Duolingo's Impacts in Senior High Classrooms

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Abstract

This study investigated the impact of using the Duolingo application on senior high school students' grammar achievement. A total of 70 students participated in the research, divided into experimental and control groups, to evaluate whether integrating Duolingo into language learning enhanced students' grammatical skills. The experimental group used Duolingo for grammar practice, while the control group followed traditional teaching methods. Pre-test and post-test scores were analysed to measure progress. The results indicated a significant improvement in the grammar scores of the experimental group, with an average increase from 66.14 (pre-test) to 76.57 (post-test). In contrast, the control group exhibited minimal improvement, maintaining an average score of 66.14. The findings suggested that Duolingo's interactive and gamified features motivated students and enhanced their comprehension of grammar rules, leading to better performance. Statistical analysis confirmed that the difference in improvement was significant, leading to the acceptance of the alternative hypothesis (Ha) and the rejection of the null hypothesis (H0). This study underscored the potential of technology-based learning tools like Duolingo in promoting grammar proficiency among senior high school students. However, limitations regarding sample diversity and the duration of intervention highlighted the need for further research to validate long-term effectiveness.

Keywords: Grammar, Grammar Achievement, Duolingo, Experimental Study.

Introduction

Mastering English grammar poses a significant challenge for students, particularly when dealing with complex structures such as tenses, sentence formation, and modal auxiliaries. Unlike Indonesian, which does not emphasize verb conjugation in the same way, English grammar requires careful attention to detail. Many students struggle with grammar rules due to the structural differences between the two languages. Traditional teaching methods, such as memorizing grammar rules, often lead to boredom and disengagement, making it difficult for students to retain information effectively.

In recent years, technological advancements have significantly influenced the field of education, offering new approaches to language learning. The integration of digital tools in education has led to the development of various language-learning applications, including Duolingo, Kahoot, and Quizlet. These applications use interactive and gamified methods to engage learners, making grammar learning more enjoyable and effective. Among these tools, Duolingo has gained popularity due to its structured lessons, real-time feedback, and reward system, which keeps learners motivated.

Duolingo is a language-learning application designed to facilitate the acquisition of new languages through short, engaging lessons. The application employs gamification strategies, such as earning points, leveling up, and unlocking achievements, to sustain learner engagement. Previous studies suggest that gamified learning can enhance students' motivation, increase retention rates, and improve overall learning outcomes. However, limited research has been conducted on the direct impact of Duolingo on students' grammar achievement, especially in a high school setting.

In recent years, the integration of digital platforms and game-based learning into English as a Foreign Language (EFL) education has gained significant attention. One platform that stands out is TikTok, which blends entertainment with educational value. The platform's interactive and gamified features allow learners to engage in authentic language use, promote learner autonomy, and increase motivation. Researchers have explored how such digital innovations, particularly when perceived as games or challenges, can support the development of English skills among EFL learners. The following studies illustrate the growing body of research that emphasizes the potential of TikTok and similar tools in enhancing language learning through game-like approaches.

Aziz (2024) found that EFL students perceived the Dacotu TikTok account as a highly beneficial tool for improving their English skills. The gamified presentation of content, through creative, entertaining videos, fostered motivation and made learning more engaging. Students reported that the playful and repetitive nature of the videos, similar to game-based learning, helped reinforce vocabulary and pronunciation. This aligns with the idea that when learning feels like play, it reduces anxiety and enhances language acquisition. (Inayah et al., 2024)

According to another study, TikTok functions as a flexible learning medium where students can practice speaking skills in a low-pressure, interactive environment. The authors highlight how the platform's design mimics gamification, such as using trends, challenges, and peer interaction, making language learning more dynamic and less intimidating. The combination of entertainment and education on TikTok allows learners to explore and practice English in ways that traditional classroom settings may not fully offer.(Agustina et al., 2024)

Armelia (2023) emphasized that the use of TikTok in the EFL context promotes learner creativity, confidence, and speaking fluency. Students are encouraged to

produce content, collaborate with peers, and engage with native-like expressions—all of which simulate real-world communication in a game-like structure. This strategy not only improves linguistic competence but also encourages continuous participation, as learners are driven by enjoyment and self-expression, key components of effective game-based learning. (Nurbani, 2020)

This study investigates the effectiveness of Duolingo as a supplementary tool for grammar instruction among senior high school students. Specifically, it examines whether students using Duolingo perform better in grammar assessments compared to those relying solely on traditional teaching methods. By comparing pre-test and post-test results, this study seeks to determine the extent to which Duolingo contributes to grammar proficiency.

