

INTEGRATING THE SHADOWING TECHNIQUE WITH AN AI-POWERED MOBILE APPLICATION TO IMPROVE STUDENTS' PRONUNCIATION AND SPEAKING FLUENCY

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Abstract

This research examines the integration of the shadowing technique and the AI-powered mobile application ELSA Speak for pronunciation and speaking fluency improvement for second-semester students of the English Language Education Study Program. This study used a quasi-experimental design, taking a sample of 45 students, and dividing them into two groups, an experimental group and a control group. Pre-tests, post-tests, and student questionnaires were used to gather data. Over six meetings, the experimental group applied the shadowing technique and ELSA Speak, while the control group was taught using regular methods. According to the results, the experimental group was more proficient than the control group in the pronunciation and speaking fluency. Conclusively, the study affirms that the combination of shadowing with AI-powered tools such as ELSA Speak effectively enhances students' oral English proficiency.

Keywords: *shadowing technique, pronunciation fluency, speaking fluency, AI-powered mobile application, ELSA SPEAK*

INTRODUCTION

The way we teach and learn English as a Foreign Language (EFL) has been reshaped by digital advancements. Speaking is arguably the most difficult skill to learn and largely because learners have little exposure to authentic spoken English. In oral communication, the components of fluency and pronunciation are critical, yet, in many classroom settings, they receive little attention. Many EFL learners experience a lack of speaking accuracy, and confidence, and they struggle to receive real-time feedback. This is due to limited opportunities to engage in meaningful conversational practice (Derwing & Munro, 2015).

In response to the aforementioned challenges, many EFL teachers have started to incorporate various innovative approaches to pedagogy and new educational technologies. The shadowing technique is one of the new approaches that is gaining popularity. This technique involves a learner listening to a model speaker and then attempting to speak in unison with them. This technique aids learners in mimicking the speech patterns of native speakers, thus refining their pronunciation, speech rhythm, and intonation. Research confirms that shadowing has a positive impact on developing a learner's phonological awareness, and automaticity and fluency in speech production (Kadota, 2019; Hamada, 2016).

AI has revolutionized language learning by providing smart technology that offers instantaneous and personalized feedback. For instance, ELSA Speak is an app that employs AI technology to assist learners in developing articulate speech. Users receive timely feedback focused on key aspects of speaking, such as pronunciation, fluency, and intonation. Numerous studies indicate ELSA Speak and other mobile-assisted language

learning (MALL) technologies foster learner engagement and increase efficacy in developing speaking skills (Karim et al., 2023).

While there is potential to improve speaking skills using the shadowing technique as well as AI-driven technologies, there is little literature that focuses on their integration in a cohesive learning environment. Hence, this study focuses on the integration of the shadowing technique and the ELSA Speak app in an effort to improve students' pronunciation and fluency in speaking.

The study utilized a quasi-experimental design comprising two groups: an experimental group that got teaching using the shadowing approach augmented with ELSA Speak, and a control group that underwent conventional instruction. The research was performed over a duration of six weeks involving 45 second-semester students from the English Language Education Study Program. We used pre-tests, post-tests, and student questionnaires to gather data and find out how well the students learned and what they thought about it.

The importance of this study is that it could lead to new ways of teaching by combining human-centered methods with smart technologies. The results are anticipated to augment the existing literature on blended methodologies for EFL instruction and provide pragmatic insights for educators aiming to boost students' speaking proficiency through AI-enhanced techniques.

METHOD

The methodology explains why specific research approaches were selected along with the techniques of data collection, processing, and examination, which were later used to provide an answer to the research topic. This enables the audience to gauge the credibility and reliability of the study. In essence, it addresses the two fundamental questions: (1) In what way was the data collected? (2) In what way was the data interpreted? For this study, a quasi-experimental design was used to assess the impact of incorporating the shadowing technique together with the AI-enabled mobile application (ELSA Speak) on learners' pronunciation and speaking fluency. The choice of a quasi-experimental design was to compare different/alternative forms of the shadowing techniques aimed at pronunciation fluency in the context of the same lesson and in the same classroom which highlights the real-life attainability of the research goals.

The study included 45 second-semester students participating in the English Language Education program at a private institution in West Java, Bandung Indonesia. Participants were divided into two intact classes: an experimental group of 23 students and a control group of 22 students. All participants had similar academic and English proficiency backgrounds and were chosen based on their availability and suitability for the study. Ethical permission was obtained, and individuals provided informed consent prior to the start of the study.

