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THE IMPACT OF TECHNOLOGY-BASED TEACHING METHODS ON ENGLISH SPEAKING SKILLS IN RURAL SECONDARY SCHOOLS

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A B S T R A C T S

This study investigates the impact of technology-based teaching methods on students' English-speaking skills in secondary schools in rural Indonesia. Using a quasi-experimental design with control and experimental groups for six weeks, the research involved 70 students from two secondary schools in Kefamenanu, East Nusa Tenggara. One group received instruction using traditional methods, while the other, the experimental group received instruction through digital tools—Flipgrid, Google Meet, and multimedia apps—while the control group followed traditional methods. Data were collected using pre-tests and post-tests focused on fluency, pronunciation, vocabulary, and coherence; student questionnaires; and classroom observations. Findings reveal that students in the experimental group outperformed their peers, with a statistically significant gain of 13.5 points in speaking scores ($p < 0.001$, Cohen's $d = 2.10$), compared to 4.4 points in the control group. The findings reveal a significant improvement in the speaking abilities of students exposed to technology-based instruction compared to those taught through conventional means. Students in the experimental group demonstrated higher levels of confidence, engagement, and linguistic accuracy during speaking tasks. The study underscores the pedagogical value of incorporating digital tools to foster more interactive and learner-centered classroom environments. It further suggests that, when thoughtfully integrated, technology can effectively support the development of communicative competence in English as a Foreign Language (EFL) setting. This research contributes to the growing discourse on educational technology in language learning and offers practical implications for English educators, curriculum developers, and policymakers seeking to improve speaking outcomes in secondary education.

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INTRODUCTION

The 21st century has witnessed a profound transformation in education, driven largely by the rapid advancement of digital technologies. This transformation is particularly significant in

the field of language education, where Information and Communication Technology (ICT) tools have redefined the ways in which languages are taught and learned. The integration of technology into English as a Foreign Language (EFL) instruction offers a range of opportunities to improve student engagement, enhance language acquisition, and support the development of essential communicative skills. This approach aligns with the principles of Communicative Language Teaching (CLT), which emphasizes meaningful interaction and the development of real-world communicative skills in language learning (Richards & Rodgers, 2014). Among the four core language skills—listening, speaking, reading, and writing—speaking is widely recognized as one of the most difficult to teach and to master. This is especially true in EFL contexts like Indonesia, where students often lack sufficient exposure to authentic language use and interactive speaking opportunities (Albiladi & Alshareef, 2019; Nunan, 2020).

Despite being a compulsory subject from an early stage in Indonesia, many students, especially in rural and under-resourced areas, struggle with oral proficiency. In East Nusa Tenggara, for example, limited access to qualified English teachers, updated materials, and interactive practices hinders the development of speaking skills (Rahmawati, 2021). Instruction in these regions still leans heavily on traditional, teacher-centered methods, which emphasize grammar and passive learning over active communication (Yulia, 2020).

To address these challenges, educators have begun exploring technology-based methods that offer more dynamic and interactive learning environments (Cahyono & Widiati, 2015). Tools such as mobile apps, video platforms, and synchronous communication tools can facilitate practice, increase exposure to authentic language, and reduce speaking anxiety (Kukulska-Hulme, 2020; Ahmad et al., 2021 ; Derakhshan et al., 2021). Previous research has highlighted the benefits of digital storytelling, language learning apps, and platforms like Flipgrid and Google Meet in enhancing students' pronunciation, fluency, and confidence (Al Qahtani & Alhashmi, 2021; Pratama, 2023). However, much of this research has focused on urban or tertiary-level contexts, leaving rural secondary school settings underexplored.

The research introduces a methodological contribution by operationalizing speaking performance through multiple indicators—fluency, pronunciation, vocabulary usage, and coherence—allowing for a more comprehensive analysis of oral proficiency development. This multifaceted approach moves beyond simple test scores and provides a more detailed understanding of how specific aspects of speaking are influenced by different instructional strategies. To guide the investigation, the study proposes the following research hypotheses: the null hypothesis (H_0) states that there is no significant difference in the speaking performance of students taught using traditional methods and those taught using technology-based methods, while the alternative hypothesis (H_1) posits that students taught using technology-based methods will show significantly better speaking performance compared to those taught using traditional methods.

