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AI-Enhanced Academic Speaking Skills: A Qualitative Investigation of Digital Tool Integration in Indonesian EFL University Context

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ABSTRACT

Academic speaking proficiency represents a critical competency for English as a Foreign Language (EFL) learners in higher education. Traditional skill approaches often fail to provide adequate individualized feedback and authentic practice opportunities, particularly in resource-constrained Indonesian university contexts. This qualitative case study explores the use of artificial intelligence (AI) technologies in academic speaking and how they affect the development of oral competency, self-assurance, and independent learning practices in EFL learners. We used a qualitative case study approach to gather information from 15 second-year English education students at a private Indonesian university over the course of six weeks through semi-structured interviews, systematic classroom observations, and artefact analysis. Structured speech initiatives incorporated artificial intelligence (AI) techniques such as ChatGPT, text-to-speech programs, and pronunciation feedback systems. The six-phase theme analysis framework developed by Braun and Clarke, validated by several researchers, was used to analyze the data. The analysis revealed four main themes: increased learner autonomy and self-regulation, improved pronunciation and fluency through instantaneous AI feedback, improved self-confidence

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through nonjudgmental practice environments, and ongoing difficulties with vocabulary acquisition and the development of metacognitive strategies. AI-assisted speech projects show great promise for improving academic speaking proficiency among EFL learners, especially in the areas of targeted skill improvement and confidence building. However, effective integration necessitates thoughtful educational design that maintains human connection for the development of pragmatic and cultural competence while addressing enduring difficulties in lexical development and metacognitive strategy abilities.
Keywords: EFL Students; Academic Speaking Skills; AI-Assisted Learning; English Speech Project; Digital Feedback; Learner Confidence

1. Introduction

As higher education internationalizes, the expectations of nonnative English speakers' academic communicative competence have been redefined. Academic speaking, comprising, amongst others, formal presentation and debate, and persuasive speaking, has become an important determinant of academic and professional success in contemporary globalized educational environments[1,2]. These challenges present EFL learners, particularly those in under-resourced educational contexts, with enormous challenges that are often inadequately served by skill-based approaches. Academic speaking is very different from conversational English in linguistic accuracy, in discourse and register and more significantly in the amount of confidence in formal exam circumstances[3]. In EFL situations, where learners have little experience with legitimate academic discourse and encounter cultural communication style conflicts that impede confident oral engagement, the complexity of these demands is exacerbated[4]. Furthermore, Indonesian university students often struggle with fluency, pronunciation correctness, and confidence when participating in academic speaking tasks, even though they have demonstrated proficiency in grammar and vocabulary through written evaluations[5,6].

The usefulness of modern EFL speaking skills in fostering academic oral competency is constrained by a number of systemic issues. The inability to give frequent, focused feedback to individual students in big enrollment classes, which are common in Indonesian higher education, is one of them[7]. Goh and Burns also stated that, traditional classroom arrangements place a higher priority on teacher-centred expertise and stress accuracy over fluency, which results in situations where students are anxious and rarely participate orally[8].

Another significant limitation on traditional speaking abilities is the feedback limitation. Speaking skill development necessitates prompt, targeted feedback on pronunciation, fluency, and discourse structure in contrast to writing, where delayed input is acceptable. This allows for quick correction and reinforcement of proper patterns[9]. However, the real-time nature of classroom interaction precludes detailed individual feedback, particularly in courses with high student-to-instructor ratios common in Indonesian universities.

Performance anxiety constitutes a third major barrier to effective speaking skills in EFL contexts[10]. Research consistently demonstrates that fear of negative evaluation, pronunciation concerns, and cultural communication style conflicts significantly impede oral participation and skill development[4]. Indonesian students, raised in educational environments that prioritize respect for authority and face-saving behaviors, frequently exhibit reluctance to participate in public speaking activities due to concerns about linguistic inaccuracies or perceptions of arrogance. Another difficulty with conventional speaking abilities is the authenticity gap. Speaking assignments in the classroom usually lack real-world relevance and true communicative goals, which lowers student motivation and restricts transfer to academic situations outside of the classroom[11]. Students need to practice speaking in a meaningful and purposeful way that reflects the needs of academic discourse in their fields of study.

Project-Based Learning (PBL) arises as a promising pedagogical approach for addressing some limitations of traditional speaking skills. PBL engages learners in extended, meaningful tasks that culminate in authentic products or performances, providing natural contexts for sustained oral communication practice[12,13]. In language learning contexts, speech projects align with PBL principles by encouraging learner autonomy, creativity, and authentic language use while developing both linguistic competency and content

knowledge[14]. Research shows that by offering opportunities to integrate academic vocabulary and discourse structures in communicative activities as well as relevant contexts for language use, well-designed speech projects can improve learners' motivation, confidence, and oral proficiency[15]. By establishing genuine audiences and speaking objectives, these initiatives bridge the authenticity gap in traditional speaking skills and promote consistent practice and introspection. Speech projects, however, can be difficult to implement, especially in settings with limited resources. Large enrollment courses may not have the resources necessary for traditional projects, which call for intensive instructor input and help during the planning phase[16]. Furthermore, in order to improve their delivery abilities and present confidence, many students need more practice chances and iterative feedback than the instructor can provide.