The data were acquired using the following instruments: Speaking Performance Tests: Both groups were given pre and post tests. These tests evaluated students' pronunciation and fluency through reading and responding verbally. A scoring rubric assessed pronunciation accuracy, correct stress and intonation, fluency and rhythm, and overall comprehensibility. It drew from established speaking assessment criteria and was reviewed by two qualified language instructors. Student Questionnaire: After the treatment, the experimental group was given a questionnaire to determine their perspectives on the shadowing technique and the ELSA Speak application. Qualitative data were collected through closed-ended questions using a 5-point Likert scale and open-ended questions. The shadowing technique investigation was conducted over a period of six weeks

integrated within the regular speaking class. The procedure was as follows: Week 1: Both groups took a pre-test to gauge their baseline speaking skills. Weeks 2–6: The experimental group was taught using the shadowing technique which was integrated with the ELSA Speak application. Each week, students shadowed in class and were assigned 20-30 minutes of ELSA practice for home. For the control group, traditional teaching methods were employed.

Quantitative data from the pre-test and post-test were evaluated using paired sample t-tests to look for within-group improvements and independent sample t-tests to compare performance between the two groups. The statistical analysis was carried out using SPSS software. These tests were chosen to determine whether the variations in means were statistically significant.

RESULTS AND DISCUSSION

Result

Table 1 illustrates how participants in the experimental group outperformed the pre-test in the speaking post-test. This indicates progress since the post-test mean and median values reflect the results from the previous treatment. Additionally, the minimum score improved, and the total score distribution became more stable, showcasing progress as evidenced by a decline in standard error. This suggests the performance enhancement is complimented by greater equality in the distribution of scores across the group post the intervention.

Table 1. Extended descriptive statistics – Experimental Group

Speaking Fluency Scores (n = 23)

Statistic	Pre-Test	Post-Test
Mean	2.43	4.13
Standard Deviation	0.84	0.76
Median	2.0	4.0
Minimum	1	3
Maximum	4	5

The detailed descriptive statistics regarding the pre-test and post-test score comparisons for the experimental group is illustrated in Table 1. Given the statistics, it appears as though the students' speaking fluency improved remarkably after six weeks of instruction using the shadowing technique with the ELSA Speak app. There was an increase in score average from 2.43 to 4.13. This total increase indicates overall performance improved greatly. Furthermore, the median score increased from 2.0 to 4.0, illustrating that at least half of the children improved after the intervention. The lowest score also increased from 1 to 3, demonstrating that even the least proficient students improved considerably. The highest score improved from 4 to 5, and a few students attained the maximum score on the rubric for the assessment. The standard deviation of the scores decreased from 0.84 to 0.76, indicating an increase in the uniformity of score distribution. All this data shows that the integrated shadowing technique with AI-assisted learning helps students attain more fluency in their speaking skills.

As seen in Table 2, the control group demonstrated minimal improvement in speaking skills when comparing pre-test and post-test results. Following traditional instruction, the attendees' average and median scores exhibited a slight increase, implying a marginal overall improvement for the group. However, the lowest and highest scores remained constant at 1 and 4, implying that there was no change for the students at either extreme.

With a standard deviation of 0.96, the gaps in performance among pupils also remained unchanged. These results highlight the limited impact of the studied teaching method on the students' speaking fluency over the study period.

Table 2. Extended descriptive statistics – Control Group

<i>Speaking Fluency Scores (n = 22)</i>		
Statistic	Pre-Test	Post-Test
Mean	2.41	2.59
Standard Deviation	0.96	0.96
Median	25.0	30.0
Minimum	1	1
Maximum	4	4

The control group's speaking fluency scores before and after the traditional teaching method are analyzed and described in detail in Table 2. Overall, the findings report tiny progression where mean scores showed slight improvements, moving from 2.41 to 2.59. Overall group performance was reported to see some consistent improvements. In addition, the median score seemed to slightly improve from 2.5 to 3.0, where somewhat more than half of the students showed improvement during the study period. Nonetheless, the lowest and highest scores of 1 and 4, found no change meaning no improvement was recorded for the weakest and strongest pupils and therefore no progress was recorded for maximum sustained gain. No change in the 0.96 standard deviation reflects no improvements in variability of student performance. Overall, all six traditional teaching weeks recorded speaking fluency improvements of little value.

Data captured in Table 3 indicate that members of the experimental group made considerable advancements in their speaking fluency scores after the intervention. The gain scores analysis shows that the post-test scores clearly overshadowed the pre-test scores, indicating considerable advancements in fluency since the intervention. While improvements of varying degrees between individuals demonstrate some discrepancies, the overall evidences suggest that the students' speaking abilities were positively and meaningfully impacted by the integration of the shadowing approach with the ELSA Speak application. The observed increase is statistically reliable, as the confidence interval clearly shows.