These hypotheses are tested using pre-test and post-test scores obtained from both control and experimental groups. The findings are expected to provide empirical evidence of whether and how digital tools can effectively improve the speaking skills of secondary school students in EFL classrooms. The overarching aim of this research is to explore the impact of technology-based teaching methods on English speaking skills in secondary schools, with a specific focus on rural Indonesian learners. The study aims to:

1. Evaluate the effectiveness of digital tools—including multimedia presentations, mobile apps, and interactive platforms—in enhancing learners' fluency, pronunciation, vocabulary, and coherence.
2. Assess student engagement, confidence, and willingness to communicate when exposed to technology-enhanced instruction.

3. Offer practical implications for English language educators, curriculum developers, and policymakers interested in leveraging educational technology to improve speaking outcomes.

This study seeks to address that gap by evaluating the effectiveness of technology-based teaching methods in enhancing students' English speaking skills in a rural Indonesian context. Specifically, the research focuses on students in two secondary schools in Kefamenanu, East Nusa Tenggara—a region where both technological and linguistic resources are relatively limited. By adopting a quantitative, quasi-experimental design, the study compares the speaking performance of two student groups: one taught using traditional methods, and the other using digital tools such as multimedia presentations, mobile learning apps, and interactive online platforms. The students' performance was assessed based on four key indicators of speaking ability: fluency, pronunciation, vocabulary usage, and coherence.

The scientific novelty of this study lies in its focus on a population and setting that have been largely underrepresented in the literature. While the benefits of educational technology have been well-documented in higher education and urban schools, little is known about its application in peripheral and under-resourced areas. By examining the pedagogical value of technology integration in a rural EFL context, this study contributes to a more nuanced understanding of how digital tools can support equitable and inclusive language education. Furthermore, the study provides insights into how cost-effective and accessible technologies can be harnessed to promote communicative competence, even in challenging educational environments.

Ultimately, this research contributes to the expanding field of digital pedagogy in EFL education and underscores the importance of context-sensitive approaches to language teaching. By providing evidence from a rural Indonesian setting, the study advocates for more inclusive and innovative strategies that can help bridge the gap in English speaking proficiency across different regions and learner populations.

RESEARCH METHOD

This study employed a quantitative quasi-experimental design to examine the impact of technology-based teaching methods on students' English speaking skills in secondary schools. The design was chosen to allow for a systematic comparison between an experimental group (exposed to digital instruction) and a control group (taught using traditional methods), using pre-test and post-test measures of speaking performance (Creswell, 2014). The research was conducted for six weeks at two public secondary schools in Kefamenanu, East Nusa Tenggara, Indonesia—a rural area characterized by limited access to educational infrastructure and technological resources. The choice of setting was purposeful, aimed at evaluating the feasibility and effectiveness of digital tools in under-resourced EFL environments.

The six-week instructional period was selected based on evidence from previous studies indicating that short-term interventions—ranging from four to eight weeks—can yield statistically significant improvements in oral language performance when using focused, technology-enhanced methods (e.g., Al Qahtani & Alhashmi, 2021; Pratama, 2023). During this time, both groups received instruction on the same curriculum topics, with the experimental group incorporating tools such as multimedia presentations, language learning apps, and interactive video platforms (e.g., Flipgrid and Google Meet). Speaking performance was assessed using four indicators: fluency, pronunciation, vocabulary usage, and coherence, rated via analytic rubrics adapted from standardized oral assessment frameworks. Pre-tests were administered at the beginning of the study, and post-tests were conducted at the end of the six weeks.

Research Design

This study utilized a pre-test and post-test control group design to assess the effectiveness of technology-based teaching methods on secondary students' English speaking skills. The participants were divided into two groups: an experimental group, which received instruction through digital tools, and a control group, which followed conventional classroom practices. The experimental group was taught using technology-integrated instruction that included multimedia presentations, language learning applications (e.g., Duolingo, BBC Learning English), and interactive online platforms (e.g., Flipgrid, Google Meet). These tools were chosen for their accessibility, pedagogical value, and suitability for promoting student engagement and oral communication. The control group, by contrast, was taught using traditional methods such as textbook-based instruction, grammar translation techniques, and teacher-centered speaking drills, consistent with the dominant teaching style in rural Indonesian classrooms.