The barriers of conventional speaking abilities can be addressed in previously unheard-of ways thanks to recent developments in artificial intelligence (AI) technology. While offering scalable support for big student groups, AI-powered language learning technologies provide rapid, individualized feedback mechanisms that can enhance human abilities[17,18]. These technologies include conversational agents for interactive practice, automated feedback platforms for fluency assessment, and voice recognition systems for pronunciation assessment. Speaking skill development is one area where modern AI approaches in language acquisition show considerable potential. With repeated practice, learners can improve phonological features of their speech, a study reported that AI-driven tool like ELSA Speak can significantly enhance their pronunciation and fluency and boost their confidence and motivation in communicative activities[19].

Modern language models like ChatGPT increase the potential for self-directed learning by providing assistance with content creation, linguistic feedback, and simulated conversation practice[20]. Sociocultural theory, which highlights the mediating function of cultural instruments in cognitive development, provides the theoretical underpinnings for the integration of AI in language learning[21]. According to this viewpoint, artificial intelligence (AI) tools serve as digital mediators that facilitate autonomous performance by scaffolding learner development through the Zone of Proximal Development. Furthermore, according to Output Hypothesis theory, language output fosters linguistic development by means of metalinguistic reflection, hypothesis testing, and fluency development[22]. These developmental processes are supported by AI-assisted speaking practice, which offers structured contexts for meaningful output with instant feedback systems.

Although speaking-focused studies are still scarce, empirical research on AI integration in language learning has shown encouraging results across several skill domains. Research on AI-powered pronunciation training has continuously demonstrated increases in student confidence and accuracy[23]. According to research on automated feedback systems, when students receive prompt, individualized assistance, their motivation and autonomous learning behaviors increase, and supported greater learner autonomy in feedback engagement[24]. Existing research, however, also highlights significant drawbacks and issues with the use of AI in language learning. Significant implementation issues include an over-reliance on technology, inconsistent feedback quality among AI systems, and the requirement for the development of digital literacy.

AI tools may also fall short in addressing interpersonal communication skills, cultural sensitivity, and pragmatic competence—all of which rely on human interaction and cultural context. The great majority of current studies on AI-language learning have been conducted in Western educational contexts, with little consideration given to developing countries whose implementation results may be influenced by financial constraints and technological infrastructure. Context-specific research is necessary to address the unique challenges and opportunities for incorporating AI in Indonesian education, which include large class sizes, limited resources, and hierarchical skill traditions.

Project-based speech tasks combined with AI tools offer a promising hybrid strategy that addresses the shortcomings of each pedagogical framework while utilizing its advantages. Traditional skills cannot match the scope or immediacy of AI-assisted speech projects, which offer controlled contexts for effective oral communication practice together with individualized feedback and coaching. By supplementing the limited attention of instructors with customized feedback on pronunciation, fluency, and linguistic accuracy, this hybrid approach solves the individualization deficiency in traditional skills[25].

The instantaneous nature of AI feedback facilitates the

iterative improvement required for speaking skill development by allowing for quick error correction and reinforcement of suitable patterns during practice phases. AI-assisted speech studies have yielded promising preliminary findings. Interactive speaking exercises mediated by AI were more successful in raising the speaking proficiency and WTC of EFL students. Additionally, the students' attitudes and views of the AI-mediated speaking teaching were favourable [26].

In a similar vein, research discovered that after practicing with AI-powered tools, students expressed greater motivation and confidence [27,28]. These studies, however, frequently fall short in their examination of learner experiences and do not sufficiently take into account the contextual and cultural elements that are pertinent to EFL instruction in Indonesia.

Even while interest in AI-enhanced language learning is expanding, there are still several important research gaps. First, there are still few empirical studies explicitly looking at the integration of AI in academic speaking abilities, especially in non-Western educational settings. Second, learner experiences and views of AI integration are frequently overlooked in favor of tool effectiveness in previous studies. Third, there is a notable lack of research in the literature that looks at how AI technologies can be incorporated into structured pedagogical frameworks like PBL. There are distinctive features of the Indonesian EFL setting that call for more research. Cultural communication style conflicts, limited exposure to authentic English discourse, and resource-constrained educational environments are some of the unique issues faced by Indonesian university students [6].

Furthermore, Indonesian higher education's quick expansion of access to digital technologies opens up possibilities for AI integration that would not be possible in other developing contexts. Gaining insight into the experiences and advantages of AI-assisted speech projects for Indonesian EFL students will help advance conversations regarding the use of technology in evolving educational settings. Given the expanding availability of AI tools and the mounting demand on Indonesian colleges to improve English proficiency results for global competitiveness, this research is especially pertinent.

