



Gamified Learning: Evaluating the Impact of Duolingo on Language Retention and Academic Performance in Secondary School Students.

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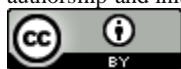
Abstract

The study investigates the relationship between Duolingo usage language learning retention, and academic achievements among high school students. Duolingo, it is known for its user-friendly interface and gamified learning approach, has acquired popularity in the field of language instruction. The major goal of this study is to determine if Duolingo usage improves academic achievement and language retention in secondary school students. This study lasted four months and involved 40 students from SMA Istiqamah Muhammadiyah Samarinda. The collection of data includes Duolingo achievement assessments and questionnaires indicated to assess patterns of Duolingo usage, language retention, and app satisfaction. Statistical analysis, specifically the Pearson correlation coefficient, was employed to assess the level and course of the correlation between Duolingo use and language learning results. The findings indicate a significant positive correlation between the use of Duolingo and the retention of language learning, as well as an improvement in academic achievements. The results suggest that integrating Duolingo into the language learning curriculum is beneficial for students, enhancing both their engagement and learning outcomes. Furthermore, the study highlights the need for further research to explore the specific mechanisms through which Duolingo impacts language learning and to expand the findings to larger and more diverse student populations. This research contributes valuable insights for educators and policymakers seeking to incorporate digital learning tools into language education and underscores the potential of Duolingo as an effective supplementary resource for language learning in secondary schools.

Keywords: Duolingo ; Students ; Language ; Academic

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1. Introduction

English is widely utilized as a global language by a substantial number of individuals across the globe, owing to a multitude of factors. The possession of an ample vocabulary is vital for the successful acquisition and utilization of a second or foreign language (Loewen & Sato, 2017). The lack of an adequate quantity of words poses challenges in effectively utilizing or employing language. In the present-day rapidly evolving educational setting, technology has emerged as an essential means for motivating students to study foreign languages. Duolingo stands out as one of the most widely used platforms for learning languages because it



was made to be easy and fun to learn new languages (Mahbub et al., 2020). This study investigates into the complex connection between Duolingo utilization, language learning maintenance, and language capability among auxiliary school understudies.

Innovation has become a crucial tool for promoting language learning among students. Duolingo is a widely used app designed to make language acquisition accessible and enjoyable, standing out among the many language learning platforms available (Kannan & Munday, 2018) This study explores the complex connection between using Duolingo, retaining language learning, and achieving proficiency in language among high school students. Throughout the last 10 years, Duolingo has acquired quality for its easy-to-use interface, gamified learning approach, and openness across different gadgets (Rofida & Kheider, n.d.) The popularity of using Duolingo among high school students has an impact on how well they learn a new language. As these students face the challenges of becoming proficient in a different language, it becomes important to study how their involvement with Duolingo relates to retaining language skills and ultimately achieving proficiency levels (Loewen & Sato, 2017). Duolingo is an innovative and effective language learning platform. This app will become a popular resource for many people who want to learn languages through interactive and engaging methods (Nushi & Eqbali, 2017). This site provides various language courses ranging from English, Spanish, French, to more exotic languages such as Swahili and Klingon. Users can access structured learning materials, including listening, reading, writing and speaking exercises. Duolingo's main advantage lies in its gamified learning approach, where users earn points and levels when completing tasks and exercises. This application also offers community features that allow users to interact, compete, and support each other in expository learning. With the availability of a portable version, Duolingo makes it easy for users to learn anywhere and at any time, making it a very flexible choice and accessible to various groups. In the context of education, the utilization of media is a deliberate effort aimed at enhancing the quality and supporting the learning process. This approach ensures that students find enjoyment in participating in learning activities. Media proves to be highly beneficial in conveying information and serves to streamline the teaching process. It also facilitates the implementation of object teaching principles and learning illustration, as highlighted by Matra



(2020). Media plays a pivotal role in conveying information from the source to the recipient, as noted by Indrasari et al., (2018)

According to Muzid and Munir (2005), one of the primary benefits of digital learning is the ability for students to repeat courses provided by the teacher at their leisure and from anywhere. This enables a relatively efficient and independent learning experience over the internet (Muzid & Munir, 2005). Digital platforms are an important part of the world of education now. Not only for learning but also for playing, making learning activities interactive, and students become more involved and motivated to explore learning material. Through this digital platform, students can also monitor their learning progress individually, get direct feedback and feel their own achievements. Therefore, the existence of this parliament can increase student motivation, performance and enthusiasm for learning. In this way, digital platforms are not just learning tools, but also transform the learning process into an experience that inspires students to continue developing their knowledge and skills.