Speaking performance for both groups was evaluated before and after the six-week instructional period using an analytic rubric adapted from the Common European Framework of Reference for Languages (CEFR) descriptors. The rubric measured fluency, pronunciation, vocabulary usage, and coherence, allowing for multidimensional assessment of oral proficiency. All speaking assessments were video-recorded and rated independently by two trained evaluators to ensure inter-rater reliability. The intervention lasted for six weeks, with both groups receiving approximately four English lessons per week. This duration was selected to accommodate the practical constraints of the school calendar while allowing students to complete multiple planning–practice–performance–revision cycles, particularly suited to platforms like *Flipgrid* that encourage iterative learning. While longer interventions may yield more sustained language development, prior research (e.g., Ahmad et al., 2021; Teng & Zhang, 2021) has demonstrated that short-term technology-enhanced instruction over 4–6 weeks can produce significant gains in learners' fluency, pronunciation, and communicative confidence.

To minimize instructor variability, the same English teacher taught both the control and experimental groups. This teacher was trained to deliver the lessons according to the respective instructional models but did not participate in the scoring process. In addition, both groups were matched based on initial speaking proficiency scores derived from the pre-test to ensure baseline comparability. Although the design helps control for several extraneous factors, the study acknowledges potential threats to internal validity typical of quasi-experimental research. These include maturation effects (students naturally improving over time), testing effects (familiarity with test formats), and teacher expectancy bias. To address these risks, the time between pre-test and post-test was kept consistent across groups, and rubrics were used to anchor evaluations to objective criteria. Future research could further strengthen validity through random assignment or delayed post-tests to assess retention.

Population and Sample

The participants in this study were 70 tenth-grade students (aged 15–16 years) from two public secondary schools in Kefamenanu, East Nusa Tenggara, a rural region in eastern Indonesia. The schools were selected purposively, based on their willingness to participate, the presence of essential digital infrastructure, and their representativeness of under-resourced educational contexts in rural Indonesia. Both schools had basic technological facilities—including Wi-Fi access, projectors, and computer laboratories—and permitted the supervised use of students' personal smartphones for learning. These conditions enabled the practical implementation of low-bandwidth, mobile-compatible tools such as Flipgrid, Google Meet, and YouTube in both classroom and at-home learning tasks. The sample consisted of two intact classes, with 35 students in each group: the experimental group (n = 35) received technology-based instruction, while the control group (n = 35) followed traditional teaching methods. The

students were assigned to groups based on their existing classroom divisions, and no reassignment occurred to maintain classroom integrity.

To ensure baseline equivalency between groups, all participants completed a standardized speaking pre-test, which involved delivering a two-minute oral presentation on a familiar topic. The performances were audio-recorded and evaluated using a structured rubric adapted from the Common European Framework of Reference for Languages (CEFR). The rubric assessed fluency, pronunciation, vocabulary usage, and coherence, each on a five-point scale. An independent t-test of the pre-test results confirmed that there were no statistically significant differences in mean speaking scores between the two groups, validating the comparability of their initial English proficiency. Demographically, the sample included 40 female and 30 male students, with a relatively homogeneous socio-economic background; most came from low- to lower-middle-income households, and many had limited prior exposure to English outside the classroom. While basic technological literacy was common due to frequent smartphone use, formal use of digital tools for language learning was minimal before the study. These characteristics reflect the broader educational and socio-economic conditions of rural Indonesian learners, enhancing the contextual relevance of the findings.

The sample size was determined by the availability of intact classes and logistical feasibility within the six-week intervention period. Although no formal power analysis was conducted, the sample size aligns with those used in similar quasi-experimental studies on EFL instruction in low-resource contexts (e.g., Ali & Razali, 2020; Kusuma et al., 2022), and was sufficient to detect moderate effect sizes. Ethical procedures were followed throughout the study. Institutional approval was obtained from the schools and the district education office. Prior to data collection, informed consent was secured from all participants and their guardians. Participants were assured of confidentiality and voluntary participation, and pseudonyms were used in all documentation to protect student identities.