By examining the integration of AI-assisted speech projects in an Indonesian EFL university setting, this study fills in the highlighted research gaps. Examining how AI-assisted speech projects affect students' academic speaking ability and investigating how students see the incorporation of AI tools into academic speaking abilities are the main goals of the study. In particular, this study aims to respond to the following queries: What effects do AI-assisted speech projects have on the academic speaking skill development of EFL learners? How do Indonesian EFL students feel about using AI technologies to practice and prepare for academic speaking? How do students incorporate AI feedback into their efforts to improve their speaking abilities? What restrictions and difficulties do students have while utilizing AI tools to improve their academic speaking?

This study addresses the particular context of Indonesian EFL skills while adding to the expanding body of research on AI integration in language teaching. The study theoretically advances our knowledge of how digital tools can facilitate autonomous learning development and mediate language acquisition processes in non-Western educational contexts. Additionally, by investigating how AI integration can improve the efficacy of speech projects, the work adds to the body of literature on project-based learning. For Indonesian EFL teachers, curriculum developers, and institutional administrators thinking about integrating AI into speaking abilities, the results offer evidence-based practical suggestions. The study provides recommendations for successful AI-assisted learning integration, including implementation tactics, possible obstacles, and student support requirements.

The study also adds to a larger body of knowledge regarding the integration of digital technology in educational settings in impoverished nations, where implementation results are influenced by infrastructure and resource limits. The study also has ramifications for the design of instructional technologies and AI tool development. Future tool development that better meets the needs of EFL learners can be informed by knowledge of how learners engage with and profit from various AI capabilities. Lastly, the study adds to the conversation on how language instruction will develop in the future and how human teachers will change in AI-enhanced classrooms.

2. Materials and Methods

2.1. Research Design

This study employed a qualitative case study design to investigate the integration of AI-assisted speech projects in academic speaking skills. Case study methodology is particularly appropriate for examining contemporary educational phenomena within real-world contexts, especially when investigating complex innovations that involve multiple interacting variables[29–32]. The bounded nature of the case a specific course, timeframe, and student population enabled intensive data collection and detailed analysis of the AI integration process and its outcomes. The interpretive paradigm underlying this research emphasizes understanding participants' lived experiences and meaning-making processes rather than establishing causal relationships or generalizable findings[33]. This approach aligns with the study's objectives of exploring student perceptions and experiences of AI tool integration, which require deep, contextualized understanding rather than statistical measurement.

2.2. Research Context and Setting

The research was conducted at a private university in Indonesia within the English Education Study Program, specifically in an Academic Speaking course required for second year undergraduate students. The university, located in South Sulawesi, serves approximately 3,000 students and offers various language education programs designed to prepare future English teachers for Indonesian secondary schools. The Academic Speaking course meets twice weekly for 90-minute sessions over a 16-week semester. The course curriculum emphasizes academic presentation skills, formal discourse competency, and confident oral communication in educational contexts. Class sizes typically range from 20–25 students, which is relatively small for Indonesian university contexts but still challenging for providing individualized speaking feedback.

2.3. Participants

Purposive sampling was employed to select 13 second-year English Education students who demonstrated a willingness to engage with digital technologies and participate in extended research activities. Participants ranged in age from 19–21 years, with English proficiency levels between intermediate and upper-intermediate based on course placement assessments. The participant group included 9 female and 4 male students, reflecting the gender distribution typical of English Education programs in Indonesia. All participants were Indonesian nationals with Bahasa Indonesia as their first language and varied regional language backgrounds reflecting Indonesia's linguistic diversity. None reported extensive prior experience with AI-powered language learning tools, though all possessed basic digital literacy skills necessary for the study. Informed consent was obtained from all participants following detailed explanation of research procedures, time commitments, and data usage. Ethical approval was secured from the university's institutional review board prior to data collection, ensuring compliance with research ethics standards for human subjects research.

2.4. AI-Assisted Speech Project Implementation

The intervention involved a six-week academic speaking project incorporating multiple AI tools and structured pedagogical activities. Students prepared 15-minute academic presentations on education-related topics relevant to their future teaching careers, utilizing AI tools throughout the preparation, practice, and revision phases. AI Tools Utilized: (1). ChatGPT: Content development, outline creation, linguistic feedback, and conversational practice; (2). Text-to-speech software: Pronunciation modelling, intonation practice, and listening comprehension; (3). Speech recognition applications: Pronunciation assessment, fluency feedback, and speaking rate analysis; and (4). Digital recording tools: Self-evaluation, progress monitoring, and reflection documentation. Project Phases: (1). Topic Selection and Research (Week 1): Students selected presentation topics with instructor approval and conducted preliminary research using both traditional and AI-assisted methods; (2). Content Development (Week 2): Outline creation, argument structuring, and evidence integration with ChatGPT assistance for organization and language refinement; (3). Language Preparation (Week 3): Vocabulary development, grammar checking, and linguistic accuracy improvement using AI feedback tools; (4) Pronunciation Practice (Week 4): Intensive pronunciation work using text-to-speech modelling and speech recognition feedback; (5). Rehearsal and Refinement (Week 5): Multiple practice sessions with AI feedback integration and peer collaboration; (6). Final Presentation (Week 6): Formal presentation delivery with instructor and peer

evaluation.

