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ARTIFICIAL INTELLIGENCE AS A MEANS TO ENHANCE SPEAKING COMPETENCE: PEDAGOGICAL OR TREND?

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ABSTRAK

Kemahiran lisan dalam Bahasa Inggris Penerbangan sangat penting bagi keselamatan operasional, tetapi pembelajaran berbicara dalam program penerbangan sering terkendala keterbatasan waktu, kelas besar, dan kecemasan belajar, sehingga kesempatan praktik dan umpan balik menjadi terbatas. Penelitian ini mengkaji peran Kecerdasan Buatan (*Artificial Intelligence* / AI) sebagai solusi pedagogis untuk meningkatkan kemampuan berbicara Bahasa Inggris Penerbangan. Penelitian menggunakan metode campuran dengan desain kuasi-eksperimen *pretest–posttest control group* dan melibatkan mahasiswa semester pertama Program Studi Teknik Dirgantara Institut Teknologi Dirgantara Adisutjipto yang mengikuti mata kuliah Bahasa Inggris Teknik I. Sebanyak 90 mahasiswa dibagi ke dalam kelompok eksperimen (n = 49) dan kelompok kontrol (n = 41). Kedua kelompok memperoleh pembelajaran yang sama; namun, kelompok eksperimen berlatih dialog penerbangan berbasis skenario menggunakan AI dengan pengenalan ujaran otomatis dan umpan balik langsung, sedangkan kelompok kontrol melakukan *role-play* konvensional. Data dikumpulkan melalui tes kinerja berbicara, kuesioner persepsi, log pembelajaran AI, dan wawancara semi-terstruktur. Hasil menunjukkan kemampuan awal yang setara, tetapi peningkatan kemampuan berbicara kelompok eksperimen secara signifikan lebih tinggi (M = +9,6 vs. +3,4; p < 0,001; d = 0,85), khususnya pada aspek pelafalan dan kefasihan. Temuan ini menegaskan bahwa praktik berbantuan AI efektif meningkatkan kemampuan berbicara Bahasa Inggris Penerbangan apabila dipadukan dengan tugas autentik dan bimbingan dosen.

Kata kunci: *Kecerdasan Buatan, Bahasa Inggris Penerbangan, Keterampilan Berbicara*

ABSTRACT

Oral proficiency in Aviation English is essential for operational safety; however, speaking instruction in aviation programs is often constrained by limited time, large classes, and learner anxiety, resulting in reduced opportunities for practice and feedback. This study examined the role of Artificial Intelligence (AI) as a pedagogical solution to enhance Aviation English speaking skills. Employing a mixed-methods quasi-experimental pretest–posttest control group design, the study involved first-semester students of the Aerospace Engineering Study Program at Institut Teknologi Dirgantara Adisutjipto enrolled in *Bahasa Inggris Teknik I*. A total of 90 students were assigned to an experimental group (n = 49) and a control group (n = 41). Both groups received identical classroom instruction; however, the experimental group practiced scenario-based aviation dialogues using AI with automatic speech recognition and immediate feedback, while the control group engaged in conventional role-plays. Data were collected through speaking performance tests, perception questionnaires, AI learning logs, and semi-structured interviews. Results indicated equivalent baseline proficiency, but significantly greater speaking gains in the experimental group (M = +9.6 vs. +3.4; p < .001; d = 0.85),

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particularly in pronunciation and fluency. These findings confirm that AI-assisted practice effectively enhances Aviation English speaking when integrated with authentic tasks and guided instructor support.

Keywords: *Artificial Intelligence, Aviation English, Speaking Skills*

INTRODUCTION

Oral proficiency is a crucial skill in Aviation English, as effective communication is inherently connected to operational safety and professional effectiveness in aviation settings. International aviation regulations emphasize the imperative for articulate, fluent, and precise spoken English, particularly for pilots and aviation personnel operating in multilingual and high-risk environments. Consequently, English language training in aviation education seeks to develop learners capable of communicating precisely, confidently, and appropriately in professional aviation environments. This emphasis highlights the central role of speaking competence as a core component of aviation professionalism and safety assurance. This regulatory urgency is explicitly articulated in the International Civil Aviation Organization (ICAO) language proficiency requirements, which mandate standardized levels of pronunciation, fluency, interaction, and comprehensibility for aviation personnel (ICAO, 2010, 2023, 2024).

