

Effectiveness Duolingo in Improving Student Motivation in Speaking Skills

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Abstract. This study aims to evaluate the effectiveness of the treatment in improving participants' learning outcomes. The research design employed a pretest and posttest, involving 20 participants as the sample. Data analysis was conducted using descriptive statistics, correlation tests, and paired t-tests. The study showed a significant increase in posttest scores, from an average of 290.75 to 502.75, indicating that the treatment effectively improved learning outcomes. However, the high standard deviation in both conditions (pretest and posttest) indicates a significant variation in results among participants. The correlation between pretest and posttest scores showed a very weak relationship, with a correlation value of 0.050 and a significance level of 0.834, indicating that participants' initial results before treatment were not significantly related to the results after treatment. The t-test showed a significant difference between the pretest and posttest, with a t-value of -2.102 and a 95% confidence interval that did not include zero, confirming the positive impact of the treatment on learning outcomes. Nonetheless, the variation in results among participants indicates the need for further research to identify other factors influencing the effectiveness of the treatment, as well as to explore the elements that contributed most to the improvement in learning outcomes.

Keywords: Duolingo, Motivations, Speaking skills

1. INTRODUCTION

Speaking ability is essential in foreign language acquisition as it supports efficient communication [1], [2]. This skill includes conveying ideas, boldness, fluency, and understanding of context [3]. Speaking becomes the primary means of daily social interaction and information sharing. Therefore, speaking skills are often considered the benchmark for successful language learning. However, learners often face obstacles, such as a lack of practice opportunities and low self-confidence. This emphasizes the importance of practical learning approaches.

Modern technology, like digital apps, has become a significant innovation in language learning because it appears student's interest even his/her motivation [3]-[5]. some interactive apps can be a trigger for student to focus on the core of problem [7]. The app offers interactive features that allow students to learn independently and flexibly [8], [9]. With gamification-based exercises, voice recognition, and gradual modules, students can develop their listening, speaking, reading, and writing skills [9]-[11]. This technology also gives access to learning materials anytime and anywhere. Instant feedback and performance evaluation help students understand their learning progress. This convenience integrates language learning into daily activities [13]-[15]. Therefore, digital apps are an effective solution to language learning challenges in the modern era.

Duolingo applies the concept of gamification to make language learning more engaging and interactive [16]. With rewards in the form of points and badges, users are motivated to continue the learning process. The daily challenges also maintain consistency in language practice [17]. The level system allows users to see how far they have progressed, increasing their sense of achievement. Competitive elements, such as user score comparisons, further encourage students to practice harder [18]. Various exercises covering speaking, listening, reading, and writing skills make the learning process more varied and fun. Implementing gamification in Duolingo has proven effective in increasing user engagement and consistency in language learning [16].

Motivation is important in increasing students' courage and practicing speaking skills consistently. Without sufficient motivation, students often have difficulty overcoming fear or anxiety when speaking [19]. High motivation encourages students to actively practice and overcome mistakes that occur [8], [20], [21]. In addition, motivation also helps to create consistent learning habits, which is very important in mastering speaking skills. With strong motivation, students tend to practice more diligently, which leads to increased confidence and speaking fluency [22], [23]. Continuous motivation can facilitate faster development of speaking skills [24]. Therefore, motivation is a key factor in successful language learning.

Previous research has shown positive results regarding using digital applications, such as Duolingo, in improving language skills, especially in reading, listening, and writing ([25]. However, these studies generally do not explore the effect of these applications on speaking motivation. Speaking motivation is important in language acquisition, especially in daily communication [26]. Most studies focus more on other language skills, while the speaking aspect is often overlooked. Therefore, despite positive findings in previous studies, not many have explored the impact of digital apps on speaking motivation [27]. Further research is needed to understand their influence in depth. It is important to explore the potential of digital apps in improving students' speaking skills [28].