Furthermore, this research builds upon previous empirical studies that highlight the advantages of technology-based learning. While some studies have demonstrated that Duolingo enhances vocabulary and reading comprehension, fewer have explored its role in improving grammar skills. Therefore, this study aims to determine the impact of the Duolingo application on students' grammar achievement. This will determine how this application effectively improves users' understanding and application of grammatical structures in a particular language.

Given the increasing reliance on digital learning tools, understanding their impact on student performance is crucial. This research not only benefits students and teachers but also contributes to the growing body of knowledge on educational technology. The findings will help educators make informed decisions about integrating digital applications into their teaching strategies, ensuring that students receive a more engaging and effective learning experience. In line with these objectives, this study seeks to answer the following question: Is there any impact of using Duolingo on senior high school students' grammar achievement?

This research employed a quasi-experimental design to examine the impact of using Duolingo on senior high school students' grammar achievement. The research preparation involved selecting participants from SMA Hang Tuah 2 Sidoarjo, specifically 70 eleventh-grade students divided into experimental and control groups. The experimental group used Duolingo as a grammar-learning tool, while the control group followed traditional teaching methods. The scope of this study was limited to analysing students' grammar proficiency before and after the intervention, focusing on the differences in achievement between the two groups.

The research objects included the students as participants, the Duolingo application as the primary intervention tool, and grammar proficiency as the dependent variable. Data collection was conducted through pre-test and post-test assessments to measure students' grammar improvement. Additionally, student engagement and perceptions of Duolingo were observed to understand the learning process better. The primary instruments used in this research were grammar tests designed to evaluate students' understanding and application of grammatical structures. These tests ensured that the study provided quantifiable data for analysis.

The study was conducted at SMA Hang Tuah 2 Sidoarjo, where students participated in a four-week learning period, integrating Duolingo into their study routines. The research variables consisted of an independent variable, which was the use of Duolingo, and a dependent variable, which was students' grammar achievement. The experimental group received regular grammar practice using Duolingo, while the control group continued learning through conventional classroom instruction. The comparison of test scores between both groups determined the effectiveness of the application.

For data analysis, statistical methods were employed using SPSS software to ensure accuracy in measuring the impact of Duolingo on students' grammar proficiency. A normality test was conducted to determine whether the data were normally distributed, followed by an independent t-test to compare the grammar scores of the experimental and control groups. If the data did not meet normality assumptions, a non-parametric Mann-Whitney U test was used instead. The analysis aimed to identify whether there was a statistically significant difference in grammar achievement between the two groups.

This research methodology ensured that the study was systematically conducted, allowing for valid conclusions regarding the role of Duolingo in enhancing senior high school students' grammar skills. By implementing rigorous data collection and statistical analysis techniques, this study contributes to understanding the effectiveness of technology-based learning in language education

Method

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Results And Discussion

The results of the pre-test and post-test for the experimental and control class can be shown in the table below:

Table 1. 1 Descriptive Test

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test Control	35	40	95	65.86	15.410
Pre-tests Experimental	35	40	95	66.14	14.607
Post-test Control	35	40	95	66.14	15.769
Post-test experimental	35	55	95	76.57	10.831
Valid N (listwise)	35				

This research included two groups: the control group (C) and the experimental group (E), with each group comprising 35 participants. Both groups underwent a pre-test and a post-test to assess their performance prior to and following the treatment. According to the pre-test scores, the control group achieved an average score of 65.86 with a standard deviation of 15.410, whereas the experimental group had a slightly higher average of 66.14 and a standard deviation of 14.607. This suggests that the participants in both groups had comparable abilities at the

start.

After the treatment was administered to the experimental group, both groups completed the post-test. The findings indicated that the control group achieved an average post-test score of 66.14 with a standard deviation of 15.769, showing almost no improvement from their pre-test scores. In comparison, the experimental group demonstrated a notable enhancement in their performance, recording an average post-test score of 76.57 and a reduced standard deviation of 10.831. This implies that the treatment provided to the experimental group positively influenced their learning outcomes.

