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Integrating Gligglish AI into Project-Based Learning to Improve Speaking Skills of Non-English Major EFL Students

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Abstract

This study examines the effectiveness of integrating Project-Based Learning (PBL) with Gligglish AI in improving the English-speaking skills of second-semester students in the Information Systems Research Program at a private university in Indonesia. In this context, many students experience persistent challenges in speaking development, including linguistic difficulties such as limited vocabulary, grammatical control, and pronunciation accuracy, as well as psychological barriers such as low self-confidence and fear of making mistakes. The study employed a mixed-methods sequential explanatory design. Quantitative data were collected through pre- and post-test assessments using a validated speaking performance rubric. In contrast, qualitative data were obtained through semi-structured interviews to explore students' learning experiences and perceptions. The instructional intervention involved implementing Project-Based Learning activities supported by Gligglish AI, which facilitated interactive speaking practice, pronunciation feedback, and opportunities for autonomous learning. The participants were two intact classes (n = 52), divided into an experimental and a control group. The quantitative findings indicate substantial improvements in students' speaking performance following the intervention, with fluency increasing by 31.4%, pronunciation by 28.6%, grammar by 24.8%, and vocabulary by 26.7%. The most pronounced improvement was observed in overall speaking performance, which increased by 47.8% from the pre-test to the post-test. Qualitative findings further reveal that students perceived the integration of PBL and Gligglish AI as engaging, relevant to their academic field, and effective in enhancing confidence, motivation, and active participation. These findings suggest that integrating AI-assisted speaking tools within a project-based learning framework offers a promising instructional approach for improving English-speaking skills in private higher education contexts.

Keywords: Project-Based Learning (PBL), speaking skills, Gligglish AI, EFL.

INTRODUCTION

English speaking competence has become an essential skill for non-English major students in higher education, as it plays a central role in academic communication and participation in English-mediated learning environments. The increasing integration of digital and hybrid learning platforms has further heightened expectations for students to

communicate, interact, and collaborate through technology-supported academic activities, particularly in international and multilingual educational contexts where English functions as a common medium of instruction and interaction (Chatterjee et al., 2023; Deschênes et al., 2024; Hofweber & Jaworska, 2022). Despite these growing academic demands, English instruction for non-English majors is often constrained by limited credit hours and its positioning as a supporting subject rather than a core component of the curriculum (Iswati & Triastuti, 2021). Consequently, opportunities for sustained communicative practice—particularly speaking—remain limited, and course design may diverge from clearly defined target needs and authentic academic task demands (Trinh & Pham, 2021; Ekayati et al., 2020). Among the four language skills, speaking is widely regarded as the most challenging because it requires real-time processing and the integration of fluency, accuracy, and meaning under communicative pressure, demands that are often compounded by affective barriers such as anxiety, fear of making mistakes, and low confidence (De Jong, 2018; Wood, 2016; Mustamir, 2024; Zhang, 2019).

Given constraints on instructional time, feedback, and practice opportunities in higher education EFL contexts, researchers and educators have increasingly explored technology-enhanced solutions to supplement classroom-based speaking instruction. In this regard, AI-assisted language learning has been positioned as a means of extending speaking practice beyond limited classroom time and teacher-led interaction (Bashori et al., 2021). AI-based speaking tools enable more personalized and flexible learning by allowing learners to rehearse at their own pace while receiving automated feedback that targets spoken performance (Junining et al., 2020; Ngo et al., 2023). Such systems are particularly valuable for pronunciation-related dimensions, including segmental and suprasegmental features, as they provide consistent opportunities for feedback that are often difficult to sustain through individualized teacher feedback in time- and resource-constrained instructional contexts (Lou et al., 2024). Importantly, research consistently frames AI's role in speaking development as complementary rather than substitutive, emphasizing its role in providing additional practice, feedback, and learner control. At the same time, teachers remain central to pedagogical decision-making, interactional scaffolding, and ethical guidance (Zawacki-Richter et al., 2019).