Recent research has examined the effectiveness of Duolingo in increasing student motivation in language learning. The results show that Duolingo improves students' writing skills and motivation [29]. In addition, Duolingo was also shown to help improve speaking skills, with many students finding it a helpful tool [30]. The gamification element in Duolingo is proven to increase students' motivation to learn English [16], [31], [32]. Another study also showed positive sentiments towards Duolingo, with students recognizing its motivational value [33]. However, the app is considered less effective in building a sense of competitiveness among students. Nonetheless, Duolingo still shows great potential in increasing student motivation, especially in speaking skills. The research aims to fill the gap by exploring how Duolingo can influence student's motivation to develop their speaking skills. It will use quantitative methods to collect more objective and comprehensive data regarding lingo's impact on speaking motivation. By the method, it is hoped that clearer evidence can be found such as the effects of this apps on improving students' speaking skills.

2. METHOD

The method used in this research is a quantitative method to examine the effectiveness of Duolingo in increasing student motivation in speaking skills. By using quantitative methods, researchers can obtain more objective and measurable data that reflect actual changes in students' performance. Quantitative research allows the systematic collection and analysis of numerical data, helping ensure the accuracy, reliability, and replicability of results. In this study, numerical data, including pretest and posttest scores, were used to assess the extent to which students' motivation and speaking performance improved after using the Duolingo application as a learning tool. The adoption of a quantitative framework enables evaluation of the causal relationship between the independent variable—Duolingo usage—and the dependent variable—students' motivation to speak English.

Data in numbers, such as test scores or rating scale results, allow for more in-depth statistical analysis and interpretation. The use of descriptive and inferential statistics not only highlights the mean and standard deviation but also tests the statistical significance of any observed differences. This approach strengthens the study's internal validity and allows researchers to make generalizations within reasonable limits. In addition, using standardized research instruments, such as structured tests or questionnaires, ensures that measurements of student motivation are consistent and can be compared across research participants. Consistency in measurement is essential for minimizing bias and ensuring that observed changes in scores accurately reflect the treatment's effect rather than extraneous factors.

The subjects in this study were 20 students of class A in Junior High School. The participants were selected purposively based on their similar academic backgrounds and English proficiency levels. All participants were within the same age range, ensuring homogeneity of the sample to minimize confounding variables such as age-related cognitive differences or varied exposure to English learning contexts. The choice of junior high school students was deliberate, as this age group often represents learners who are developing foundational speaking skills and are highly responsive to interactive, technology-based learning tools. Duolingo, with its game-like design, immediate feedback, and self-paced exercises, was expected to suit their learning preferences and cognitive needs effectively.

The research design was a group pretest-posttest design with a single group, namely class A, as the experimental group. This design involves measuring the same participants before and after the treatment, enabling researchers to assess the intervention's effect on each individual directly. The pretest serves as a

baseline measurement of students' speaking motivation and performance before exposure to Duolingo, while the posttest measures their progress after the treatment. By comparing these two sets of scores, researchers can identify whether any observed improvement is statistically significant. The use of a single-group design, although limited in its ability to control for external variables, is appropriate for exploratory research aimed at evaluating preliminary effectiveness before applying a larger-scale experimental framework with control groups.

The research instrument used in this study consisted of a test administered before (pretest) and after (posttest) the use of the application. Both instruments were designed to assess students' motivation and performance in speaking English. The pretest and posttest were administered under similar conditions to ensure consistency in data collection. The test items included prompts that required students to demonstrate their ability to express ideas, respond to communicative tasks, and use appropriate pronunciation and fluency. In addition to assessing linguistic performance, the test indirectly measured students' confidence and willingness to communicate—key indicators of speaking motivation.

Data analysis used a paired t-test to compare the mean scores before and after treatment in these groups. The paired t-test is a widely accepted statistical technique for determining whether there is a significant difference between two related means, such as pretest and posttest scores from the same participants. This method was chosen because it is particularly effective in measuring the impact of an intervention within a single group, thereby controlling for individual variability across participants. The t-test compares the average difference between paired observations and determines whether the observed mean difference is statistically significant or could have occurred by chance.