Aviation school teaching in speaking skills should include intensive practice, immediate feedback, and contextual communication exercises reflecting real operational situations; however, several classroom constraints persist. Limited instructional time, large class sizes, and insufficient opportunities for individualized practice often hinder students from achieving adequate oral fluency. In addition, speaking anxiety and reduced self-confidence frequently restrict learners' participation in speaking activities. Speaking anxiety has been widely recognized as a significant affective factor influencing oral performance, particularly in high-stakes communication contexts (Horwitz et al., 1986), and a comprehensive meta-analysis confirms its negative association with academic achievement (Botes et al., 2020). Consequently, a clear gap remains between the speaking proficiency required for aviation communication and the performance demonstrated by students.

Recent improvements in educational technology, particularly Artificial Intelligence (AI), have been widely promoted as a potential solution to these challenges. AI-driven technologies, such as speech recognition systems, automated pronunciation feedback, and conversational agents, enable learners to practice speaking independently and regularly while receiving quick corrective feedback. These technologies are also aligned with the evolving direction of pronunciation research and instruction, which increasingly emphasizes technology-mediated, learner-centered practice (O'Brien et al., 2018). From a theoretical perspective, AI-assisted language learning aligns with second language acquisition principles that emphasize the necessity of consistent practice, meaningful contact, and immediate feedback to improve speaking proficiency (Chapelle, 2017). Accordingly, AI has the potential to address pedagogical constraints commonly encountered in aviation English instruction.

Beyond pedagogical efficiency, AI-based language learning environments also influence learners' affective and motivational dimensions. Research shows that AI-assisted language learning can reduce academic demotivation and foreign language anxiety while enhancing learner autonomy through flexible and non-threatening practice opportunities (Alsager, 2024). Automatic speech recognition (ASR) systems support pronunciation learning by enabling learners to monitor and regulate their progress, thereby fostering autonomous learning behaviors (McCrocklin, 2016), and have been shown to improve pronunciation

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accuracy and speaking confidence through repeated practice and individualized feedback (Dennis, 2024). Additionally, AI-based interactive scaffolding significantly enhances EFL learners' speaking development by adapting instructional support to learners' performance levels (Wang et al., 2025).

Recent empirical studies demonstrate positive effects of AI-assisted learning on speaking abilities. Research has shown that AI-assisted speaking activities using AI-based mobile applications improve learners' pronunciation accuracy and fluency while also increasing learner engagement and interest (Rahayu et al., 2025). Studies on AI-assisted speaking practice indicate that automated feedback reduces speaking anxiety and promotes learner autonomy (Ouyang & Jiao, 2021; Kessler, 2018). A recent meta-analysis indicates that the use of AI in English language instruction markedly improves learners' speaking performance relative to conventional approaches (Zhai & Wibowo, 2023).

Despite these promising outcomes, most existing research focuses on general English learning contexts, such as secondary or higher education in non-specialized fields, while studies examining AI-assisted speaking training in aviation education remain limited. Aviation English, classified as English for Specific Purposes (ESP), involves technical, standardized, and safety-critical communication, presenting unique instructional challenges related to domain-specific terminology and operational phraseology (Demirdöken, 2021). Research highlights that aviation learners must master specialized radiotelephony vocabulary distinct from general English (Drayton & Coxhead, 2023), and learner perspectives reveal that aspiring pilots often experience heightened communicative pressure due to the safety-critical nature of their future professional roles (Dinçer & Demirdöken, 2023). Furthermore, many studies emphasize technological benefits without critically examining whether AI aligns with pedagogical objectives or merely reflects digital trends, underscoring the need for context-specific investigations in aviation education.

This study aims to investigate the utilization of Artificial Intelligence in teaching speaking skills in Aviation English. The novelty of this study lies in its focus on AI-assisted speaking practice within aviation education and its critical evaluation of AI as a pedagogical tool rather than solely a technological entity. This study seeks to furnish empirical evidence on the effectiveness of AI in bridging the gap between expected and actual speaking proficiency in aviation education, through an analysis of both speaking performance and student perceptions. By doing so, the study contributes to the development of evidence-based instructional practices for Aviation English.