Normality Test Analysis

In this research, a pre-test and post-test were carried out first to determine the impact of Duolingo on grammar skills. Data was considered regularly distributed if the values of both series exceeded 0.05. This meant that the t-test could be used to determine the significance of an increase in scores.

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	1	.120	35	.200*	.964	35	.291
	2	.134	35	.114	.953	35	.145
Posttest	1	.129	35	.149	.950	35	.116
	2	.133	35	.123	.952	35	.129

This is a lower bound of the true significance.

a. Lilliefors Significance Correction

1: Experimental class

2: Control class

Before carrying out additional analysis, the researcher needed to verify that the data followed a normal distribution, which is an essential assumption for applying parametric statistical tests. To assess this, two normality assessments were conducted: the Kolmogorov-Smirnov test and the Shapiro-Wilk test. These assessments were performed on the pretest and posttest scores of two classes, each containing 35 students. For the pretest scores, Class 1 recorded a Kolmogorov-Smirnov significance level of .200 and a Shapiro-Wilk value of .291, whereas Class 2 had significance levels of .114 (Kolmogorov-Smirnov) and .145 (Shapiro-Wilk). Regarding the posttest scores, Class 1 revealed significance levels of .149 and .116, while Class 2 had values of .123 and .129, respectively. Since all p-values exceeded 0.05, it can be inferred that the data followed a normal distribution. This indicates that the normality assumption was satisfied, enabling the researcher to continue with parametric tests in the subsequent phase of the analysis.

T-test

1. Experimental

Group Statistics					
	Test	N	Mean	Std. Deviation	Std. Error Mean
Experimental	1.00	35	66.14	14.607	2.469
	2.00	35	76.57	10.831	1.831

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Experimental	Equal variances assumed	4.743	.033	-3.393	68	.001	-10.429	3.074	-16.562	-4.295
	Equal variances not assumed			-3.393	62.709	.001	-10.429	3.074	-16.571	-4.286

Explanation: 1. Pre-test

2. Post-test

After weeks of planning, preparation, and teaching, the time had finally come to see whether the intervention used in the experimental group had truly made a difference. The researcher, filled with both excitement and a bit of anxiety, turned to the data collected from the students' pre-test and post-test scores. Like a teacher checking final grades after a long semester, there was hope that the effort invested had paid off.

The focus was on the experimental group, which had received a special learning intervention, different from the traditional method used in the control group. Before any conclusions could be made, the researcher needed to statistically verify whether the changes in student performance were significant or just random variation. To do this, an independent samples t-test was used, comparing the group's pre-test and post-test results.

From the descriptive statistics, the mean score before the intervention (pre-

test) was 66.14 with a standard deviation of 14.607, while the mean score after the intervention (post-test) increased to 76.57, with a lower standard deviation of 10.831. This alone suggested improvement, but to be sure it wasn't due to chance, the researcher moved on to the inferential statistics.

First, Levene's Test for Equality of Variances was conducted. The result showed a significance value of .033, which is below the common threshold of 0.05. This meant that the assumption of equal variances was not met, and therefore the t-test results based on "equal variances not assumed" were the appropriate ones to interpret. Using this row, the t-value was -3.393 with a significance level (2-tailed) of .001, indicating a highly significant difference between the pre- and post-test scores. The mean difference was -10.429, and the 95% confidence interval ranged from -16.571 to -4.286, confirming that the improvement was statistically meaningful.

The results brought relief and satisfaction. The numbers told a clear story: the intervention had a real, measurable impact. Students in the experimental group didn't just learn—they improved significantly. This outcome stood in contrast to the control group, which showed little to no gain. For the researcher, it wasn't just about numbers; it was proof that thoughtful teaching strategies could truly make a difference in student learning.

Control Class

Group Statistics					
	Test	N	Mean	Std. Deviation	Std. Error Mean
Control	1.00	35	65.86	15.410	2.605
	2.00	35	66.14	15.769	2.665

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
								95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Control	Equal variances assumed	.025	.875	-.077	68	.939	-.286	3.727	-7.723	7.151
	Equal variances not assumed			-.077	67.964	.939	-.286	3.727	-7.723	7.151

Explanation: 1. Pre-test
              2. Post-test

The study began by examining the untreated control group, which included 35 participants. When comparing the average scores between the control and experimental groups using a T-test, the results showed no significant difference. The mean difference was very small, only -0.286, and the 95% confidence interval ranged from -7.723 to 7.151. This indicated that the control group maintained consistent conditions without any influence from external factors. In other words, the intervention given to the experimental group initially did not appear to cause a noticeable change. However, the relatively high standard deviations in both groups suggested some variability among individual participants.