During the project, students employed a number of AI technologies to help with speech preparation and delivery. The main tool, ChatGPT (OpenAI, GPT-3.5 version), was accessed via the online interface and was used for grammatical correction, idea generation, and outline creation. Students used phonetic transcription websites like ToPhonetics.com and text-to-speech systems like NaturalReader to practice their pronunciation. Some students also practiced and assessed their own pronunciation and fluency using mobile speech recognition programs, such as Google Speech-to-Text or voice memos. Since all of the tools were publicly available or had free versions, they could be used in educational settings with limited resources.

2.5. Data Collection Methods

Multiple data collection methods ensured triangulation and enhanced the credibility and trustworthiness of findings: (1). Semi-structured Interviews: Individual 45-60 minute interviews were conducted with all participants following completion of their presentations. Interview protocols explored student experiences with AI tools, perceived learning outcomes, challenges encountered, and recommendations for improvement. Interviews were conducted in participants' preferred language (Indonesian or English) to ensure comfortable expression of ideas and experiences. (2). Classroom Observations: Systematic observations were conducted during all project phases using structured observation protocols. Researchers documented student engagement patterns, AI tool usage behaviors, peer interactions, and instructor facilitation strategies. Observation notes captured both verbal and non-verbal behaviors relevant to learning processes and outcomes. (3). Artefact Analysis: Multiple student artefacts were collected and analyzed, including presentation recordings, AI-generated feedback reports, draft outlines, reflection journals, and final presentation materials. These artifacts provided insight into learning processes, AI tool utilization patterns, and skill development trajectories over time. (4). Focus Group Discussions: Two focus group sessions with 6-7 participants each were conducted to explore collective experiences and validate individual interview findings. Focus groups enabled exploration of shared experiences and diverse perspectives on AI integration effectiveness.

2.6. Data Analysis Procedures

Data analysis followed Braun and Clarke's six-phase thematic analysis framework[33]:

Phase 1: Data Familiarization. All interviews were transcribed verbatim and researchers engaged in repeated reading to develop intimate familiarity with the data corpus.

Phase 2: Initial Coding. Systematic line-by-line coding identified meaningful data segments related to research questions and emerging patterns of interest.

Phase 3: Theme Development. Codes were clustered into broader thematic patterns through iterative review and categorization processes.

Phase 4: Theme Review. Emerging themes were refined through multiple researcher reviews and validation against the original data corpus.

Phase 5: Theme Definition. Final thematic labels and descriptions were developed with clear operational definitions and boundaries.

Phase 6: Report Writing. Themes were integrated with supporting evidence and interpreted within relevant theoretical frameworks.

Multiple researchers participated in coding and theme development processes to enhance reliability and minimize individual bias. Regular debriefing sessions and peer review ensured analytical rigor and trustworthiness of interpretations.

3. Results

The results and analysis of a case study examining the ways in which AI-assisted English speech projects help EFL college students improve their academic speaking abilities are presented in this part. Thirteen people participated in semi-structured interviews and classroom observations to collect the data. Students' involvement in the AI-assisted speech study led to notable improvements in their academic speaking abilities, according to a review of interview transcripts and observations made in the classroom. To answer the research question that guided this investigation, the findings are arranged thematically. The thematic distribution of student views on their experiences with AI-assisted speech projects is shown in **Table 1**. Interview transcripts were categorized using a grounded, inductive methodology to identify themes.

Table 1. Frequency of Emergent Themes in Student Reflections on AI-Assisted Academic Speaking Projects.

Theme	Description	Frequency
Increased Confidence	Growth in student self-assurance when speaking academically	High
AI as a Supportive Feedback Tool	Use of AI for grammar correction, pronunciation, and fluency	High
Motivation and Autonomous Learning	Students felt encouraged and learned independently with AI	Moderate
Initial Fear / Anxiety	Common fear of public speaking, grammar mistakes, and pronunciation issues	Moderate
Vocabulary and Pronunciation Challenges	Specific challenges in lexical range and accurate pronunciation	Moderate
Time Management & Memorization Difficulties	Struggles with speech preparation and rehearsal schedules	Low
Perceived Role of AI as a Non-Judgmental Learning Partner	AI seen as an accessible and encouraging tool for repeated practice	Moderate

(Source: Author's classroom-based case study).

Theme 1: Enhanced Self-Confidence Through Risk-Free Practice Environments

The most prominent finding across all data sources was students' reported enhancement of speaking confidence through AI-mediated practice opportunities. Participants frequently talked about how AI technologies provide "safe spaces" for trial and error without the social anxiety that comes with interacting with people.

"Before this project, I was really scared to speak English in front of people because I worried about making grammar mistakes or having bad pronunciation. But with AI, I could practice many times without feeling embarrassed. Nobody was there to judge me, so I felt free to try different ways of saying things." (Participant 7)

This effect of increasing confidence seemed especially important for pupils who were experiencing high levels of linguistic anxiety. Before speaking in front of human audiences, participants explained how they were able to recognize and fix mistakes in private situations through repeated practice with AI feedback. One important element in lowering performance anxiety has been identified is the nonjudgmental character of AI contact.

