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Enhancing Speaking Skills through Collaborative Learning: A Study on Engineering Students

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◆ Abstract

Speaking is an essential communication skill, particularly for engineering students who must effectively express ideas in academic and professional settings. However, many students struggle with fluency, coherence, pronunciation, vocabulary, and grammatical accuracy due to fear of failure and lack of practice. This study explores the impact of collaborative learning in improving the speaking skills of engineering students at VFSTR University. A pre-test using IELTS rubrics was conducted to assess students' initial proficiency, followed by a structured three-month intervention involving various speaking activities. The study concludes with a post-test analysis, highlighting improvements and discussing the challenges faced during the research.

Keywords: Speaking skills, Collaborative learning, Engineering students, Fluency and coherence, Pronunciation, Vocabulary, Grammatical accuracy, IELTS rubrics

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1. Introduction

In today's globalized world, effective communication skills are essential for professional and academic success. Among the four primary language skills—listening, speaking, reading, and writing—speaking is often considered the most critical for real-time communication. Unlike writing, which allows for revisions, or reading and listening, which are receptive skills, speaking is an active, spontaneous skill that requires immediate processing and response. Despite its importance, many students, particularly those in engineering disciplines, face significant challenges in developing their speaking proficiency.

Engineering students, despite possessing strong technical knowledge, often struggle with oral communication due to several factors. Fear of failure, lack of confidence, anthropophobia (fear of speaking in front of people), limited exposure to English-speaking environments, and inadequate speaking practice contribute to their difficulties. These barriers not only affect their academic performance but also hinder their ability to succeed in job interviews, workplace discussions, and professional presentations.

To address these challenges,, collaborative learning has been identified as an effective strategy for improving speaking skills. According to Vygotsky (1978), social interaction plays a fundamental role in cognitive development, emphasizing that learning occurs through meaningful communication with peers. Johnson and Johnson (1999) also argue that cooperative learning enhances student engagement and communication skills, making it a valuable approach in education. These theories support the use of collaborative learning as a powerful tool for language development."

. Collaborative learning involves students working together, engaging in discussions, exchanging ideas, and providing peer feedback, which creates an interactive and supportive environment for language acquisition. Studies have shown that when students participate in structured speaking activities within groups, they develop greater confidence, fluency, and clarity in their communication.

This study focuses on assessing and enhancing the English-speaking skills of third-year, second-semester engineering students at VFSTR University through collaborative learning techniques. A pre-test was conducted using IELTS rubrics to evaluate students' initial proficiency in fluency, coherence, pronunciation, vocabulary, and grammatical accuracy. Over a period of three months, students participated in structured speaking activities, including Just A Minute (JAM), self-introduction, group discussions, jigsaw activities, case studies, and group presentations. A post-test was then conducted to measure the effectiveness of these activities in improving their speaking skills.

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The study aims to:

The study aims at evaluating the speaking proficiency of students before and after the intervention, implement collaborative learning techniques to enhance communication skills, analyze the impact of structured speaking activities on fluency, pronunciation, and grammatical accuracy, and identify challenges and limitations in the learning process**.**

- Assess students' speaking proficiency before and after the intervention.
- Implement collaborative learning techniques to enhance communication skills.
- Analyze the impact of structured speaking activities on fluency, pronunciation, and grammatical accuracy.
- Identify challenges and limitations in the learning process.

By evaluating the effectiveness of collaborative learning, this research seeks to contribute valuable insights into how engineering students can overcome their speaking difficulties and develop confidence in public communication. The findings of this study will be useful for educators, curriculum developers, and language trainers seeking to enhance the English proficiency of engineering students in academic and professional settings.

.2. Research Objectives

The study aims to assess the impact of collaborative learning on students' speaking skills by evaluating their proficiency before and after the intervention. It focuses on improving fluency, pronunciation, vocabulary, and grammatical accuracy through structured speaking activities.

- To assess the initial speaking proficiency of engineering students using IELTS rubrics.
- To implement a structured collaborative learning approach for speaking skill Development.
- To measure improvements through a post-test and analyze the effectiveness of the intervention.
- To identify the challenges and limitations faced in the study.

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3. Methodology

To systematically examine the impact of collaborative learning on speaking skills, this study adopts a structured research methodology. A combination of qualitative and quantitative approaches has been used to assess student improvement and analyze intervention effectiveness**.**

3.1 Participants

The study involved 35 third-year, second-semester engineering students from various branches at VFSTR University who voluntarily participated.