Table 3. Gain score analysis – experimental group

<i>Pre-Test vs. Post-Test Gain (n = 23)</i>	
Statistic	Gain
Mean	1.70
Standard Deviation	0.56
95% Confidence Interval (Lower)	1.45
95% Confidence Interval (Upper)	1.95

The gain score analysis for the experimental group is shown in Table 3. The average increase from the pre-test to the post-test was 1.70 points, with a standard deviation of 0.56. This shows that all of the individuals made steady progress. The mean gain's 95% confidence interval was between 1.45 and 1.95. This means that the intervention employing the shadowing technique with ELSA Speak likely made a statistically significant difference in speaking fluency.

Table 4, on the other hand, shows that the control group only made a small improvement in their speaking fluency ratings from the pre-test to the post-test. The data

show that the improvement was small and not uniform across all pupils, even though the average gain was little. The small confidence interval means that any gain that was seen could be due to chance or natural variation, not the effect of the teaching. These results suggest that conventional training alone was not very helpful at improving students' speaking fluency during the intervention period.

Table 4. Gain score analysis – Control Group

<i>Pre-Test vs. Post-Test Gain (n = 22)</i>	
Statistic	Gain
Mean	0.18
Standard Deviation	0.39
95% Confidence Interval (Lower)	0.01
95% Confidence Interval (Upper)	0.36

Table 4 shows the analysis of the gain scores for the control group. The average gain from the pre-test to the post-test was only 0.18 points, with a standard deviation of 0.39. This shows that the participants didn't improve much or consistently. The 95% confidence interval was between 0.01 and 0.36, which means that even while some progress was made, it was small and not very strong statistically. This reinforces the conclusion that conventional education alone had a little effect on improving students' speaking fluency during the intervention period.

An independent sample t-test was performed on the post-test scores of the control and experimental groups to ascertain the statistical significance of the observed enhancements in speaking fluency between the two groups. This analysis sought to assess the intervention's efficacy by comparing the final performance outcomes following six weeks of instruction. Table 5 shows a summary of the results, which include the mean difference, significant level, and effect size.

Table 5. Post-test comparison – control vs experimental groups

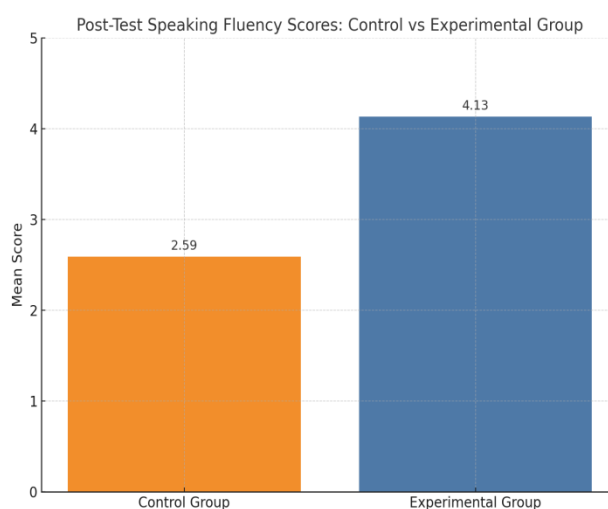
<i>Independent t-Test and Effect Size Analysis</i>						
Comparison	Control Group	Experimental Group	Mean Difference	t-value	p-value	Cohen's d
Post-Test Comparison	2.59	4.13	1.54	6.783	0.000	1.38

Table 5 demonstrates the results of an independent sample t-test that compared the post-test results for the control group to those of the experimental group. In this case, the experimental group attained a mean post-test score of 4.13, as opposed to 2.59 for the control group, meaning the two groups differed on average by 1.54. In this particular case, the t-test indicated a t-value of 6.783 and a p-value of 0.001. This indicates that the scores from the two groups are different in a statistically significant sense, that is, the difference is more than a chance difference. In the case of the experimental group, the intervention had a very strong effect on students' speaking fluency, demonstrated by the d value of Cohen's effect size of 1.38 indicates a substantial effect size, affirming that the intervention significantly influenced students' speaking fluency.