RESEARCH METHODOLOGY

This study employed a mixed-methods approach with a quasi-experimental pretest–posttest control group design to examine the effectiveness of AI-assisted speaking practice in Aviation English and to explore learners' experiences. The research was conducted in the Aerospace Engineering Study Program at Institut Teknologi Dirgantara Adisutjipto within the *Bahasa Inggris Teknik I* course for first-semester students. A total of 90 students from two intact classes participated, with Class A (n = 49) assigned as the experimental group and Class B (n = 41) as the control group using cluster-based assignment. Only students who completed both tests and attended at least 80% of instructional sessions were included in the final analysis.

Both groups received identical classroom instruction in Aviation English. The experimental group additionally engaged in AI-assisted speaking practice using a system equipped with automatic speech recognition and a conversational agent, while the control group conducted speaking practice through conventional in-class role-plays without AI support. The

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AI activities emphasized scenario-based aviation dialogues, immediate automated feedback on speaking performance, and guided repetition until task criteria were met. Practice duration, task objectives, topic coverage, and task complexity were carefully matched across groups to ensure instructional consistency, including scenarios involving routine radiotelephony and abnormal or emergency situations.

Multiple instruments were used to collect quantitative and qualitative data. A performance-based Aviation English speaking test was administered as both pretest and posttest, with tasks recorded and assessed using an analytic rubric covering pronunciation, fluency, phraseology, grammatical accuracy, and interaction. Two trained raters independently evaluated all recordings, and final scores were determined through averaging. Additional data were obtained from learner perception questionnaires, AI learning logs, and semi-structured interviews with selected participants.

The research procedure involved instrument preparation, pretesting, intervention, and posttesting stages. The intervention lasted four weeks, during which both groups followed the same instructional schedule. Quantitative data were analyzed using significance testing and effect size calculations, while qualitative data underwent thematic analysis. Ethical considerations were observed through informed consent, anonymization of data, and voluntary participation.

RESULT AND DISCUSSION

Result

Participants and Implementation

This research was carried out in the Aerospace Engineering Study Program at Institut Teknologi Dirgantara Adisutjipto, specifically within the Bahasa Inggris Teknik I course for first-semester students. Ninety students participated from two intact classes: Class A (n = 49) and Class B (n = 41). Employing cluster-based assignment, one class functioned as the experimental group (AI-assisted speaking practice), while the other acted as the control group (non-AI in-class role-plays with equivalent practice duration). Students who failed to complete both pretest and posttest exams or whose attendance fell below 80% were omitted from the final analysis. Following the screening, the overall number of students remains unchanged at 90. The AI tool logs revealed that all participants in the experimental group fulfilled the mandated speaking activities throughout the 4-week deployment period, however engagement levels differed among people in terms of session frequency and duration of task participation.

Speaking Performance: Baseline Equivalence and Post-intervention Outcomes

Table 1 presents the aggregate speaking scores (0–100) of the experimental and control groups across the pretest and posttest phases. The table summarizes overall speaking performance for both groups at two measurement points. It allows for a direct comparison of group performance before and after the instructional intervention. This presentation is intended to provide a clear quantitative reference for the subsequent analysis of speaking outcomes.

Table 1. Total Speaking Test Scores by Group (0–100)

Group	Pretest M (SD)	Posttest M (SD)	Gain M (SD)	p (gain diff.)	Effect Size (d)
Experimental (AI)	69.8 (7.1)	79.4 (6.5)	+9.6 (5.8)	< .001	0.85
Control (Non-AI)	70.2 (6.9)	73.6 (6.8)	+3.4 (5.4)		

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As shown in Table 1, the experimental and control groups demonstrated comparable speaking proficiency at baseline (pretest MExp = 69.8, SD = 7.1; MCtrl = 70.2, SD = 6.9), indicating equivalent starting levels. Following the intervention, the experimental group showed a greater improvement in speaking performance (posttest MExp = 79.4, SD = 6.5) compared to the control group (posttest MCtrl = 73.6, SD = 6.8). Further analysis of the gain scores presented in Table 1 confirmed that the experimental group achieved significantly higher improvement than the control group (MExp = +9.6 vs. MCtrl = +3.4; $p < .001$), with a moderate-to-large effect size ($d = 0.85$). These findings indicate that AI-assisted speaking practice resulted in more substantial speaking gains than equivalent non-AI role-play activities.