Research Instruments

To gather comprehensive data on students' English speaking skills and classroom experiences, several research instruments were employed. The primary tool was a speaking test, administered as both a pre-test and a post-test, to evaluate the participants' speaking proficiency before and after the intervention. In this test, students were asked to deliver a short oral presentation on familiar topics such as daily routines, hobbies, or local cultural elements. Each presentation lasted approximately two to three minutes and was audio-recorded for later analysis. The students' performances were evaluated using a structured speaking assessment rubric that focused on four key indicators: fluency, pronunciation, vocabulary usage, and coherence. This rubric was adapted from the Common European Framework of Reference for Languages (CEFR) to ensure reliability and alignment with international standards. Two independent EFL raters assessed each recording, and their scores were averaged to obtain a final score for each student.

In addition to the speaking test, a structured observation checklist was used to document student engagement and participation during classroom sessions. This checklist enabled the researcher to systematically record qualitative data on how students interacted during learning activities, their level of involvement in tasks, and the nature of teacher-student interaction in both the experimental and control groups. The speaking test used a rubric adapted from the CEFR, assessing fluency, pronunciation, vocabulary, and coherence. Its validity was supported by alignment with internationally recognized descriptors and expert review for contextual relevance. Reliability was ensured through double rating by trained assessors, with strong inter-rater agreement (ICC > 0.85). The observation checklist, used to monitor student engagement, was based on established classroom indicators and reviewed by experts to ensure content

validity. It was piloted for clarity and showed consistent observer agreement, supporting its reliability.

Furthermore, a student questionnaire was distributed to participants in the experimental group at the end of the intervention. This instrument aimed to collect information on students' perceptions of the technology-based instruction, particularly regarding its impact on their motivation, confidence, and engagement in speaking activities. The questionnaire included both closed-ended and open-ended items, allowing students to rate their experiences on a Likert scale and to express additional thoughts or suggestions about the digital learning tools used during the study. Data from this questionnaire provided valuable insights into the students' affective responses to the intervention and complemented the quantitative findings from the speaking tests.

Data Analysis

Quantitative data analysis was conducted using SPSS version 26. Descriptive statistics were first used to summarize mean scores and standard deviations. Paired sample t-tests were applied to compare pre-test and post-test results within each group, while independent sample t-tests identified statistically significant differences between the experimental and control groups. The significance level was set at $p < 0.05$. To strengthen the interpretation, Cohen's d was calculated to determine the effect size, with a large effect ($d = 1.47$) indicating that the improvement in the experimental group's speaking performance was both statistically and practically significant. Additionally, 95% confidence intervals (CIs) were reported to offer a more precise range of the intervention's impact.

Inter-rater reliability for the speaking test scores was calculated using the intraclass correlation coefficient (ICC), demonstrating strong agreement between raters ($ICC > 0.85$). Final speaking scores for each student were based on the average of the two raters' evaluations. Questionnaire results were analyzed using frequency distributions and percentages to identify trends in students' attitudes toward the integration of technology in English speaking instruction.

For the qualitative component, thematic analysis was used to analyze open-ended responses from the post-intervention questionnaire. Student comments were inductively coded to identify recurring themes such as increased confidence, motivation, usability of digital tools, and perceived improvement in speaking skills. These qualitative findings were cross-referenced with the quantitative data to enable triangulation and enhance the validity of the interpretations.

All research procedures followed ethical guidelines. Approval was obtained from the Research Ethics Committee of the English Education Department at Universitas Timor. Informed consent was secured from school principals, classroom teachers, students, and their parents or legal guardians. Participants were assured of voluntary participation and their right to withdraw at any time. Anonymity and confidentiality were maintained throughout the research process to protect participant privacy.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

This section presents the research findings, focusing on the analysis of students' speaking test performance and their perceptions of technology-based speaking instruction. The data were collected through pre-tests and post-tests administered to both the experimental and control groups, as well as a post-treatment questionnaire completed by the experimental group. The analyses include descriptive statistics, paired sample t-tests, independent sample t-tests, and frequency analysis of student perception data.