Table 5 describes the data analysis results, showing that the control group (conventional methods) and experimental group (ELSA Speak app and shadowing technique) scored

statistically different in speaking fluency. The experimental group scored statistically higher, with an average of 4.13 compared to 2.59 for the control group, leading to a 1.54 difference. This difference is statistically significant, with $p < 0.001$ and $t = 6.783$. The Cohen's d effect size of 1.38 shows that the intervention had a big influence on students' speaking fluency in real life. These results strongly suggest that using shadowing along with AI-powered mobile learning technologies greatly improves learners' speaking skills in English as a Foreign Language (EFL) settings. A bar chart was made to show the difference in performance between the control and experimental groups by comparing the mean post-test speaking fluency scores. This picture shows the average results of each group in a simple and easy-to-understand way, which shows the overall effect of the intervention.

Figure 1. Post-test mean scores comparison between control and experimental groups.



The bar chart illustrates that those in the experimental group outperformed the control group. This indicates that the use of the shadowing method in conjunction with an AI-enabled mobile application is beneficial in enhancing fluency in speech.

To gain a deeper understanding of the students' perspectives and experiences with the interventions, a post-test questionnaire was given to the experimental group. This questionnaire consisted of closed-ended questions and utilized a 5-point Likert scale. Responses to the Likert-scale questions were analyzed using descriptive statistics. Below is a table reflecting the extent of students' agreement with key statements:

Table 6. Summary of Student Perceptions Based on Questionnaire Result
 (n = 23, Scale: 1 = Strongly Disagree to 5 = Strongly Agree)

Statement	Mean	SD Level	Agreement
I found the shadowing technique helpful for improving my pronunciation	5.00	0.00	Strongly Agree
Using ELSA Speak helped me become more aware of my pronunciation errors.	4.00	0.29	Agree
I became more confident in speaking English after using this method.	4.13	0.34	Strongly Agree
I was motivated to practice speaking regularly with	4.00	0.20	Strongly Agree

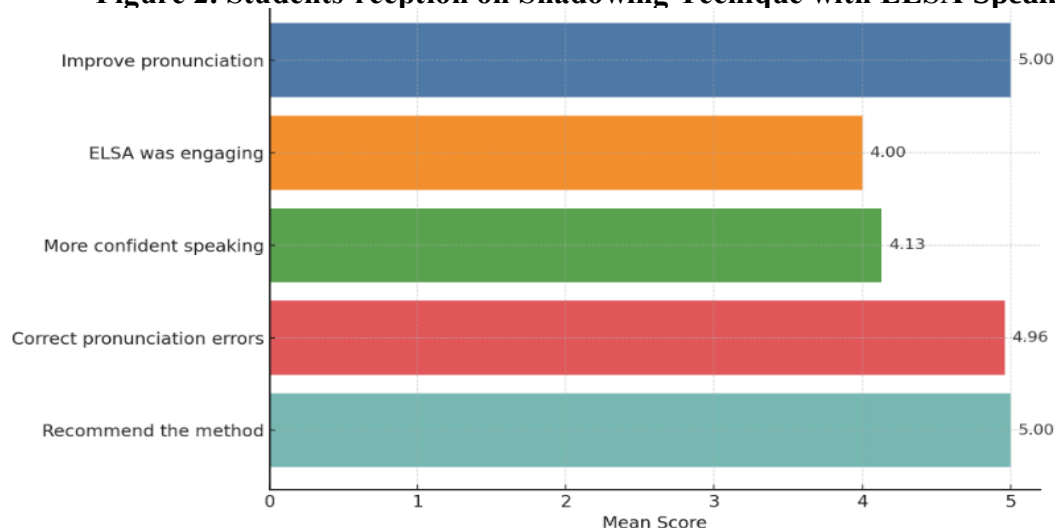
the help of the app	96	Agree	
The combination of shadowing and ELSA Speak is more effective than textbooks.	5.00	Strongly Agree	

Intervention findings encourage us to be optimistic since participants appreciated the learning experience. A mean score of 5.00 for both Statements 1 and 5 tells us that students unanimously appreciated the shadowing practice and said, it helped them improve their pronunciation, plus, they would recommend it to others. Having a mean of 4.96, Statement 4 suggests that nearly all students found the method helpful in locating and correcting their pronunciation mistakes more easily.

While Statement 2 had the lowest mean of 4.00, it still reflects a positive sentiment. This suggests most students found ELSA Speak engaging and user-friendly, while it is probable that a few students had marginal usability challenges. The standard deviations across all items were low, a positive indicator of response cohesion in all items.

Positive responses clearly indicate students learned, and that the method in practice provided motivation and encouragement in developing their speaking skills. The bar chart reflects students' positive sentiment on the learning method that integrated shadowing with ELSA Speak.