Speaking Performance by Rubric Domain

Domain-level results (Table 2) indicated that the experimental group exhibited the most significant improvements in Pronunciation/Clarity and Fluency, succeeded by Aviation Vocabulary. The control group demonstrated lesser improvements across various domains. The trend suggests that AI-assisted practice specifically facilitated areas associated with frequent oral output and prompt feedback.

Table 2. Rubric Domain Scores by Group (Each Domain 0–20; Total 0–100)

Domain	Experimental Pre M (SD)	Experimental Post M (SD)	Control Pre M (SD)	Control Post M (SD)
Pronunciation/Clarity	13.4 (2.1)	16.3 (2.0)	13.6 (2.0)	14.5 (2.1)
Fluency	13.7 (2.2)	16.1 (2.1)	13.9 (2.1)	14.6 (2.2)
Aviation Phraseology/Vocabulary	14.3 (2.1)	16.0 (2.0)	14.4 (2.2)	15.0 (2.1)
Grammatical Accuracy	14.0 (2.1)	15.1 (2.0)	14.1 (2.1)	14.6 (2.1)
Interactional Appropriateness	14.4 (2.0)	15.9 (1.9)	14.2 (2.0)	14.9 (2.0)
Total	**69.8 (7.1)**	**79.4 (6.5)**	**70.2 (6.9)**	**73.6 (6.8)**

As presented in Table 2, domain-specific rubric scores show changes in speaking performance for both groups across the pretest and posttest phases. At baseline, the experimental and control groups demonstrated comparable mean scores across all five speaking domains, indicating similar initial proficiency profiles. After the intervention, both groups showed increases in domain scores; however, the experimental group consistently demonstrated larger posttest gains across domains. Overall, Table 2 provides a detailed overview of how speaking performance evolved at the domain level, serving as the basis for further interpretation of differential learning outcomes.

Scoring Reliability

Two trained evaluators assessed all speech recordings utilizing the analytic rubric. Inter-rater reliability was elevated, with an ICC of .87 for pretest scores and an ICC of .89 for posttest scores, signifying consistent scoring among raters and across measurement dates. This level of agreement indicates that the scoring procedure was applied in a stable and systematic manner. Accordingly, the reliability results support the credibility of the speaking performance scores used for subsequent analysis.

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Learning Analytics: AI Practice Logs (Experimental Group)

The AI system logs presented evidence of the intensity of practice and repetitive behavior in the experimental group. Students, on average, completed 11.8 sessions (SD = 3.2; range 6–17) and dedicated a total of 198 minutes to AI practice (SD = 62; range 95–340). Repetition was prevalent: participants reiterated speaking attempts an average of 2.3 times per scenario (SD = 0.6; range 1.2–3.7). As summarized in Table 3, these log indicators provide a quantitative overview of learners' engagement patterns and the extent of repeated speaking practice during the intervention.

Table 3. AI Practice Log Summary (Experimental Group)

Log Indicator	Mean (SD)	Range
Sessions completed	11.8 (3.2)	6–17
Total practice time (minutes)	198 (62)	95–340
Average repeats per scenario	2.3 (0.6)	1.2–3.7

Based on the engagement indicators reported in Table 3, exploratory analysis indicated that greater learner engagement was associated with larger speaking improvements. Total practice time showed a moderate correlation with gain scores ($r = .39$, $p = .006$). Session count demonstrated a weaker but still positive association with speaking gains ($r = .31$, $p = .029$). These results suggest that the depth of practice may be more influential than frequency alone in supporting speaking development.

Learner Perceptions of AI-assisted Speaking Practice (Experimental Group)

Participants in the experimental group had predominantly positive views of AI-assisted speaking practice (Table 4). The greatest evaluations pertained to perceived utility and relevance to aviation communication tasks, although feedback accuracy and trust were marginally lower, indicating that learners appreciated AI assistance but did not deem it entirely dependable for all facets of Aviation English assessment. The questionnaire exhibited robust internal consistency. These findings indicate that students' perceptions were measured reliably and provide contextual support for interpreting the attitudinal results.