3.2 Pre-Test Assessment

The IELTS rubrics were chosen for this study as they provide a standardized and widely accepted framework for assessing speaking skills. They offer a comprehensive evaluation based on fluency, coherence, pronunciation, lexical resource, and grammatical accuracy, ensuring a detailed and objective measurement of students' proficiency. Additionally, since IELTS is commonly used in academic and professional settings, using its rubrics allows for a more practical assessment, helping students develop communication skills relevant to real-world scenarios.

Students were evaluated on the following areas:

- Fluency and Coherence
- Pronunciation
- Lexical Resource (Vocabulary)
- Grammatical Range and Accuracy

3.3 Intervention – Collaborative Learning Activities

The study adopted an experimental approach to assess the impact of collaborative learning techniq**ues** on enhancing the speaking skills of engineering students. Apre-test and post-test experimental design was used, where students' speaking proficiency was evaluated before and after the intervention to measure improvement.

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3.3.1 Experimental Design

The experiment followed a one-group pre-test post-test design, consisting of the following phases:

The pre-test served as a baseline assessment where students' speaking skills were evaluated using IELTS rubrics before any intervention. This test measured fluency and coherence, pronunciation, lexical resource (vocabulary), and grammatical range and accuracy, establishing a baseline for comparison after the intervention. The intervention phase lasted three months, structured into three cycles, each spanning three weeks. Every week included two structured speaking tasks and one review session, designed to simulate real-world communication and encourage peer interaction. After completing the intervention, students took a post-test using the same IELTS rubrics to measure improvements in their speaking skills. The pre-test and post-test scores were compared to determine the effectiveness of the intervention. The study was conducted with 35 third-year, second-semester engineering students from different branches who volunteered to participate. The students were randomly assigned to small groups to encourage peer learning and interaction, while a controlled environment was maintained to ensure consistency in task execution and assessment.

3.3.2 Intervention Activities (Independent Variable)

The experimental intervention focused on six key speaking activities, each targeting different aspects of spoken communication.

Cycle 1: Building Fluency and Confidence

1. **Just A Minute (JAM)** – Students spoke spontaneously for one minute on a given topic to improve fluency and reduce hesitation.
2. **Self-Introduction** – Each student introduced themselves formally to practice structuring their speech.

Cycle 2: Interactive and Analytical Speaking

3. **Group Discussion (GD)** – Students engaged in discussions on technical and general topics, focusing on articulation and logical reasoning.
4. **Jigsaw Activity** – Students exchanged and explained different parts of a topic to improve structured speaking.

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Cycle 3: Professional and Real-World Communication

5. **Case Study Analysis** – Students analyzed real-world problems and presented their solutions, integrating domain-specific vocabulary.
6. **Group Presentation** – Students worked in teams to deliver formal presentations, improving pronunciation and audience engagement.

3.3 Dependent Variables and Evaluation

The effectiveness of the intervention was measured by evaluating changes in key dependent variables related to speaking proficiency. Fluency and coherence were assessed by observing reductions in hesitation and improvements in the logical structuring of speech. Pronunciation was evaluated based on clarity in speech and the accurate articulation of words, ensuring better intelligibility. Lexical resource development was analyzed through the use of diverse and contextually appropriate vocabulary, reflecting an enriched language repertoire. Additionally, grammatical range and accuracy were examined by assessing improvements in sentence structure and overall grammatical correctness, contributing to more precise and effective communication.

3.4 Data Collection and Analysis

The study employed both quantitative and qualitative analysis to evaluate the effectiveness of the intervention. Quantitative analysis involved comparing pre-test and post-test scores using descriptive statistics such as mean, standard deviation, and percentage increase to measure overall improvement. Additionally, a paired t-test was conducted to determine the statistical significance of the observed improvements in students' speaking proficiency. Qualitative analysis was conducted through student feedback and observations recorded in self-reflection journals and instructor notes. Classroom participation and confidence levels were also assessed through instructor observations and peer feedback, providing deeper insights into the students' engagement and progress throughout the study.

3.5 Challenges and Limitations

The study encountered several challenges and limitations that impacted the intervention process. Some students exhibited initial reluctance to participate due to a lack of confidence, which affected their willingness to engage in speaking activities. Additionally, time constraints limited the opportunity for extensive one-on-one feedback, making it difficult to provide individualized guidance for every student. Another limitation was the absence of a control group, which made it challenging to isolate the exact impact of collaborative learning from other potential influencing factors. Despite these challenges, the overall findings indicate a positive improvement in students' speaking skills through structured collaborative learning activities.

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Despite these challenges, the experimental results demonstrated a significant improvement in students' speaking proficiency, validating the effectiveness **of** collaborative learning in enhancing speaking skills among engineering students.

3.6 Post-Test Assessment

After three months, a post-test was conducted using the same IELTS rubrics to measure improvements in speaking proficiency.