Figure 2. Students' reception on Shadowing Technique with ELSA Speak



The bar chart revealed that most students gave the method a good rating, notably for aiding with pronunciation and suggesting it to others (both got a perfect 5.00). The lowest grade for ELSA's engagement (4.00) was still good, which means that there is opportunity for slight improvements in how easy or fun the app is to use.

Discussion

The study's findings present compelling evidence that using an AI-powered mobile app combined with the shadowing approach significantly increases students' speaking fluency. The experimental group performed significantly better than the control group, according to the quantitative results from the pre-test and post-test scores. The experimental group's post-test mean score of 4.13 was greater than their pre-test mean score of 2.43. Only a minor improvement was seen in the control group, which went from 2.41 to 2.59. This discrepancy was supported by the gain score analysis, which showed that the experimental group achieved a mean gain of 1.70 compared to the control group's only 0.18.

The independent t-test revealed a significant difference between the two groups ($p < 0.001$), with a Cohen's d effect value of 1.38. This demonstrates how well shadowing, which is based on replicating and repeating sounds, combines with real-time, personalized feedback from the ELSA Speak app. These findings support previous research (Celce-Murcia et al., 2010; Derwing & Munro, 2015), which emphasizes the importance of repetition, self-monitoring, and corrective feedback in improving pronunciation and oral fluency.

In addition to the quantifiable improvements in speaking fluency indicated by pre- and post-test scores, the student questionnaire provided more profound insights into the learners' experiences and impressions of the intervention. The overwhelmingly positive comments show that the strategy works, is acceptable, and has a motivating effect.

The questionnaire results indicate that students overwhelmingly recognized the shadowing approach as effective in enhancing their pronunciation, achieving a perfect mean score of 5.00. The statement "I would recommend this method to others" likewise obtained a mean score of 5.00, which means that all participants fully supported it. These results indicate that students acknowledged distinct advantages in learning spoken English via recurrent listening and mimicking, aligning with previous research that highlights the cognitive and phonological benefits of shadowing (Celce-Murcia et al., 2010; Trofimovich & Gatbonton, 2006).

In addition, participants said that they had improved in recognizing their own pronunciation mistakes ($M = 4.96$), which aligns with the prompt customized feedback that ELSA Speak provides. Self-correcting and self-monitoring is a fundamental part of speaking fluently, especially in environments with minimal direct teacher interaction.

With a mean of 4.00, the statement "ELSA Speak was enjoyable and simple to follow" was rated a little lower than the other arguments but the mean score was still in the positive. This likely points to the statement being positively enjoyable to a majority. This response could be due to varying digital literacy skills, especially regarding mobile applications and possibly an unwillingness to engage with the AI.

Positive feedback from students and improvements in the test data imply that the incorporation of shadowing with AI applications is uplifting students' technical skills and is positively impacting their self-confidence, autonomy, and motivation. This substantiates the integration of mobile-assisted language learning (MALL) and adaptive teaching which is growing in research and practice, demonstrating that effective teaching methods, combined with adaptive technology, can enhance the language learning experience.

CONCLUSION

This study incorporated the shadowing technique alongside an AI-driven mobile application for students' pronunciation and speaking fluency within English as a Foreign Language (EFL) context. The study employed a quasi-experimental design with 45 second-semester students within a 6-week period. One experimental group practiced shadowing with ELSA Speak, and the other control group received traditional instruction. Pre and post tests showed that experimental group showed a greater increase in fluency compared to control group and this difference was statistically significant. Gain score analysis and independent t-tests showed a significant effect size corresponding with the integrated approach. The planned repetition of the shadowing technique assimilated with real time contextual feedback from ELSA Speak created a conducive environment for students to improve their pronunciation, fluency and confidence.

The program's post-intervention questionnaires told us a great deal about the students' perspectives. Many students reported great satisfaction with the approach and noted improvements in their pronunciation and self-confidence, and that the approach was worth

sharing with others. Such comments demonstrate that the students improved their English speaking and writing skills and appreciated the method's usability and value.

To sum up, this study offers clear proof that integrating conventional shadowing with AI-powered mobile apps is a viable and practical approach to improve learners' oral English skills in EFL classes. This approach not only assists in the development of the skills but also enhances students' motivation, which has important implications for teachers, curriculum planners, and institutions as they seek to innovate their oral skills instruction. Future studies should focus on the same method with learners of different levels of English, for longer periods and different demographic groups to demonstrate the method's sustainability and extensiveness.

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