Table 4. Post-intervention Perception Questionnaire (Experimental Group; Likert 1–5)

Dimension	Mean (SD)
Perceived usefulness	4.32 (0.55)
Ease of use	4.08 (0.63)
Feedback clarity/actionability	4.15 (0.60)
Feedback accuracy/trust	3.78 (0.67)
Confidence increase / anxiety reduction	4.02 (0.65)
Relevance to aviation communication	4.24 (0.57)

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Qualitative Results: Themes from Interviews/FGD

Qualitative analysis yielded five interrelated themes that help explain the observed quantitative gains and learner perceptions. First, immediate feedback facilitated self-correction, as students reported using AI input to adjust their pronunciation and speech rate in real time. Second, repetition was found to enhance fluency and automaticity, with participants indicating reduced hesitation after repeatedly rehearsing the same scenarios. Third, learner autonomy reduced feelings of embarrassment and increased confidence, as students valued the opportunity to practice individually before speaking in front of their peers. Fourth, the authenticity of the scenarios strengthened perceived relevance; tasks closely aligned with operational aviation communication, such as readback and clarification, were considered the most beneficial. Finally, trust in the AI-assisted practice was dependent on the accuracy of the automatic speech recognition and the instructional scaffolding provided by the teacher, as students noted occasional misrecognition and relied on instructor guidance and standardized phraseology models to confirm safety-critical utterances.

Discussion

AI-Assisted Practice as an Instructional Solution in a Constrained Speaking Environment

The results indicate that including AI-assisted speaking practice yielded greater enhancements in speaking proficiency compared to equivalent non-AI role-play exercise. Despite both groups began with similar baseline performance (Table 1), the experimental group realized a significantly greater improvement (+9.6) compared to the control group (+3.4), yielding a moderate-to-large effect size (d = 0.85). This trend suggests that the AI tool served not only as a technology enhancement but as an educational extension, augmenting speaking chances and feedback cycles beyond the limitations of classroom engagement alone. This supports the perspective that technology can enhance oral growth by increasing practice frequency and offering prompt feedback, which are essential criteria for speaking improvement in computer-assisted language acquisition (Chapelle, 2017). Comparable findings have been reported in empirical ASR studies, where repeated AI-mediated practice contributed to measurable gains in speaking performance beyond traditional classroom interaction (Bashori et al., 2024).

Why Pronunciation/Clarity and Fluency Benefited Most

The experimental group exhibited the most significant enhancements in Pronunciation/Clarity and Fluency, as indicated by the domain-level results (Table 2). These domains are especially responsive to frequent production, prompt corrective feedback, and swift opportunities for re-attempts often provided by ASR-based systems and conversational agents. The findings align with studies indicating that AI-assisted speaking activities can improve pronunciation and fluency by facilitating iterative practice and providing instant feedback on learner performance (Rahayu et al., 2025). This pattern is consistent with earlier evidence demonstrating that ASR-based learning environments can enhance pronunciation accuracy while simultaneously reducing speaking anxiety and increasing enjoyment in EFL learners (Bashori et al., 2021). Conversely, improvements in Grammatical Accuracy were minimal, potentially indicating that the advancement of grammar necessitates prolonged exposure, conscious awareness, and continuous feedback that surpasses brief automated corrections. This pattern indicates that AI practice is likely most effective when focused on performance-oriented speaking elements (clarity, fluency, and intelligibility), whereas grammar may necessitate additional instructional supports, like guided feedback, targeted mini-lessons,

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and structured output tasks. This interpretation aligns with earlier research on computer-based corrective feedback, which suggests that focused, segment-level feedback is more effective for pronunciation development than for broader grammatical restructuring.

Practice "dose" Matters: Interpreting Learning Analytics

Learning analytics facilitate the understanding that engagement levels influenced variations in outcomes. In the experimental group, overall practice duration and session frequency showed a positive correlation with speaking improvements ($r = .39$ and $r = .31$, respectively). This correlational response pattern reinforces the assertion that improvement was associated with the learning process facilitated by the AI technology, namely time-on-task and repeated efforts, rather than solely test familiarity or overall course advancement. This analytics-driven data is a distinct advantage for educational technology research as it records how learners engaged with the intervention, rather of simply assessing their satisfaction with it. Simultaneously, the duration of practice serves as an inadequate surrogate for the quality of practice; subsequent research could identify more nuanced metrics (e.g., intra-scenario enhancement across trials, decrease in persistent mispronunciations) to elucidate how practice correlates with quantifiable advancements. Large-scale reviews and meta-analyses similarly emphasize that consistent exposure and repeated pronunciation attempts are key predictors of ASR-mediated speaking improvement (Ngo et al., 2024; Liu et al., 2025).