Within this broader landscape of technology-supported speaking practice, Project-Based Learning (PBL) remains a pedagogically grounded approach that promotes authentic communication and meaningful language use through real-world tasks (Bakar et al., 2019; Sirisrimangkorn, 2021). However, in non-English-major contexts, the speaking benefits of PBL are often constrained by limited instructional time and challenges in providing consistent feedback on pronunciation, accuracy, and fluency during project work (Guo et al., 2020; Van Ha et al., 2021). These limitations highlight the potential value of integrating AI-assisted speaking tools within PBL frameworks. In particular, Gligglish AI can be positioned as an AI-supported speaking practice platform that leverages automatic speech recognition (ASR) technology to capture learners' oral responses and deliver near-immediate feedback on spoken performance, including pronunciation accuracy and overall output quality (Guaillas & Armijos, 2024; Khoudri, 2024). As a supplementary learning tool, Gligglish AI offers flexible and low-stakes practice opportunities that promote learner autonomy, reduce speaking anxiety, and support sustained engagement, especially in contexts where classroom speaking time is limited (El Shazly, 2021; Kafryawan, 2023; Zhang et al., 2024).

When integrated into PBL, Glig glish AI can serve as a rehearsal and refinement tool that supports individual preparation before group discussion or project presentations, thereby complementing classroom interaction and enabling more continuous and focused speaking practice across project cycles (Ginusti, 2023; Suryani & Argawati, 2023; Purnami, 2024).

Recent research has consistently shown that AI-assisted speaking applications can effectively support EFL learners' speaking development, particularly in pronunciation, fluency, and confidence. Radhiyya et al. (2025) demonstrate that the use of AI Gliglish in Thai secondary school classrooms led to measurable gains in speaking proficiency, increased student participation, and reduced speaking anxiety, highlighting the role of real-time feedback and interactive conversation practice. Similarly, Dennis (2024) found that AI-powered speech recognition technology significantly improved learners' pronunciation and overall speaking performance, and was positively perceived as a flexible tool for self-paced oral practice. Evidence from application-specific studies further reinforces these findings. Khalizah and Damanik (2024) show that ELSA Speak enhanced multiple speaking components while successfully re-engaging demotivated learners, although their review indicates that most existing studies remain short-term and exploratory. At the higher education level, Qassrawi et al. (2024) report that AI-based applications, such as the Google Assistant, improved students' fluency, interaction, and pronunciation while promoting self-directed learning, despite technical and accessibility challenges. Likewise, Hidayatullah (2024) shows that university students using Talkpal.AI achieved significantly higher speaking fluency and clarity than control groups, accompanied by positive learner perceptions but limited institutional support. Collectively, these studies suggest that AI-assisted speaking tools have strong potential to enhance EFL speaking outcomes, while also underscoring the need for pedagogically grounded integration that supports sustained speaking practice.

Although prior studies have demonstrated the effectiveness of AI-assisted speaking applications in improving EFL learners' pronunciation, fluency, and confidence across secondary and higher education contexts, much of the existing work has focused on using such tools as stand-alone interventions or short-term supplements to classroom instruction. As a result, less attention has been given to how AI-based speaking tools can be systematically embedded within pedagogical frameworks that emphasize sustained communication, learner interaction, and meaningful task engagement. In non-English major contexts, where instructional time is limited and opportunities for extended oral practice are constrained, there remains a need to explore instructional designs that combine the strengths of communicative pedagogy with the affordances of AI-supported practice. Integrating an AI-powered speaking platform such as Glig glish AI into Project-Based Learning offers a promising instructional configuration, as it allows learners to engage in autonomous rehearsal and feedback-driven refinement while simultaneously participating in collaborative, task-based speaking activities. Building on this premise, the present study examines how integrating Glig glish AI into a Project-Based Learning environment influences students' speaking development and learning experiences, with particular attention to speaking performance and learner engagement in a non-English-major higher education setting.