"The AI never got impatient with me when I made mistakes. I could repeat the same sentence ten times until I got it right. This helped me build confidence because I knew I could improve with practice." (Participant 12)

These self-reports were supported by observational data, as field notes showed that students who had used AI practice tools extensively showed reduced anxiety during class presentations and higher voluntary engagement.

Theme 2: Targeted Skill Improvement Through Immediate Feedback

Several learners gave AI tools credit for enabling particular gains in linguistic precision, speaking fluency, and pronunciation accuracy (**Figure 1**). Rapid error identification and correction cycles were made possible by AI's immediate feedback, which was not possible with traditional skills.

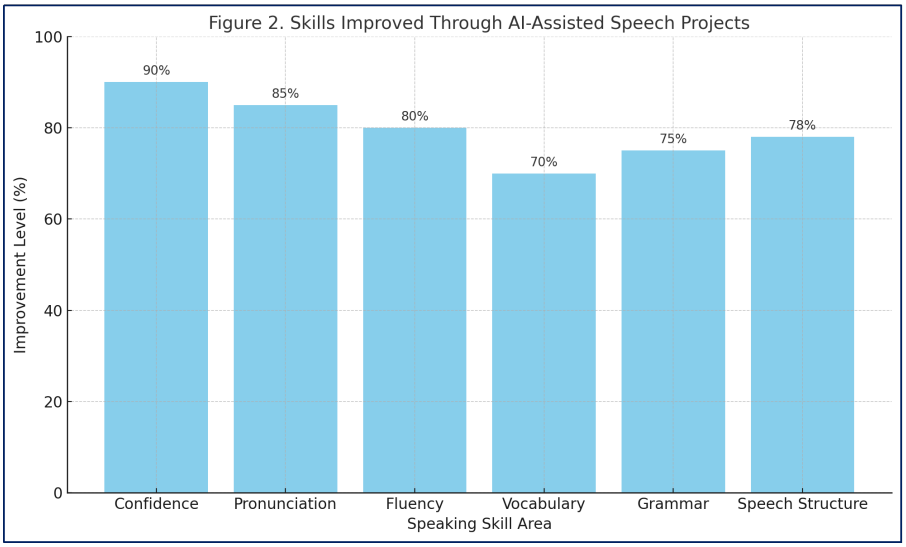

Figure 1. Visualizes the Skills Improved Through AI-Assisted Speech Projects. It shows that pronunciation was the second most improved skill, followed by fluency and vocabulary use.

Source: Author's classroom-based case study.

"ChatGPT helped me understand which words I was pronouncing incorrectly, and the text-to-speech showed me exactly how they should sound. I could practice until my pronunciation matched the model. This was much better than just guessing if I was saying words correctly." (Participant 3)

AI input was especially appreciated by participants for resolving problems with speaking rhythm and tempo. AI technologies offered continuous input that allowed for progressive tempo correction, as many people reported initial tendency to speak too quickly when anxious.

"The speech recognition told me I was speaking too fast and gave me a score for clarity. I practiced slowing down and could see my scores improve. This helped me learn to control my speaking speed even when I felt nervous." (Participant 9)

Measurable gains in fluency markers and pronunciation accuracy were found by artefact analysis between the original and final student presentation recordings. Some participants, however, experienced issues with the accuracy of AI speech recognition, especially when regional accent elements hampered the tool's functionality.

Theme 3: Development of Autonomous Learning Behaviors

The integration of AI tools appeared to foster enhanced learner autonomy and self-regulation among participants. Students demonstrated increased initiative in seeking feedback, engaging in self-correction, and managing their own learning processes.

"I started using AI to check my grammar and vocabulary before asking the teacher. It became like having a private tutor who was always available. I felt more independent and capable of solving problems myself." (Participant 11)

This independent involvement included organizational help and content creation in addition to technical repair. Students showed advanced methods to AI integration by using ChatGPT for brainstorming, argument structure, and rhetorical strategy building.

"I learned to ask ChatGPT specific questions about organizing my presentation. Instead of just asking for general help, I would ask things like 'How can I make a stronger conclusion?' or 'What examples would support this argument?' I became better at knowing what kind of help I needed." (Participant 4)

Observational data supported these self-reports, documenting students' spontaneous AI tool usage during preparation phases and evidence of strategic, goal-directed interaction patterns rather than passive dependence.

Theme 4: Persistent Challenges in Vocabulary Acquisition and Metacognitive Strategy Development

Even with generally favorable results, participants noted lingering issues that AI techniques were unable to completely resolve. Ineffective study techniques, a lack of academic language, and memory problems surfaced as recurring issues needing more assistance.

"AI could suggest good academic words for my presentation, but I had trouble remembering them and using them naturally when speaking. The suggestions were helpful, but I needed more practice to make the vocabulary feel like mine." (Participant 6)

Several students continued to struggle with time management and study techniques, indicating that the availability of AI tools by itself was insufficient to create successful teaching strategies.

"I spent too much time trying to memorize my entire speech word-for-word instead of understanding the ideas deeply. The AI couldn't help me with my study habits or teach me better ways to prepare." (Participant 8)

Some participants also mentioned difficulties in properly assessing AI-generated recommendations and choosing to incorporating feedback instead of blindly accepting all of them.