Learner Perceptions: Usefulness and Relevance with Cautious Trust in Automated Feedback

The questionnaire findings revealed that learners regarded the AI-assisted practice as beneficial and pertinent to aviation communication (Table 4). This is crucial in a safety-critical domain, since perceived relevance can foster ongoing engagement and facilitate transfer to professional communication contexts. The marginally reduced rating for feedback accuracy and trust indicates that learners acknowledged the limitations of computerized assessment. This corresponds with previous research indicating that although automated feedback can enhance learner autonomy and alleviate anxiety, learners may still doubt the accuracy of machine-generated feedback, particularly in specialized contexts (Ouyang & Jiao, 2021; Kessler, 2018). The qualitative themes elucidate this tension: learners appreciated immediacy and repetition but noted sporadic ASR misrecognition, leading them to depend on instructor models or checklists for confirmation. The combined quantitative and qualitative findings suggest that AI is most pedagogically useful when utilized as helpful feedback for practice rather than as the exclusive arbiter of correctness. This cautious trust in automated feedback echoes conclusions from systematic reviews of computer-assisted pronunciation training, which highlight learner reliance on human validation when linguistic accuracy carries high stakes (Amrate & Tsai, 2025).

Autonomy and Anxiety Reduction as Mechanisms for Improved Participation

The confidence/anxiety component garnered favorable evaluations, and interview data indicated that private practice alleviated humiliation and motivated learners to rehearse prior to speaking in class. This is significant because speaking anxiety can restrict engagement and diminish the extent of oral practice kids obtain. AI solutions can diminish the emotive barrier by providing boundless rehearsal chances devoid of social judgment, potentially enabling learners to amass more speaking turns than conventional classroom formats permit. Previous studies indicate that automated speaking environments might enhance autonomy and diminish

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fear, perhaps leading to increased frequency and consistency of practice (Ouyang & Jiao, 2021; Kessler, 2018). Similar affective benefits have been reported in ASR-based EFL contexts, where reduced anxiety and increased enjoyment were associated with higher participation rates (Bashori et al., 2021). This study indicates that the elevated gain scores for the experimental group may be seen as both a direct consequence of feedback and an indirect result of enhanced motivation to practice.

Aviation English Specificity: Task Alignment and Safety-Critical Guardrails

Aviation English emphasizes intelligibility, precision, and standardized phraseology, as misinterpretation can lead to severe repercussions. The advancements in phraseology and vocabulary were favorable (Table 2), although the diminished trust ratings and qualitative feedback from learners indicate that AI may not consistently assess aviation phraseology with the same dependability as a qualified instructor. This underscores a fundamental implication: the efficacy of AI in Aviation English is heavily contingent upon instructional design and scaffolding. The genuineness of the scenario (Theme 4) certainly enhanced perceived relevance and involvement. Nevertheless, as ASR systems may emphasize broad linguistic characteristics over domain-specific terminology, educators should provide essential safeguards, including: (1) comprehensive readback checklists, (2) curated phraseology databases, and (3) concise instructor validation for crucial items. This aligns with findings from simulation-based Aviation English studies, which emphasize the necessity of guided instructional frameworks to ensure communicative accuracy in safety-critical training environments (Demirdöken & Atay, 2024). These measures mitigate excessive dependence on automation and guarantee that AI practices align with the professional standards anticipated in aviation communication.

Pedagogical Solution or Technological Trend?

The results collectively support the interpretation of AI as a pedagogical solution rather than a transient trend—at least under the settings of this intervention. The amalgamation of (1) superior advancements compared to the control group, (2) affirmative learner views of utility and pertinence, and (3) indications of prolonged engagement from log data implies that the technology significantly enhanced learning. This perspective corresponds with extensive research indicating that AI integration enhances speaking outcomes by augmenting opportunities for interaction and feedback compared to conventional practice (Zhai & Wibowo, 2023). Recent meta-analytical and systematic reviews further position ASR-based pronunciation practice as an evidence-supported instructional approach rather than a novelty, provided it is pedagogically aligned and contextually grounded (Ngo et al., 2024; Liu et al., 2025). Nonetheless, the results reveal that advantages are not guaranteed: trust concerns and recognition inaccuracies highlight the necessity for meticulous integration. Consequently, AI seems to be most efficacious as an ancillary practice component integrated within an educational framework, rather than as an independent solution.