METHOD

This study employed a mixed-methods sequential explanatory design, in which quantitative data collection and analysis were conducted first, followed by qualitative inquiry to explain further and elaborate the quantitative findings (McCrudden & McTigue, 2019; Gordon & Clark., 2024; Bazeley, 2024). The quantitative phase used a quasi-experimental pretest–posttest design with an experimental and a control group to examine changes in students' English-speaking skills before and after the instructional intervention. The qualitative phase was subsequently conducted to explore students' perceptions and learning experiences related to the instruction they received, thereby strengthening interpretation by linking qualitative insights to patterns observed in the quantitative results (Tunarosa & Glynn, 2017; Turner et al., 2017).

Participants consisted of two intact classes of second-semester students enrolled in the Information Systems Program at a private university in Indonesia, reflecting typical constraints in classroom-based quasi-experimental research. Due to institutional constraints and class availability, a convenience sampling approach was used, with one class assigned to the experimental group and the other to the control group, each comprising 26 students. The two groups were considered comparable at baseline in terms of age range, academic background, and prior English proficiency, consistent with standard approaches to addressing selection bias in nonequivalent-group designs through baseline equivalence (Cook et al., 2020; Dong & Lipsey, 2018; D'Attoma et al., 2017).

Two primary instruments were used to collect data: a speaking performance rubric administered as both a pre-test and a post-test to generate quantitative speaking scores, and semi-structured interviews conducted with selected students in the experimental group to obtain explanatory, experience-based qualitative data (Wallwey & Kajfez, 2023; Roberts, 2020). The speaking rubric functioned as a structured performance assessment tool that enabled systematic scoring of oral production, supported comparability across testing occasions, and made rater decision-making explicit through clearly defined performance descriptors. Semi-structured interviews were selected because they allow systematic coverage of predetermined topics, including students' perceptions of learning activities, experiences with the instructional approach, and perceived changes in confidence and motivation, while also providing flexibility for participants to elaborate their responses in depth (Castillo-Montoya, 2016). To establish content validity, both the speaking rubric and interview protocol were reviewed by expert judges and refined based on feedback regarding relevance and clarity. Rubric reliability was examined through pilot scoring and inter-rater consistency checks to ensure stable scoring across evaluators and to support accurate interpretation of agreement evidence in rubric-based performance assessment.

Quantitative data from the pre-test and post-test were analyzed using descriptive statistics, with learning change summarized through percentage-change indices to present an interpretable picture of improvement across the speaking assessment. Percentage gains were calculated for each speaking component to support dimension-level interpretation consistent with analytic scoring practices, in which rubric domains are treated as separable performance components and reported transparently (Wind, 2019; Bhatnagar et al., 2021). This descriptive approach was adopted to foreground the magnitude and practical meaning of observed change rather than relying primarily on dichotomous significance testing. Qualitative data from the semi-structured interviews were analyzed using thematic analysis,

involving transcription, repeated reading for familiarization, inductive coding of meaningful units, and iterative theme development and refinement (Braun & Clarke, 2019; Nowell et al., 2017). The resulting qualitative themes were then used to explain and contextualize the quantitative patterns, consistent with explanatory sequential mixed-methods integration practices that connect analytic phases and support the development of meta-inferences.

FINDING AND DISCUSSION

The findings from the pre-test and post-test speaking assessments provide an overview of changes in students' speaking performance across key components. At the same time, qualitative evidence from semi-structured interviews explains and contextualizes these changes from students' perspectives. Table 1 summarizes the percentage gains across speaking dimensions, and selected interview excerpts illustrate how learners experienced and interpreted their speaking development during the instructional intervention.