The t-test is very effective for comparing the averages of a single sample group, as in this study, which compares students' confidence and motivation scores before and after using the application [34]. Research designs that use experimental groups and paired data collection (pre-test and post-test) are well-suited to the assumptions of the t-test, which include normal distribution of the difference scores and homogeneity of variances. In this study, these assumptions were carefully considered before analysis to ensure the validity of the results. The normality of the data was assessed using descriptive statistics and graphical methods, while consistency of testing conditions minimized external influences on participants' performance.

The use of a paired t-test also allows for more robust conclusions compared to simple descriptive comparisons. It helps to determine whether the improvement in scores after treatment reflects a real effect of the Duolingo application or is merely due to random variation. This makes the statistical results more reliable and supports stronger inferences regarding the effectiveness of Duolingo in enhancing students' speaking motivation. The t-test results provide both the t-value and the level of significance (p-value), which together indicate the degree of confidence in rejecting or accepting the null hypothesis. In this context, the null hypothesis assumes that there is no difference in student motivation and performance before and after using Duolingo. A significant p-value (less than 0.05) indicates that Duolingo has a statistically significant impact on students' speaking motivation.

Identification of the research problem related to students' low motivation and limited speaking practice in English classes. After identifying the issue, the researcher introduced Duolingo as an intervention to address these challenges. Students were trained to use the application, and the learning sessions were conducted over a set period to ensure consistent exposure. During this period, students engaged in various Duolingo modules designed to enhance vocabulary, pronunciation, and sentence construction. Regular monitoring ensured that participants used the app effectively and consistently. Following the treatment period, the posttest was administered to assess any improvement.

Finally, the collected data were analyzed using a paired t-test to assess the statistical significance of the observed changes. The findings derived from this analysis served as the foundation for interpreting the relationship between digital learning engagement and speaking motivation. Through this methodical process, the research provides credible, replicable evidence supporting the hypothesis that Duolingo, as a gamified learning platform, positively affects students' motivation and English-speaking performance. The implementation stage of this research is shown in Figure 1.