Observational Findings: Behavioral Changes and Engagement Patterns

Several noteworthy behavioral changes linked to the integration of AI tools were seen in the classroom. With more time spent on rehearsal and revision exercises, students showed greater engagement during the preparation stages. When compared to conventional project forms, the frequency of voluntary practice sessions significantly increased. Students' presentation delivery quality significantly improved, and they showed improved audience engagement behaviors and less reliance on manuscripts. Nevertheless, observations also showed persistent difficulties, such as certain students' reliance on memorization and their limited ability to produce spontaneous language outside of prepared material. Peer collaboration patterns changed as students supported one another's tool use and shared AI strategies. Unexpectedly,

this collaborative element surfaced and seemed to improve the development of the learning community as a whole in the classroom.

4. Discussion

4.1. AI as Confidence-Building Mediator in Language Learning

The finding that AI tools greatly increased student confidence is consistent with sociocultural theory, which emphasizes the function that cultural tools play as mediators in the evolution of learning [21]. In order to create what Krashen [34] referred to as environments with lowered affective filters that were favorable to language acquisition, artificial intelligence (AI) acted as a psychological mediator that decreased affective obstacles to language output. In Indonesian educational institutions, where conventional hierarchical structures frequently inhibit students from taking risks and participating orally, this confidence-building effect is especially important. Research on language anxiety and how it impairs oral performance is consistent with the idea that AI offers "safe spaces" for practice [35]. AI tools allowed students to concentrate on linguistic and communicative components of their performance without the cognitive load involved with managing social anxiety by eliminating the social evaluation component that usually goes along with speaking practice. According to this research, high-anxiety learners who gain from practice with little risk may find AI integration especially helpful. As proved by better classroom presentation performance and higher voluntary engagement, the confidence increases participants experienced seem to translate from AI-mediated practice to human interaction scenarios. This transfer effect addresses worries about the artificial nature of AI-mediated practice by implying that confidence gained through AI engagement can transfer to real-world communicative contexts. This makes it conceptually relevant.

4.2. Immediate Feedback and Metalinguistic Awareness Development

The participants' reported improvements in pronunciation and fluency support existing research on the effectiveness of immediate feedback in motor skill learning and language acquisition [36]. Rapid error correction and reinforcement cycles made possible by AI feedback's real-time nature are consistent with cognitive load theory's tenets of learning optimization through feedback's precise timing and specificity [37]. More significantly, students' explicit understanding of language as a system that can be analyzed and changed seemed to be improved by AI interactions [38]. A key element of advanced language competency and the capacity for independent learning is this awareness. Students' descriptions of learning to evaluate their own pronunciation and adjust speaking rate indicate developing metacognitive skills that extend beyond the specific AI tools used in this study. The limitations participants encountered with AI speech recognition, particularly related to accent and background noise interference, highlight important considerations for AI tool selection and implementation. These challenges underscore the need for careful tool evaluation and possibly multiple AI systems to accommodate diverse learner needs and characteristics.

4.3. Scaffolding Autonomous Learning Through Digital Mediation

The enhanced learner autonomy demonstrated by participants reflects successful scaffolding through AI mediation, consistent with Zone of Proximal Development theory [21]. Students showed internalization of learning processes and the development of self-regulation skills as they moved from using dependent tools to deploying independent strategies. Students' strategic approaches to AI contact, such as asking targeted, focused questions instead of requesting generic help, show advanced metacognitive development that goes beyond language acquisition to more general academic abilities. This research implies that effectively integrating AI can help develop developers who are more equipped for independent skill development and lifetime learning. However, the emergence of autonomous learning necessitated initial scaffolding and supervision, suggesting that integrating AI requires deliberate planning rather than merely granting access to tools. The combination of AI technologies with instructor support and structured pedagogical activities, rather than AI tools alone, is probably what made this intervention successful.

4.4. Persistent Challenges and Limitations of AI Integration

The ongoing difficulties with vocabulary growth and the application of metacognitive strategies draw attention to the present shortcomings of AI tools in covering every facet of language acquisition. These results provide credence to claims that AI tools operate best when incorporated into all-encompassing pedagogical frameworks that consider many aspects of learning, as opposed to being used as stand-alone remedies [39]. Some students stated memorization issues highlight the necessity for specific training in efficient study methods and content internalization tactics to support the use of AI tools. This implies that in addition to technology elements, improved instructor attention to learning strategy creation and metacognitive skills training is necessary for successful AI integration. The difficulties students encountered while attempting to critically assess AI-generated recommendations highlight how crucial it is to establish AI literacy in addition to language proficiency. Students need explicit skills in how to interact effectively with AI systems, evaluate the quality of automated feedback, and integrate AI suggestions selectively rather than uncritically.