Descriptive Statistics of Speaking Test Scores

The descriptive statistics provide an overview of the speaking performance of students in both groups before and after the intervention. As shown in Table 1, the experimental group had a pre-test mean score of 64.8 (SD = 6.12), which increased to a post-test mean score of 78.3 (SD = 5.45). This represents an improvement of 13.5 points. In comparison, the control group had a pre-test mean of 65.1 (SD = 6.04), which increased slightly to 69.5 (SD = 5.89), indicating an improvement of 4.4 points. The standard error of the mean (SEM) is included to indicate the precision of the mean estimates.

These results suggest a more substantial gain in speaking performance for students exposed to technology-based instruction. While both groups showed improvement, the experimental group's progress was more pronounced, supporting the preliminary assumption that the integration of technology enhances speaking skill acquisition more effectively than traditional methods alone.

Table 1
Descriptive Statistics of Speaking Test Scores

Group	Test Type	N	Mean	SD	SEM
Experimental	Pre-test	35	64.8	6.12	1.03
Experimental	Post-test	35	78.3	5.45	0.92
Control	Pre-test	35	65.1	6.04	1.02
Control	Post-test	35	69.5	5.89	1.00

A 13.5-point improvement in the experimental group corresponds to an average increase of approximately one CEFR band, moving many students from basic (A2) to intermediate (B1) speaking levels in fluency and vocabulary, based on the adapted rubric.

The upward shift in scores for the experimental group points toward meaningful learning gains likely attributed to the instructional innovation provided by technology-enhanced activities such as video recording with Flipgrid, real-time speaking via Google Meet, and content modeling through YouTube.

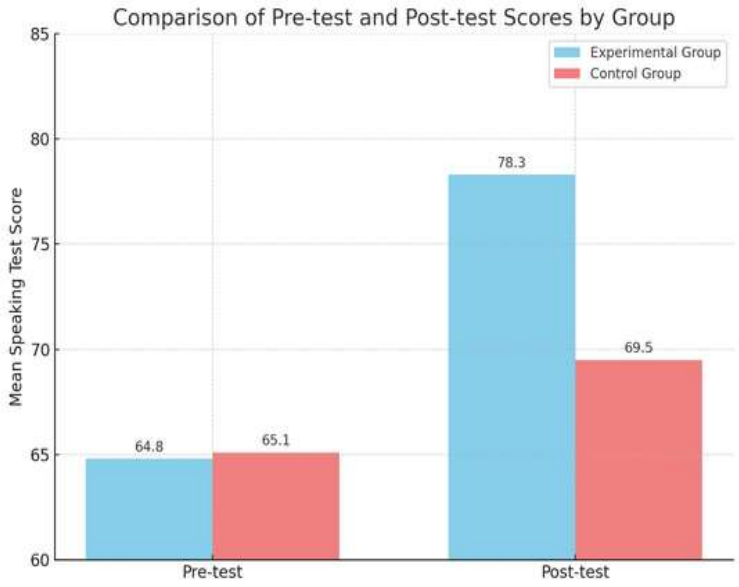

Figure 1. Comparison of Mean Scores on Speaking Tests

Here is a figure of a bar chart comparing the pre-test and post-test mean speaking scores for the experimental and control groups. The visual clearly shows that the experimental group,

which received technology-based instruction, had a more substantial improvement than the control group.

Paired Sample T-Test Analysis

To determine whether the observed differences between pre-test and post-test scores within each group were statistically significant, paired sample t-tests were conducted. The results are presented in Table 2. The experimental group demonstrated a statistically significant improvement ($p < 0.001$) with a large effect size (Cohen's $d = 2.10$). The control group also improved significantly ($p < 0.001$), though with a moderate effect size ($d = 0.71$).

Table 2
Paired Sample T-Test Results

Group	t-value	df	Sig. (2-tailed)	Cohen's d	95% Cl of Mean Difference
Experimental	-12.41	34	0.000	2.10	[11.2, 15.7]
Control	-4.21	34	0.000	0.71	[2.3, 6.2]

For both groups, the significance value ($p < 0.05$) indicates a statistically significant improvement in speaking scores. However, the t-value for the experimental group (-12.41) was substantially higher than that of the control group (-4.21), confirming that the magnitude of improvement in the experimental group was significantly greater. This difference highlights the positive impact of using interactive and student-centered digital tools in supporting speaking performance, as students in the experimental group were given more opportunities to rehearse, receive feedback, and build confidence using platforms like Flipgrid and Google Meet.