Table 1. Summary of Speaking Skill Improvement Results

Skill Aspect	Average Pre-test Score	Average Post-test Score	Percentage Increase
Fluency	65.2	85.7	31.4%
Pronunciation	68.5	88.1	28.6%
Grammar	70.1	87.5	24.8%
Vocabulary	67.8	85.9	26.7%
Overall	60.5	89.4	47.8%

Table 1 summarizes students' speaking performance before and after the instructional intervention, showing clear percentage gains across all assessed speaking components. Fluency increased by 31.4%, indicating that students spoke with greater continuity and reduced hesitation. This improvement is reflected in interview data, where several students reported feeling more able to sustain speech without frequent pauses. One student stated, *"Before, I often stopped because I did not know how to continue, but now I can keep talking even if my sentence is not perfect"* (S4). Another noted, *"I feel my speaking is more flowing because I practice more and I am not too afraid of silence anymore"* (S11). These accounts suggest that increased exposure to extended speaking practice contributed to improved fluency.

Pronunciation also showed a substantial gain of 28.6%, indicating more precise articulation and greater accuracy in sound production. Interview responses reveal heightened awareness of pronunciation features and self-monitoring strategies. As one participant explained, *"I realize my pronunciation mistakes more clearly, especially when I repeat my speaking and compare it with the model"* (S7). Another student highlighted confidence-related change, stating, *"I am more confident to speak because my pronunciation is better than before, so I am not too worried about being laughed at"* (S15). These narratives align with the quantitative improvement in pronunciation by demonstrating how feedback and repetition simultaneously supported accuracy and confidence.

Grammar improvement, reflected in a 24.8% increase, suggests better control of sentence structure during oral production. Although grammatical accuracy showed a smaller gain compared to fluency and pronunciation, interview data indicate that students became more attentive to grammatical form while speaking. One student remarked, *"I still make grammar mistakes, but now I try to arrange my sentences more carefully when I speak"* (S9). Another commented, *"I understand grammar better when I use it directly in speaking, not only*

in written exercises" (S2). These responses suggest that grammatical development occurred through practical use rather than explicit rule memorization.

Vocabulary gains reached 26.7%, indicating that students were able to use a broader range of words to express ideas orally. Interview excerpts show that students perceived vocabulary growth as directly linked to speaking practice. For example, one participant stated, *"When I prepare my speech, I learn new words and try to use them, so my vocabulary becomes richer"* (S13). Another added, *"I feel easier to explain my ideas because I know more words related to my topic"* (S6). These statements support the quantitative findings by showing how vocabulary development enhanced expressive capacity.

The most pronounced improvement was observed in overall speaking performance, which increased by 47.8% from the pre-test to the post-test. This significant gain suggests holistic development across multiple speaking dimensions rather than isolated improvement. Interview data strongly reinforce this interpretation. Students frequently reported changes in confidence, motivation, and participation across the globe. One student reflected, *"Now I am not scared to speak in front of others. Even if I make mistakes, I just continue"* (S1), while another noted, *"I feel more active in class because speaking English is not as difficult as before"* (S18). Such reflections indicate that affective changes—particularly increased confidence and reduced anxiety—played a central role in supporting overall improvement in speaking.

DISCUSSION

The observed changes in students' English-speaking performance across fluency, pronunciation, grammar, vocabulary, and overall speaking ability reflect patterns widely documented in EFL speaking research, particularly in non-English-major higher education contexts. The increase in fluency aligns with prior studies indicating that sustained opportunities for oral production can support learners' ability to manage real-time speech processing and reduce hesitation during spoken interaction (De Jong, 2018; Wood, 2016). In similar contexts, project-oriented and practice-rich speaking activities have been shown to encourage learners to sustain speech and negotiate meaning more actively, which contributes to greater continuity in oral production (Bakar et al., 2019; Sirisrimangkorn, 2021; Purnami & Widiadnya, 2024).