4.5. Cultural and Contextual Considerations

The positive results of this study might be attributed to certain features of Indonesian learning environments that render the incorporation of AI particularly advantageous. It's possible that the historical focus on correctness rather than fluency in Indonesian EFL skills made student populations especially receptive to AI feedback that resolves accuracy issues while offering secure environments for fluency growth. AI tools may also be especially useful as substitute sources of assistance and feedback because of the hierarchical structure of Indonesian education, which frequently restricts student-teacher interaction and question-asking. Cultural limitations may prevent traditional educational settings from offering the individualized attention and opportunities for repeated practice that AI tools can. Technology integration can have unforeseen social benefits that improve learning community development, according to the collaborative dimension that evolved among students exchanging AI ideas. This finding challenges concerns about AI tools promoting isolated, individualistic learning and suggests potential for enhancing rather than diminishing social aspects of language learning.

4.6. Implications for Indonesian EFL Education

These results are especially pertinent to EFL instruction in Indonesia, where speaking skill development is frequently hampered by big class sizes, a lack of resources, and traditional skills-based methods. Scalable solutions for individualization deficiencies are provided by AI technologies, which also promote self-assurance and the growth of autonomous learning. Given the effectiveness of this intervention, Indonesian institutions ought to think about systematically incorporating AI tools into language instruction, especially in speaking, where conventional methods have the most drawbacks. However, institutional dedication to infrastructure development, teacher training, and continuous pedagogical support is necessary for successful implementation. Students' cooperative actions point to the possibility of creating peer learning networks around the use of AI tools, which could optimize the advantages of integrating technology while resolving resource limitations through shared learning opportunities.

4.7. Pedagogical Implications

To ensure practical applicability, especially in under-resourced EFL contexts, institutions can begin with low-cost, scalable interventions. For instance, brief training modules or workshops can be developed to familiarize instructors with AI tools like ChatGPT, speech-to-text apps, and pronunciation feedback platforms. These modules could include demonstrations, sample activities, and troubleshooting tips. Additionally, simple tool selection guidelines—based on accessibility, language features, and offline availability—would assist educators in choosing appropriate technologies. By focusing on open-access and low-bandwidth tools, such practices can be implemented even in institutions with limited technological infrastructure.

Additionally, teachers can divide students into small groups to use AI tools to collaboratively plan and rehearse their speeches asynchronously, adapting this AI-supported Project-Based Learning model for bigger classrooms. Workload can be managed, and all students can receive guidance with the use of peer feedback and guided templates.

Accessibility in schools with inadequate digital infrastructure will also be improved by utilizing mobile-friendly, low-bandwidth AI systems.

4.8. Theoretical Contributions

By showing how AI tools might act as cultural mediators that scaffold learning growth, this work expands the applicability of sociocultural theory to digital learning settings. Understanding how digital and human learning settings interact in language acquisition processes is aided by the discovery that AI-mediated confidence building transfers to human interaction contexts. Understanding how learners gain agency and autonomy in technology-enhanced learning environments is aided by the development of strategic AI interaction tactics among participants. According to these results, learners must transition from passive recipients of automated feedback to active, strategic users in order for AI integration to be successful.

4.9. Researcher Reflection

As researchers and classroom observers, we also saw how this AI-assisted speech project functioned as a forum for deeper social and individual reflection in addition to being a language learning exercise. Learners seemed more likely to discuss important, frequently difficult issues including human values, cultural identity, mental health, and technological change. Their chosen subjects demonstrated a growing understanding of contemporary concerns and their responsibilities as young global citizens. Through this process, they improved their critical thinking and self-expression skills in addition to their vocabulary and public speaking abilities. Additionally, several students showed an emergent digital literacy that will help them outside

4.10. Limitations and Future Research Directions

These results might not apply to all EFL situations or student demographics because the study was a qualitative case study with a small sample size, a narrow focus from a single institution, and a brief study period. This investigation's voluntary involvement and small class size might have produced more conducive conditions for integrating AI than are often found in Indonesian university settings. Future research could improve the design by using mixed-methods approaches that combine qualitative insights with quantitative outcome measurements to examine the integration of AI in various student groups, educational settings, and cultural contexts. Longitudinal studies investigating the long-term impacts of AI-assisted skills would yield important data regarding long-term learning outcomes and retention. Future studies could also look into how scalable models, like teacher training manuals, AI integration frameworks, or student self-access modules, can be created and maintained in settings with limited resources.

Further study into the properties of AI tools that best help various facets of speaking development would direct future pedagogical implementation and technology design. Implementation plans and support systems would also receive help from studies looking at instructors' opinions and perspectives on AI integration and professional development requirements. Future research might also explore how scalable models—such as AI integration frameworks, teacher training guides, or student self-access modules—can be developed and sustained in resource-constrained environments.

5. Conclusions

The small class size and voluntary participation in this study may have created more favourable circumstances for incorporating AI than are often encountered in Indonesian university settings. Future research should examine AI integration across a variety of educational settings, student groups, and cultural contexts using mixed-methods approaches that combine quantitative outcome assessments with qualitative insights. Longitudinal studies investigating the long-term impacts of AI-assisted skills would yield crucial data regarding long-term learning outcomes and retention. Future pedagogical implementation and technology design would be guided by more research into the characteristics of specific AI tools that best support different aspects of speaking development. Studying teachers' perspectives on AI integration and professional development needs would also help implementation plans and support systems.