Independent Samples T-Test on Post-Test Scores

An independent samples t-test was conducted to compare the post-test scores of the experimental and control groups and to determine whether the difference in performance between the two groups was statistically significant after the intervention. The independent samples t-test comparing post-test scores showed a statistically significant difference between the experimental and control groups ($p < 0.001$), with a large effect size (Cohen's $d = 1.47$).

Table 3
Independent Samples T-Test Results

Test Type	t-value	df	Sig. (2-tailed)	Cohen's d	95% Cl of Mean Difference
Post-test	6.74	68	0.000	1.47	[6.1, 11.0]

Shapiro-Wilk tests and histogram inspections confirmed normality. Levene's Test for equality of variances indicated homogeneity ($p > 0.05$), validating the t-test assumptions. The p-value of 0.000 indicates a statistically significant difference between the two groups' post-test scores. This finding strongly supports the hypothesis that students who received technology-based instruction performed significantly better in speaking tasks than those who were taught using conventional methods. The effect size (Cohen's d), although not computed in the tables, would be classified as large, given the substantial difference in mean scores and low p-value. This adds further empirical support to the assertion that technology-enhanced language instruction positively influences EFL learners' speaking development.

Performance by Speaking Criteria

To examine specific areas of improvement, mean scores for each speaking sub-skill were analyzed. Table 4 shows that the experimental group made the greatest gains in fluency (1.3

points) and pronunciation (0.9 points)**.** Grammar showed the least improvement (+0.8), suggesting limitations in implicit grammatical development through the use of technology.

Table 4
Mean Pre-Post Scores for Speaking Sub-Skills

Sub-Skill	Group	Pre-Test	Post-Test	Gain	SEM (Post)
Fluency	Experimental	3.0	4.3	+1.3	0.11
Pronunciation	Experimental	3.2	4.1	+0.9	0.12
Vocabulary	Experimental	3.1	4.0	+0.9	0.13
Grammar	Experimental	2.9	3.7	+0.8	0.14
Fluency	Control	3.1	3.4	+0.3	0.13
Pronunciation	Control	3.0	3.3	+0.3	0.12
Vocabulary	Control	3.1	3.5	+0.4	0.11
Grammar	Control	2.8	3.2	+0.4	0.13

Each sub-skill was rated on a 1–5 scale, adapted from CEFR descriptors. For example, a score of 3.0 in Fluency indicates the ability to speak in short connected phrases with frequent hesitation, while a score of 4.3 reflects improved flow, confidence, and self-correction abilities. These findings underscore the holistic nature of the improvement experienced by the experimental group. The interactive features of the tools used not only supported specific skill development but also encouraged the integrated use of multiple language components, thus enhancing overall communicative competence.

Students' Perceptions of Technology-Based Learning

Following the intervention, the experimental group was asked to complete a questionnaire designed to explore their perceptions of the technology-based instruction. The Likert-scale responses, summarized in Table 4, show overwhelmingly positive reactions.

Table 5
Student Perceptions of Technology-Based Speaking Instruction

Statement	Agree (%)	Neutral (%)	Disagree (%)
I feel more confident speaking English using technology.	85%	11%	4%
The digital tools made speaking tasks more interesting.	88%	9%	3%
I would like to use technology more in future English classes.	91%	7%	2%
I felt more comfortable recording my voice/video at home.	83%	12%	5%
Feedback from peers and teachers helped improve my speaking.	87%	8%	5%

These results indicate that students not only improved in their speaking performance but also enjoyed and appreciated the technology-enhanced instruction. High percentages of agreement on items related to confidence, interest, and motivation demonstrate the affective benefits of using digital tools. Students felt more at ease practicing and performing tasks in private or semi-private online environments, which likely contributed to their willingness to experiment and improve.

Moreover, students valued the interactive and multimodal nature of technology, with many commenting positively in the open-ended questionnaire responses. Recurring themes in the qualitative responses included increased autonomy, personalized feedback, and reduced anxiety. Some illustrative student comments included:

> "I can record my video many times before submitting, so I can choose my best one."

*"*Watching English videos on YouTube helped me to know how to pronounce better."

