Zohrabi, M. (2025). Exploring the impacts of an AI-driven instructional intervention on Iranian EFL learners' pronunciation skill development. *Discover Education*, *4*(1). https://doi.org/10.1007/s44217-025-00782-2

Živković, S. (2014). The importance of oral presentations for university students. *Mediterranean Journal of Social Sciences*, *5*(19), 468–475. https://doi.org/10.5901/mjss.2014.v5n19p468