To clarify the research expectations, the hypotheses were set as follows: The alternative hypothesis (Ha) proposed that the teaching method applied would have a significant effect on students' grammar achievement. Conversely, the null hypothesis (H0) claimed there would be no significant effect from the teaching method. The researchers then compared the calculated t-values with the critical values from the t-table, using a significance level of 5% and degrees of freedom of 34. The rule was simple: if the t-value exceeded the t-table value, the null hypothesis would be rejected, meaning the teaching method did have a significant effect.

The t-test results provided clear evidence. For the control group's pretest, the t-value was 25.283, with a significance of 0.000. The experimental group's pretest showed a t-value of 26.789, also with a significance of 0.000. Moving to the posttest, the control group recorded a t-value of 24.815, while the experimental group reached an even higher t-value of 41.825, both with the same degrees of freedom and significance levels. Since all significance values were below 0.05 and all t-values exceeded the critical t-table values, the null hypothesis was rejected. This confirmed that the teaching method applied to the experimental group had a significant positive impact on their grammar performance.

Discussion

The findings of the present study highlight the significant impact that the implementation of the Duolingo application in senior high school English classes, that is, in grammar achievement, can bring. The experimental group, which succeeded the utilization of Duolingo, had its grammar scores statistically elevated compared with the control group, which continued conventional instruction. This is proof of the hypothesis that technology-enhanced learning materials in language, especially those with gamified features incorporated, can improve student achievement in mastering grammar.

The experimental group's post-test scores of improvements align with recent research in support of gamification of learning. The format of prompt feedback,

receiving badges for accomplishment, and interactive practice of Duolingo would probably enhance students' motivation and sustain attention. These aspects could have facilitated more motivated and pleasurable practice of grammar and thus better retention and understanding of grammatical components. In addition, the decrease in post-test standard deviation in the experimental group hints at a more uniform performance level among participants, not just implying improvement but also greater fairness in achievement.

Conversely, limited gain by the control group corroborates concerns about the inefficiencies within traditional grammar instruction, which relies heavily on memorization and receptivity. The flat scores in this case substantiates the need to implement more active and student-centered approaches, especially in grammar learning, which most students find challenging and boring.

The results of this research are consistent with earlier research by Azhima & Halim (2024), Fatmawati et al. (2023), and Dian Fadhilawati et al. (2023), which also reported Duolingo's positive effects on learning grammar and vocabulary. Aside from that, while the research focuses on Duolingo, it tracks trends in digital learning tools more broadly, as seen in TikTok-mediated learning explored by Inayah et al. (2024) and Agustina et al. (2024), which also center on gamification and learner agency.

Despite the positive effects, several limitations should be mentioned. The comparatively short duration of the study (four weeks) might not be representative of the long-term impact of time spent on Duolingo. The sample was also taken from a single school only, and thus the results could be less generalizable. Differences between student motivation, initial technology exposure, or teaching support could also influence results and should be considered in future studies.

In conclusion, this study suggests that Duolingo can serve as an effective additional learning tool for senior high school grammar instruction. It boosts motivation, fits the learning speed, and provides measurable academic achievement. Further studies involving higher sample diversity and intervention time would provide further views on Duolingo's long-term educational significance and possible integration modes within different learning settings.

Conclusion

This study examined the effect of the Duolingo application on the grammar achievements of senior high school students. The findings revealed a significant improvement in the grammar scores of students in the experimental group, who used Duolingo, compared to those in the control group, who relied on traditional teaching methods. Statistical analysis confirmed that the improvement in the experimental group was substantial, leading to the acceptance of the alternative hypothesis (Ha) and the rejection of the null hypothesis (H0).

The results indicate that Duolingo's interactive and gamified learning approach enhances students' engagement and comprehension of grammar rules, making the learning experience both enjoyable and effective. This supports the notion that

technology-based learning tools can be valuable supplements to conventional teaching methods. However, limitations such as the short duration of the study and the lack of diversity in the sample suggest a need for further research to explore the long-term effects of Duolingo on grammar proficiency.

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