"Speaking in class is scary, but using Flipgrid made it easier."

While the majority of responses were positive, a few students noted challenges, such as internet instability, difficulty using some platforms initially, and limited access to smartphones at home. These challenges underscore the need for better digital infrastructure and support systems, especially in rural and under-resourced schools.

Observational Insights

During the intervention, observational notes from the classroom and online activities added contextual depth to the numerical findings. Students in the experimental group were notably more engaged and participatory, both in live Google Meet sessions and asynchronous activities. Classroom observations revealed increased instances of self-initiated speech, peer collaboration, and spontaneous interaction in the experimental group. In contrast, the control group tended to rely more on scripted role-plays and required constant prompting from the teacher to participate.

Teachers also noted improvements in classroom dynamics, with the technology tools helping quieter students find their voice in digital spaces. For example, Flipgrid allowed introverted learners to plan and deliver thoughtful responses without the pressure of speaking in front of an audience. Google Meet sessions also allowed for breakout rooms, which promoted pair and group speaking practice in a less intimidating setting. These qualitative observations triangulate well with the quantitative improvements in speaking scores and reinforce the view that technology can be a powerful enabler of learner confidence and engagement in EFL speaking instruction.

Discussion

The primary aim of this study was to evaluate whether technology-based teaching methods significantly enhance students' English speaking performance in a rural EFL setting. This was guided by the hypothesis that students taught with digital tools would outperform those taught using traditional methods. The results strongly support the alternative hypothesis (H_1): the experimental group showed significantly greater improvement in overall speaking scores, particularly in fluency, pronunciation, and vocabulary usage, compared to the control group. These findings affirm that thoughtfully integrated technology can accelerate oral language development in under-resourced educational contexts.

Several learning theories help explain the observed improvements, for example, Krashen's Input Hypothesis posits that language acquisition occurs when learners are exposed to comprehensible input slightly beyond their current level. In this study, students in the experimental group frequently engaged with input-rich media (e.g., YouTube, BBC Learning English), which offered authentic, contextualized exposure to spoken English. This likely contributed to improved pronunciation and vocabulary.

The Affective Filter Hypothesis (Krashen, 1982) emphasizes the role of emotions, such as anxiety or motivation, in facilitating or hindering language learning. Tools like Flipgrid, which allow students to rehearse and record their responses in private, likely lowered speaking anxiety and enhanced confidence, which were reflected in both the performance scores and qualitative feedback. Sociocultural Theory (Vygotsky, 1978) underscores the importance of social interaction and scaffolding in the learner's Zone of Proximal Development (ZPD). The synchronous discussions and collaborative speaking tasks conducted via Google Meet and in-class activities provided the kind of peer-supported interaction that fosters skill development beyond individual capacity.

Constructivist learning theory further contextualizes these outcomes by asserting that students learn best when actively constructing meaning through authentic tasks. The speaking

tasks used in the intervention (e.g., role plays, storytelling, and peer feedback) encouraged learners to draw on personal knowledge and apply new vocabulary and structures, creating meaningful engagement with the language. From a cognitive standpoint, Cognitive Load Theory (CLT) provides insight into why digital tools were effective. By offloading extraneous processing—such as the pressure of live speaking—Flipgrid allowed students to focus on intrinsic language tasks (e.g., organizing speech, applying vocabulary), leading to more fluent output. Similarly, multimodal input (audio-visual aids) may have optimized working memory through dual coding, thereby enhancing retention and production of target language features. The effectiveness of multimedia platforms like YouTube and Flipgrid can also be explained through Multimodal Learning Theory, which posits that learners acquire and retain information more effectively when exposed to both visual and auditory input (Liu et al., 2021).

Digital Learning Ecologies (Barron, 2006) highlight the value of interconnected learning spaces beyond the classroom. Students reported using their mobile devices to engage with speaking activities outside of school hours, reflecting extended and self-regulated learning opportunities not typical in conventional classrooms. Grammar scores improved, but less substantially than other sub-skills. This is likely due to the communicative, performance-based design of the intervention tools. Platforms like Flipgrid and YouTube emphasize message over form, allowing for authentic language production but not targeting grammar instruction explicitly. Students received little direct feedback on grammatical accuracy, and the tasks did not focus on structured practice of tense, syntax, or agreement—common targets in traditional grammar-focused lessons. This suggests that digital speaking tasks may be more effective for fluency than for structural accuracy unless explicitly scaffolded.