In prior study by Anton Adi Purwanto & Syafryadin, (2023) entitled "Students Perception On Using Duolingo For Learning English Vocabulary, The purpose of this study is to describe and monitor students' attitudes toward utilizing Duolingo program for vocabulary at Madrasah Tsanawiyah 01 Darussalam Kepahiang ". This study used qualitative analytic approaches and collected data using tests, questionnaires, and interviews. In this study, the author utilized a non-probability sampling approach, with 25 students from class VIII E chosen as a sample. This survey discovered that the majority of students were encouraged to acquire English vocabulary using the Duolingo program. Students may use the Duolingo app to study English vocabulary in an easy-to-understand format, which increases their interest and excitement in learning new terms.

This research aims to investigate and provide insights into the correlation between Duolingo usage and retention and language proficiency among secondary school students. The central focus revolves around addressing the key question: "Is there a positive relationship between the retention of utilization of Duolingo, leading to an enhancement in language academic achievement for secondary school students?" The research is designed to find out



whether the use of Duolingo positively impacts both the retention and the language academic achievement levels of secondary school students. The findings of the study are anticipated to be a valuable resource for educators and scholars seeking to conduct comparable research on the relationship between Duolingo usage, language learning retention, and academic achievements in secondary school students. This study also aims to offer valuable insights for teachers, learners, and prospective scholars. It provides insights into students' achievements and language retention using Duolingo as a platform to aid student learning. This study will reveal important interaction benefits for students using Duolingo, showing how it can improve language skills, cognitive flexibility, and academic performance in secondary schools. Duolingo, used as an effective educational tool, not only cultivates proficiency in languages but also significantly impacts academic achievement. Teachers may utilize the research findings as pedagogical resources for teaching English, based on their understanding of the relationship between language learning retention and student achievements. This research will also provide valuable insights for future researchers who wish to conduct similar investigations, offering knowledge of the approaches used and incorporating them into future research efforts, thereby encouraging further investigations within this subject matter. In this thesis, the researcher explored the relationship between language learning retention through Duolingo and academic achievement among secondary school students. The investigation focused on the correlation of Duolingo as an online learning tool to enhance language retention. Additionally, the study examined the impact of the Duolingo application as a measuring tool for assessing students' final achievement.

1.1. Literature Review

In the AI development for educational purposes, Schank (1991) emphasized the endeavor to replicate human behavior. The challenge for researchers lies in navigating the complexities of scaling up AI programs to serve practical purposes, marking a transition from mere "toy domains" to concrete applications. Within the educational landscape, the emergence of Intelligent Computer Assisted Language Learning (ICALL) stands as a evidence to the fusion of AI and education (Kannan & Munday, 2018) highlight ICALL as a specialized branch of Computer Assisted Language Learning (CALL), integrating



AI principles, methods, algorithms, and technologies. Notably, this includes Natural Language Processing (NLP), user modeling, expert systems, and intelligent teaching systems.

Researching into the applications of AI in language acquisition, the research focus has predominantly centered on the development of tutoring systems, writing assistants, virtual reality settings, chatbots, and adaptive software, as noted by Pokrivcakova (2019). These technologies aim to revolutionize language learning by offering tailored and adjustable experiences, enhancing individual autonomy, motivation, engagement, and efficacy. The movement from foundational AI concepts to concrete applications in educational settings underscores the pivotal role of AI in transforming traditional paradigms and fostering personalized, effective learning experiences.

Duolingo is an online learning platform that uses artificial intelligence (AI) to enhance its features and improve the learning experience for its users (Bicknell et al., 2023). The platform has introduced a subscription tier called “Called Max” which includes two new AI-powered features: Explain my answer allows learners to receive explanations for their answer lessons, while roleplay lets them practice real world conversation skills with AI characters. Duolingo has also integrated AI into its placement test to determine the starting knowledge of each user to determine the starting knowledge of each user for the language they want to learn. Additionally, the company uses AI to personalize language lessons and analyze user data to improve the learning experience.