Implications for Technology-Enhanced Instruction in Bahasa Inggris Teknik I

AI-assisted speaking practice can be systematically integrated to enhance classroom instruction for first-semester Aerospace Engineering students. Based on the identified patterns, several practical measures are recommended. First, scenario-based modules should be aligned with course learning outcomes, with an emphasis on both routine and non-routine aviation communication tasks that require clarity, confirmation, and corrective strategies. Second, AI tools should be strategically employed to support pronunciation and fluency development

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through frequent practice and immediate feedback, as these areas showed the most substantial improvement. Third, a blended feedback model is recommended, combining AI-assisted practice with instructor-led validation to ensure compliance with standard phraseology and accuracy in safety-critical communication. Finally, learning analytics should be leveraged to identify students with limited practice engagement, allowing instructors to provide targeted support or set individualized learning goals. These findings directly address the study objective of examining whether AI functions as a pedagogical solution rather than merely a technological trend.

CONCLUSION

This study investigated whether Artificial Intelligence functions as an effective instructional tool for enhancing Aviation English speaking skills, rather than merely representing a technological trend, among first-semester Aerospace Engineering students. The results demonstrate that AI-assisted speaking practice can significantly enhance the learning objectives of Aviation English by increasing possibilities for repeated oral production, instant feedback, and self-paced rehearsal, which are challenging to deliver consistently through traditional classroom instruction. In this context, AI is most accurately perceived as a facilitator of learning that diminishes the disparity between anticipated speaking proficiency and students' actual performance, especially in performance-centric areas of speaking, such as pronunciation, clarity, and fluency.

In addition to performance outcomes, students' perceptions indicate that AI positively influences affective and behavioral aspects: it enhances learner autonomy, promotes consistent practice, and reduces speaking anxiety, hence boosting students' readiness to engage in speaking and improve their output. Nonetheless, the data further substantiates that AI lacks pedagogical neutrality. Learners' prudent reliance on automated feedback underscores the imperative for instructional scaffolding—particularly in Aviation English, where communication is vital for safety and adherence to phraseology norms is essential. Consequently, AI ought to be integrated as an auxiliary practice component inside a systematic educational framework, augmented by instructor validation for adherence to phrasing standards and operational precision.

These results endorse a pragmatic implementation strategy for aviation-focused English courses: incorporate AI-driven rehearsals into scenario-based modules, track participation via learning analytics, and combine automated and human feedback to maintain domain-specific standards. Subsequent investigations ought to expand the data base by employing multi-class or multi-institution frameworks, prolonging intervention duration, and incorporating aviation-specific metrics (e.g., readback completion and phraseology compliance) as outcome measures. Additional research comparing various AI feedback setups and investigating retention via delayed posttests would elucidate the parameters under which AI most consistently functions as an effective pedagogical tool in Aviation English teaching.

DAFTAR PUSTAKA

Alsager, H. N. (2024). To look from another window in education: Artificial intelligence assisted language learning and its reflections on academic demotivation, foreign language learning anxiety and autonomy. *Computer Assisted Language Learning Electronic Journal*, *25*(4), 124–147. https://callej.org/index.php/journal/article/view/469

Amrate, M., & Tsai, P.-H. (2025). Computer-assisted pronunciation training: A systematic

https://doi.org/10.51878/edutech.v6i1.9156

review. *ReCALL, 37*(1), 22–42. https://doi.org/10.1017/S0958344024000181

Bashori, M., van Hout, R., Strik, H., & Cucchiarini, C. (2021). Effects of ASR-based websites on EFL learners' vocabulary, speaking anxiety, and language enjoyment. *System, 99*, 102496. https://doi.org/10.1016/j.system.2021.102496

Bashori, M., van Hout, R., Strik, H., & Cucchiarini, C. (2024). "I can speak": Improving English pronunciation through automatic speech recognition-based language learning systems. *Innovation in Language Learning and Teaching, 18*(5), 443–461. https://doi.org/10.1080/17501229.2024.2315101

Botes, E., Dewaele, J.-M., & Greiff, S. (2020). The foreign language classroom anxiety scale and academic achievement: An overview of the prevailing literature and a meta-analysis. *Journal for the Psychology of Language Learning, 2*(1), 26–56. https://doi.org/10.52598/jpll/2/1/3

Chapelle, C. A., & Sauro, S. (Eds.). (2017). *The handbook of technology and second language teaching and learning*. Wiley Blackwell.