The most important discovery is that one of the main obstacles to speaking skill development in EFL situations is a lack of confidence, which AI tools may effectively solve. AI solutions help students overcome performance anxiety and build the confidence needed for effective academic commu-

nication by offering nonjudgmental practice environments. Instead of context-dependent performance improvement, this confidence-boosting impact seems to carry over from AI-mediated practice to real-world communication scenarios, showing actual learning. The incapacity of traditional speaking skills to give regular, focused feedback to individual learners is a basic issue that is addressed by AI technologies' instant feedback capabilities. Through iterative repetition with AI feedback, students showed quantifiable gains in pronunciation accuracy and fluency—outcomes that would be challenging to reach with just standard classroom abilities. Perhaps the biggest long-term advantage of integrating AI is the creation of autonomous learning behaviors. Students' use of dependent tools gave way to patterns of strategic, self-directed interaction that point to improved learning agency and metacognition. These skills go beyond language acquisition to more general academic and professional settings where self-directed skill development is crucial.

AI integration should be viewed by Indonesian EFL teachers and administrators as a useful addition to conventional speaking abilities, especially in situations with high student enrolment or constrained funding. But effective implementation causes more than just having the right tools; it also calls for thoughtful pedagogical design that directs appropriate use while keeping the development of communicative competence front and center. The results point to a number of particular implementation suggestions. First, rather than being provided as stand-alone tools, AI integration ought to be incorporated into organized educational activities. The mix of AI tools, project-based learning frameworks, and instructor support was what made this intervention successful. Second, creating efficient usage patterns requires specific knowledge of AI interaction techniques and automated feedback quality assessment. Third, to address enduring issues that AI systems are unable to completely address, ongoing focus on vocabulary growth and metacognitive strategy abilities is required. Successful AI integration requires institutional support for technical help, infrastructural enhancement, and professional development. Teachers need to be trained in both the use of AI tools and pedagogical strategies that successfully integrate AI and human intelligence in language learning settings.

This work tackles real-world issues in educational settings with limited resources while deepening our understanding of how digital technologies can influence language learning processes in ways that align with sociocultural theory. Theoretical knowledge of the relationship between technology and human learning environments in language acquisition is advanced by the discovery that AI-mediated confidence development carries over to human interaction contexts. Participants' adoption of strategic AI engagement techniques adds to the expanding body of research on learner agency in technologically enhanced learning settings. According to these results, learners must transition from passive recipients of automated feedback to active, strategic users for AI integration to be successful.

Although the qualitative case study design offers valuable insights into the experiences of learners, it restricts generalizability to various populations and circumstances. Future studies should use mixed methods approaches that incorporate quantitative outcome measurements and qualitative insights from a range of student groups and educational contexts. Longitudinal studies looking at the long-term effects of AI-assisted skills would yield important information about retention effects and long-term learning results. Furthermore, comparative research of various AI tool combinations and implementation techniques would direct the best practices for technology integration. Implementation support systems would be informed by research looking at instructor opinions on professional development requirements, classroom management techniques, and AI integration. Examining scalability and cost-effectiveness aspects might allay realistic worries regarding the broad use of AI in educational settings with limited resources. Institutions can begin with low-cost, scalable actions to support implementation in EFL situations with limited resources. For instance, educators can learn how to use AI tools like ChatGPT, speech-to-text applications, and pronunciation aids through brief training sessions. Basic troubleshooting, practice exercises, and demonstrations could be a part of these sessions. It will also be beneficial to have clear criteria for selecting offline-friendly, easily accessible technologies. Adopting these techniques is made easier for schools with limited infrastructure by using low-bandwidth, open-access software.

We advise EFL teachers and administrators to view AI integration as a strategic addition to conventional abilities rather than a substitute for human instruction considering these findings. Careful consideration of pedagogical design,

student support, and continuous assessment of learning outcomes is necessary for successful implementation. AI can democratize access to individualized language learning support, which is a huge opportunity to improve the quality of EFL instruction, especially in developing educational situations where traditional resources could be scarce. But achieving these potential calls for careful execution that keeps the emphasis on genuine communication, cultural sensitivity, and deep human connection. Universities in Indonesia ought to think about testing AI-assisted speaking abilities in pilot programs after carefully assessing the results, difficulties, and resource needs. These pilot programs can inform broader adoption strategies while building institutional capacity for effective technology integration. The future of EFL speaking skills likely involves hybrid approaches that leverage both human expertise and artificial intelligence capabilities. This study suggests that such integration can enhance learning outcomes while addressing persistent challenges in traditional skills, provided that implementation is guided by sound pedagogical principles and attention to learner needs.

Author Contributions

Conceptualization, S.P. and N.P.P.; methodology, S.P.; software, Y.P.; validation, H.I., J.R.T. and H.I.; formal analysis, S.P.; investigation, N.P.P.; resources, R.; data curation, H.I.; writing—original draft preparation, S.P.; writing—review and editing, S.P.; visualization, Y.P.; supervision, J.R.T.; project administration, R.; funding acquisition, J.R.T. All authors have read and agreed to the published version of the manuscript.

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