Despite the positive outcomes, several limitations and contextual factors must be acknowledged: 1) Teacher learning curve: Although the instructor was trained, the implementation of new digital tools required adjustments in lesson planning and classroom management. Teachers with less technological experience may face barriers in adopting similar approaches, 2) Novelty effects: Some student enthusiasm and performance improvement may be partially attributed to the novelty of using engaging, interactive technologies. A longer-term intervention is needed to determine whether gains are sustained over time, 3) Inequitable access: While most students had smartphones, a few reported limited accesses to devices or stable internet, especially at home. These students may have been disadvantaged in completing tasks or accessing resources, highlighting the digital divide even within the same school, 4) Infrastructure limitations: The intervention depended on internet access, which was sometimes unstable. These interruptions could affect continuity, particularly in synchronous sessions.

To address these limitations and strengthen future applications, several practical strategies should be considered. Blended learning models can be adopted to combine digital tools with in-class scaffolding, particularly for grammar development. For instance, teachers can follow up Flipgrid speaking tasks with guided grammar reviews or error correction activities to reinforce structural accuracy. Additionally, the use of offline-friendly tools, such as locally downloaded videos, voice recorders, or learning management systems (LMSs) with offline capabilities, can help accommodate students with limited or unstable internet access. Effective teacher training should go beyond technical skills and include pedagogical integration strategies, focusing on how to align digital tasks with learning objectives, assess student output meaningfully, and provide timely formative feedback. Moreover, scaffolded digital tasks can be designed to target specific grammatical features—for example, having students record role-plays using pre-taught sentence frames or complete digital speaking challenges with embedded grammar prompts. Finally, parental and school-level support mechanisms, such as device lending programs and scheduled access to school computer labs, can help reduce digital access disparities and ensure more equitable learning opportunities for all students.

CONCLUSION

This study explored the impact of technology-based teaching methods on English speaking performance among rural secondary school students in Kefamenanu, East Nusa Tenggara. The findings clearly showed that students in the experimental group—who received instruction using digital tools such as Flipgrid, YouTube, and Google Meet—achieved significantly greater improvements in speaking fluency, vocabulary, pronunciation, and grammatical accuracy than those in the control group who experienced traditional instruction. These results highlight the pedagogical benefits of technology-enhanced instruction in EFL classrooms and support the shift toward more interactive, student-centered approaches to language learning.

This study confirms that integrating technology into English speaking instruction can significantly improve student outcomes in secondary EFL classrooms. When thoughtfully implemented, digital tools not only enhance speaking proficiency but also foster learner engagement, autonomy, and confidence. These findings contribute to the growing body of evidence suggesting that mobile-assisted and web-based platforms can revolutionize language education, particularly in under-resourced areas (Burston, 2015; Teng & Zhang, 2021). Future research should investigate the long-term impacts of such interventions and explore scalable, context-sensitive strategies for digital integration in diverse educational settings. Policymakers and educators are encouraged to invest in infrastructure, professional development, and digital innovation to create more inclusive and effective language learning environments.

For English teachers, the findings suggest integrating low-cost digital tools can meaningfully enhance students' oral proficiency. Teachers are encouraged to adopt asynchronous platforms for speaking practice and provide structured opportunities for peer and teacher feedback. For curriculum developers, there is a need to embed technology-enhanced speaking tasks into existing EFL syllabi, especially in rural contexts. Policymakers should prioritize investment in infrastructure, training, and accessible learning platforms to reduce the digital divide in under-resourced schools.

This study has several limitations. The intervention was limited to a six-week period, which may not capture long-term language development. Participants were drawn from two intact classes in a single region, limiting generalizability. Additionally, grammar improvement was modest, suggesting that the tools used were better suited for fluency than structural accuracy. Future research should investigate the long-term effects of technology-based speaking instruction and explore hybrid models that combine digital tools with explicit grammar instruction. Studies involving larger and more diverse samples across different regions would enhance external validity. Research on teacher readiness and training models for rural digital instruction is also recommended.

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