Demirdöken, G. (2021). The constructivist approach towards identifying the challenges of ESP teachers: The case of Aviation English. *International Journal of Aviation, Aeronautics, and Aerospace, 8*(2). https://doi.org/10.15394/ijaaa.2021.1571

Demirdöken, G., & Atay, D. (2024). Enhancing aviation English competency: A simulation-based approach for aspiring pilots. *English for Specific Purposes, 76*, 106–121. https://doi.org/10.1016/j.esp.2024.08.001

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

Dinçer, N., & Demirdöken, G. (2023). Ab-initio pilots' perspectives on the use of simulation in the aviation English course. *Journal of Teaching English for Specific and Academic Purposes, 11*(1), 11–22. https://doi.org/10.22190/JTESAP230130003D

Drayton, J., & Coxhead, A. (2023). The development, evaluation and application of an aviation radiotelephony specialised technical vocabulary list. *English for Specific Purposes, 69*, 51–66. https://doi.org/10.1016/j.esp.2022.10.001

Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal, 70*(2), 125–132. https://doi.org/10.1111/j.1540-4781.1986.tb05256.x

International Civil Aviation Organization. (2010). *Manual on the implementation of ICAO language proficiency requirements* (Doc 9835). ICAO.

International Civil Aviation Organization. (2023). *Guidance on the harmonized implementation of language proficiency requirements and its oversight* (EUR Doc 046, 1st ed.). ICAO EUR/NAT Office.

International Civil Aviation Organization. (2024). *Test design guidelines: Handbook on the design of tests for the ICAO language proficiency requirements* (Doc 10197, 1st ed.). ICAO.

Kessler, G. (2018). Technology and the future of language teaching. *Foreign Language Annals, 51*(1), 205–218. https://doi.org/10.1111/flan.12318

Liu, Y., binti Ab Rahman, F., & binti Mohamad Zain, F. (2025). A systematic literature review of research on automatic speech recognition in EFL pronunciation. *Cogent Education, 12*(1), 2466288. https://doi.org/10.1080/2331186X.2025.2466288

McCrocklin, S. (2016). Pronunciation learner autonomy: The potential of automatic speech recognition. *System, 57*, 25–42. https://doi.org/10.1016/j.system.2016.01.001

https://doi.org/10.51878/edutech.v6i1.9156

Ngo, T. T.-N., Chen, H. H.-J., & Lai, K. K.-W. (2024). The effectiveness of automatic speech recognition in ESL/EFL pronunciation: A meta-analysis. *ReCALL, 36*(1), 4–21. https://doi.org/10.1017/S0958344023000113

O'Brien, M. G., Derwing, T. M., Cucchiarini, C., Hardison, D. M., Mixdorff, H., Thomson, R. I., Strik, H., Levis, J. M., Munro, M. J., & Foote, J. A. (2018). Directions for the future of technology in pronunciation research and teaching. *Journal of Second Language Pronunciation, 4*(2), 182–207. https://doi.org/10.1075/jslp.17001.obr

Ouyang, F., & Jiao, P. (2021). Artificial intelligence in education: The three paradigms. *Computers and Education: Artificial Intelligence, 2*, 100020. https://doi.org/10.1016/j.caeai.2021.100020

Rahayu, Y. S., Maulida, R. D., & Wintarsih, W. (2025). *Integrating the shadowing technique with an AI-powered mobile application to improve students' pronunciation and speaking fluency*. JELT (Jambi-English Language Teaching), 9(2). https://online-journal.unja.ac.id/jelt/article/view/46341

Wang, F., Wang, X., Wang, Y., & Wang, J. (2025). The effects of artificial intelligence-based interactive scaffolding on EFL learners' speaking learning in interactive learning environments. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2025.2470319

Zhai, C., & Wibowo, S. (2023). A systematic review on artificial intelligence dialogue systems for enhancing English as foreign language students' interactional competence in the university. *Computers and Education: Artificial Intelligence, 4*, 100134. https://doi.org/10.1016/j.caeai.2023.100134

https://doi.org/10.51878/edutech.v6i1.9156