Improvements in pronunciation are consistent with a growing body of research demonstrating that technology-supported speaking practice, particularly those that incorporate automatic speech recognition, can enhance learners' awareness of the segmental and suprasegmental features of spoken English (Dennis, 2024; Ngo et al., 2023; Lou et al., 2024). Prior studies have shown that repeated exposure to spoken models and opportunities for self-monitoring contribute to more precise articulation and improved intelligibility, especially in contexts where individualized teacher feedback is limited (Junining et al., 2020; Khoudri, 2024). Similar pronunciation-related trends have been reported in studies examining the use of AI-supported speaking applications, including Gliglish, in secondary and tertiary EFL settings (Guaillas Gualán & Armijos Ramírez, 2024; Radhiyya et al., 2025).

Grammar gains, while comparatively smaller than those observed in fluency and pronunciation, are consistent with research suggesting that grammatical development in spoken language tends to occur gradually and is often embedded within communicative use

rather than explicit rule application (Van Ha et al., 2021; Trinh & Pham, 2021). Learners' reported attention to sentence construction during speaking activities supports the view that grammar awareness can be strengthened through contextualized oral use, particularly when learners are encouraged to focus on message delivery rather than error avoidance (Iswati & Triastuti, 2021). Vocabulary development further supports this interpretation, as expanded lexical resources are known to facilitate clearer expression of ideas and reduce cognitive load during speaking (Ekayati et al., 2020; Hwang et al., 2024).

Beyond linguistic outcomes, the qualitative findings underscore the importance of affective factors in shaping speaking performance. Students' reports of increased confidence, reduced fear of making mistakes, and greater willingness to participate are consistent with extensive research linking speaking anxiety to oral performance in EFL contexts (Zhang, 2019; Mustamir, 2024). Studies have shown that supportive speaking environments and opportunities for repeated practice can mitigate anxiety and promote greater engagement in oral communication (Shazly, 2021; Zhang et al., 2024). Research on AI-assisted speaking tools similarly highlights their potential to reduce anxiety and increase enjoyment and willingness to communicate by offering low-pressure practice conditions (Bashori et al., 2021; Qassrawi et al., 2024; Hidayatullah, 2024).

These findings reflect broader trends in EFL speaking research that emphasize the interaction between linguistic development and affective conditions. Rather than viewing speaking improvement as the result of isolated skill gains, the results support perspectives that frame oral proficiency as emerging from repeated practice, increased awareness, and shifts in learners' confidence and participation (Guo et al., 2020; Suryani & Argawati, 2023). In non-English-major higher education settings—where instructional time for speaking is often constrained, and learners face both linguistic and psychological challenges—approaches that combine structured speaking tasks with supportive practice environments appear well positioned to promote observable improvements in speaking performance.

CONCLUSION

Changes in English-speaking performance were observed among non-English major university students across multiple speaking components, including fluency, pronunciation, grammar, vocabulary, and overall speaking performance, as reflected in percentage gains between pre-test and post-test assessments. These patterns indicate greater coordination among speaking sub-skills and an increased capacity to sustain oral communication, rather than isolated development in individual linguistic areas. The distribution of gains across components suggests that speaking development occurred in an integrated manner, shaped by opportunities for practice and performance awareness. Participants also reported increased confidence, reduced fear of making mistakes, and greater willingness to engage in oral activities. Such affective changes appear to have supported students' participation in speaking tasks and their readiness to use English more actively. The convergence of quantitative and qualitative findings underscores the close relationship between linguistic performance and affective conditions in EFL speaking, particularly in higher education settings where sustained speaking practice is often constrained.

However, several limitations should be considered. The study involved a relatively small sample from a single private university, which limits the generalizability of the findings. The use of intact classes within a quasi-experimental design also limits causal

interpretation, and the short intervention period does not allow for the examination of long-term effects. Future research may extend this work by involving larger and more diverse samples, adopting longitudinal designs to examine the sustainability of speaking-related changes, and exploring how different instructional configurations influence specific speaking components and learner engagement in higher education EFL contexts.

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