4.Results and Discussion

Table 1: Pre-Test and Post-Test Score Comparison

The comparison of pre-test and post-test scores highlights a significant improvement in students' speaking skills across all evaluated components. Post-test results show noticeable progress in fluency and coherence, pronunciation, lexical resource, and grammatical accuracy, with an overall increase of approximately 30% in speaking proficiency. The structured collaborative learning intervention played a crucial role in enhancing students' confidence and ability to express themselves more effectively. The results indicate that engaging in interactive speaking tasks positively impacted their performance, making them more articulate and grammatically precise in spoken communication.

Component	**Pre-Test Mean Score**	**Post-Test Mean Score**	**Percentage Improvement**
Fluency and Coherence	5.2	6.8	30.70%
Pronunciation	5	6.5	30.00%
Lexical Resource	5.1	6.6	29.40%
Grammatical Accuracy	4.8	6.3	31.30%
Overall Speaking Score	**5**	**6.5**	**30.00%**

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Table 2: Statistical Analysis of Pre-Test and Post-Test Scores

The statistical analysis of pre-test and post-test scores confirms that the observed improvements in speaking skills are statistically significant**.** The paired t-test results ($p < 0.05$) indicate that the increase in fluency, pronunciation, vocabulary, and grammatical accuracy was not due to chance but directly linked to the collaborative learning intervention. The mean difference and standard deviation values show consistent growth in students' speaking proficiency, reinforcing the effectiveness of structured group-based speaking activities in enhancing communication skills.

Component	Mean Difference	Standard Deviation	t-Test Value	p-Value
Fluency and Coherence	1.6	0.5	6.24	<0.05
Pronunciation	1.5	0.6	5.89	<0.05
Lexical Resource	1.5	0.5	6.1	<0.05
Grammatical Accuracy	1.5	0.6	5.95	<0.05
Overall Speaking Score	**1.5**	**0.55**	**6.05**	**<0.05**

Summary

Summary of Pre-Test and Post-Test Results

The pre-test and post-test score comparison demonstrates a significant improvement in students' speaking skills after the collaborative learning intervention. The post-test results show an increase of approximately 30% across all assessed areas, including fluency, pronunciation, vocabulary, and grammatical accuracy. Students exhibited reduced hesitation, clearer pronunciation, expanded vocabulary, and improved sentence construction.

The statistical analysis further confirms these improvements as statistically significant ($p < 0.05$). The paired t-test results indicate that the intervention effectively enhanced students' speaking proficiency, with notable increases in mean scores and reduced variability in performance. These findings validate the impact of structured speaking activities in developing confident and articulate speakers.

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5. Findings:

The study revealed significant improvements in students' speaking skills through collaborative learning techniques. The post-test scores showed a 30% increase across key areas: fluency, pronunciation, vocabulary, and grammatical accuracy. Students demonstrated reduced hesitation, improved speech clarity, better word choice, and enhanced sentence structure after participating in structured speaking activities.

The statistical analysis confirmed that these improvements were statistically significant ($p < 0.05$), indicating that the observed progress was a direct result of the collaborative learning intervention rather than random variation. Additionally, students reported increased confidence and engagement in speaking activities, showing that peer-based learning methods created a more supportive and interactive environment for skill development.

Despite these positive outcomes, the study also identified challenges such as initial reluctance due to lack of confidence, time constraints for individual feedback, and the absence of a control group for precise comparison. However, the overall findings strongly support the effectiveness of collaborative learning in enhancing speaking proficiency among engineering students.

6. Recommendations:

Based on the findings of this study, several recommendations can be made to enhance the speaking skills of engineering students through collaborative learning techniques. Integrating structured speaking activities into the curriculum will ensure continuous language practice and long-term skill development. Institutions should encourage peer-learning methods such as group discussions, debates, and case studies to create a more interactive and engaging language learning environment. Additionally, providing detailed feedback through rubric-based assessments and self-reflection journals can help students track their progress and make necessary improvements. Leveraging technology, such as AI-powered pronunciation tools and multimedia resources, can further support language learning by offering instant feedback and diverse speaking opportunities. Addressing psychological barriers, such as speech anxiety, through confidence-building workshops and mentoring sessions will help students overcome communication apprehension and enhance their overall speaking proficiency.

7.Conclusion

This study establishes collaborative learning as an effective pedagogical tool for enhancing English speaking skills among engineering students. By integrating structured speaking activities, technology-driven interventions, and psychological support, institutions can bridge the communication gap and prepare students for global professional challenges. Future research

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should explore hybrid learning models, AI-driven speaking assistants, and industry-academia collaborations to further enhance English-speaking competencies among engineering graduates.

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