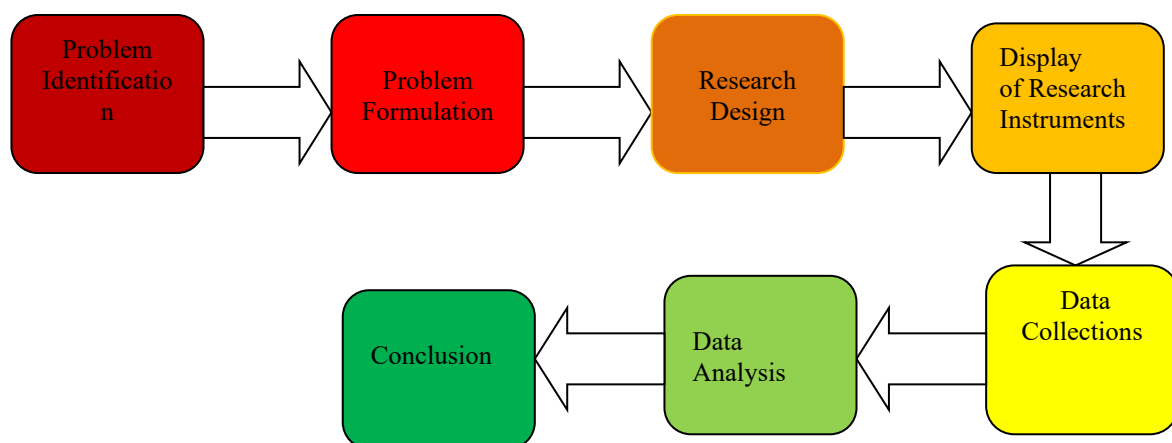


Figure 1. Research Procedures

Figure 1 explains the research procedure in the first stage, identifying problems related to the effectiveness of the Duolingo application and the factors that influence its effectiveness in increasing student motivation in speaking skills. This stage is essential to ensure the research is grounded in a clear understanding of the challenges students face in developing their speaking skills through digital learning tools. Second, the formulation of the problem will focus on the effectiveness of the Duolingo application and the factors that influence its ability to support students' learning motivation and engagement. Third, the research design will adopt a quantitative approach to systematically and objectively measure the research variables. Fourth, the presentation of the research instrument involves creating an assessment rubric to measure student motivation and the need for learning interventions to determine the factors that affect the effectiveness of the Duolingo application. Fifth, data collection will be conducted through learning interventions to obtain data from students and other relevant parties, ensuring the accuracy and reliability of the information gathered. Sixth, data analysis will use a t-test to test the hypothesis and find the relationship pattern between the research variables with statistical precision. Finally, conclusions will be drawn from the research, which is expected to enhance the effectiveness of the Duolingo application in boosting student motivation for speaking skills and to provide valuable insights for future educational practices.

3. FINDINGS

This chapter presents the research results from detailed data analysis, complemented by thorough discussions to provide a deeper, broader understanding of the topic. The findings are carefully organized to answer the research questions and support the predetermined objectives of this study. Furthermore, the discussion not only relates the research results to relevant theories and previous research but also highlights their practical implications in the broader educational context. In addition, the strengths and limitations of the findings are explicitly addressed to provide a more comprehensive, balanced, and in-depth picture of the topic under investigation. This discussion also carefully examines the relationship between variables X and Y, critically analyzing its impact on the overall results of this study.

Table 1. Paired Sample Statistic

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before				
	Treatment	290.7500	20	311.49586	69.65259
	After	502.7500	20	342.14292	76.50548

Table 1 shows the descriptive statistics of the pretest and posttest scores. The mean pretest score was 290.75 with a standard deviation of 311.49, indicating a considerable variation in scores among participants before the treatment was given. After the treatment, the average posttest score increased to 502.75 with a standard deviation of 342.14. The standard error mean value for the pretest was 69.65, and for the posttest,

it was 76.51, representing the level of accuracy of the sample mean in the population. This increase in mean score indicates a change in scores after the treatment, although the high standard deviation value indicates a wide spread of scores in both groups.

Table 2. Paired Sample Correlations

		N	Correlation	Sig
Pair 1	Before treatment	20	.050	.834
	After treatment			

Table 2 presents the results of the correlation between pretest and posttest scores. Based on the table, the correlation value obtained is 0.050, indicating a weak relationship between the two variables. The significance level obtained is 0.834, well above the significance threshold of 0.05. Thus, the correlation between pretest and posttest scores is not statistically significant. This indicates that the increase or change in posttest scores is not directly related to the participants' initial scores on the pretest.

Table 3. Paired Sample Test

		Paired differences					t	df
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
					Lower	Upper		
Pair 1	Before treatment	-			-	-	-	
	After treatment	212.0000	451.0000	100.8466	423.0745	.9254	2.10	19
		0	6	8	2	8	2	

Table 3 presents the results of the mean difference test between the pretest and posttest scores using a paired t-test. The mean difference between pretest and posttest scores was -212.00 with a standard deviation of 451.00 and a Standard Error Mean of 100.85. The 95% confidence interval for the difference in scores is between -423.07 and -0.92. Since this interval does not include zero, this score difference is considered statistically significant. The t-value obtained was -2.102 with a degree of freedom (df) of 19, indicating a significant difference between the pretest and posttest scores. This test confirmed a fundamental change in the participants' scores after the treatment was given.

4. DISCUSSION

Duolingo significantly influenced students' speaking motivation and learning outcomes. This result reinforces previous studies Amin and friends, who found that gamified language applications can effectively increase students' interest and motivation in English learning. Furthermore, this finding extends the evidence by focusing specifically on speaking skills—an area often less emphasized in previous Duolingo-related research, which tended to prioritize reading, vocabulary, or writing outcomes. The current study thus adds a valuable dimension by demonstrating that consistent use of Duolingo can foster confidence in spoken English.

Although the intervention's effect was statistically significant, the observed participant variability warrants further attention. Some learners may have engaged passively with the application, completing exercises without actively internalizing the communicative aspects of speaking. Others may have approached tasks strategically, using repetition and feedback to refine pronunciation, syntax, and fluency. These differences in learning strategies highlight the importance of learner agency in digital learning contexts. Duolingo's automated feedback system, while effective for lexical accuracy, may not fully capture pragmatic or discourse-level proficiency in speaking. Therefore, while Duolingo serves as an excellent supplementary tool, it might not entirely substitute for interactive speaking practice with human interlocutors, which remains essential for achieving communicative competence.

Another factor to consider is the role of motivation type—whether intrinsic or extrinsic—in mediating learning outcomes. Duolingo's reward-based system, which relies on external incentives such as experience points and leaderboards, primarily triggers extrinsic motivation. While extrinsic motivators can successfully initiate learning behaviors, sustaining long-term engagement requires intrinsic interest in the language itself. The high posttest scores suggest that short-term motivation was effectively enhanced. Still, longitudinal studies are needed to examine whether these motivational gains persist after the application's novelty effect diminishes. Integrating Duolingo with classroom-based speaking activities or peer interaction could help transform extrinsic motivation into more enduring intrinsic motivation.

From a pedagogical perspective, this study demonstrates that integrating Duolingo into formal or informal language learning settings can create a more dynamic learning environment. Teachers may leverage the app to supplement classroom activities, track student progress, and encourage independent practice outside school hours. The app's data analytics could also inform instructors about learner performance patterns, allowing them to provide more personalized guidance. However, to maximize the pedagogical impact, educators should consider scaffolding digital learning with explicit speaking tasks—such as role-plays, debates, or storytelling—that reinforce communicative objectives.

Despite the positive results, several limitations must be acknowledged. The small sample size (N=20) restricts the generalizability of findings to broader populations. Moreover, the study's one-group pretest-posttest design lacks a control group, making it challenging to attribute score improvements solely to the Duolingo intervention. External variables such as current exposure to English media, peer interactions, or classroom instruction could have contributed to the gains. Future studies should employ randomized controlled trials or mixed-method designs to triangulate quantitative findings with qualitative data such as learner interviews or observation notes, providing a richer understanding of the motivational processes involved.

Lastly, this study highlights the complex nature of motivation in digital-assisted language learning. Motivation is dynamic, context-dependent, and multifactorial. While technological innovations like Duolingo can significantly enhance engagement, they should be viewed as part of a broader ecosystem of language learning strategies that include teacher feedback, peer collaboration, and self-reflection. Therefore, future research should investigate how Duolingo interacts with these variables to sustain motivation and promote communicative improvement over time.

5. CONCLUSION

This study showed that the treatment provided had a significant impact on improving participants' scores. Based on the analysis, the average posttest score was substantially higher than the pretest score. However, the high standard deviation indicates considerable variation in results among participants, which may be influenced by individual factors such as initial ability, motivation, and learning experience. In addition, despite improved outcomes, the correlation between pretest and posttest scores was very low, suggesting that the treatment's success was not entirely related to participants' initial scores. These findings emphasize that learning outcomes are multifaceted and shaped by both internal and external factors, including students' learning styles, opportunities for practice, and engagement during the intervention period.

T-test results further confirmed that the difference between pretest and posttest scores was statistically significant, indicating the treatment's effectiveness in improving learning outcomes. However, the low correlation and high variation in results underscore the need for more in-depth studies to identify factors that support the treatment's success. Further research is also needed to determine which elements of the treatment had the most significant impact and to provide more targeted recommendations for developing effective learning methods.

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