Duolingo is an application that utilizes artificial intelligence (AI) to improve language learning. Here are some interesting ways in which Duolingo incorporates AI into its platform according to Bicknell et al. (2023) One of them is called Duolingo Max. This premium subscription level, powered by GPT-4 (the latest technology from OpenAI), introduces two exciting features, namely Explain My Answer and Roleplay. These features enhance the learning process by offering personalized explanations for both correct and incorrect responses, as well as allowing learners to practice conversational skills with AI-driven characters.

Second, the AI incorporated in Duolingo is AI for Grammar and Pronunciation. Duolingo employs AI to analyze user answers, detect common grammar errors, and provide corrections and suggestions. It also evaluates speech patterns to offer specific feedback on



pronunciation. Duolingo's mission as a startup is to make language learning fun and accessible. AI plays a vital role in achieving this objective by enriching the learner experience. Third, Duolingo integrates AI and machine learning into various features such as Stories, Smart Tips, podcasts, reports, and notifications. In essence, Duolingo's innovative utilization of AI enhances language learning by making it more engaging, efficient, and accessible for learners worldwide (Bicknell et al., 2023).

Duolingo, a mobile app catering to both English and non-English speakers, offers a multifaceted language learning experience encompassing activities that span vocabulary acquisition, translation, pronunciation, and dictation, each connected to the four main language skills. (Amán Balseca, 2020) underscores the significance of Duolingo's lessons, the focal point of its language learning approach, organized into small sets known as skills and presented through a top-down training structure termed the skills tree.

One fundamental aspect of language learning, as emphasized by Cheng and Chen, (2018) is vocabulary. It encompasses words known to an individual within a specific language and extends to a curated list of terms and phrases related to a specific subject. This organized compilation plays a pivotal role in shaping an individual's speaking, listening, reading, and writing abilities. Duolingo, recognizing the paramount importance of vocabulary, becomes a valuable tool for secondary school students seeking to enhance these language skills. The interplay between vocabulary and communication skills is highlighted by Santaso (2014), who notes that an individual's lexicon significantly influences their ability to effectively communicate in a language. Duolingo, with its focus on vocabulary-building activities, becomes a catalyst for improving not only the use of language but also the expansion of one's vocabulary. The global impact of Duolingo is noteworthy, as (Maria & Alicia, 2022) points out that it stands as the most downloaded platform for language learning, engaging over a million users worldwide. Within the Duolingo ecosystem, reviews, activities, and stories form integral components, contributing to its widespread popularity and effectiveness in facilitating language acquisition across diverse linguistic landscape.

In (Savira, 2020) study, titled "The Use of Duolingo Application to Enhance Junior High School Student's English Vocabulary," the researcher investigated the impact of



Duolingo on English vocabulary acquisition among 17 grade 7 students in a middle school. Employing a semi-experimental research design with pre-test and post-test assessments, the findings revealed a statistically significant positive effect. The calculated significance level (p-value) from the experimental post-test scores was .000, indicating a substantial difference in the experimental group after receiving the treatment, with a significance level lower than .05. Moreover, the experimental group achieved a higher average post-test score of 87.94 compared to the control group's 75.52. In summary, Savira concluded that Duolingo, as a gamified language learning app, can effectively enhance seventh-grade students' vocabulary skills. However, it is crucial to note that the study's limitation lies in its exclusive focus on vocabulary learning, lacking an exploration of the correlation between Duolingo usage and students' language proficiency.

In a prior study conducted by (Purwanto, 2023), which Investigated the effectiveness of Duolingo in English vocabulary learning, through quantitative research methods, positive outcomes were observed. The research utilized two distinct groups, namely the experimental group and the treatment group, to collect data. The findings demonstrated a significant positive impact of Duolingo on vocabulary learning at Madrasah Aliyah Skn. The Test of Homogeneity indicated a significance value of 0.736, which was higher than the threshold of 0.05. The independent samples T-test further supported these results, revealing a significance value of 0.035, which is below the 0.05 threshold. It is essential to note a limitation in the study; the research specifically focused on vocabulary practice facilitated by the Duolingo application.

Moreover, a study conducted by (Su & Zou, 2022), titled "Learning English with The Mobile Language Learning Application 'Duolingo': The Experiences Of Three Working Adults At Different Proficiency Levels," employed qualitative research methods involving interviews. While many studies have predominantly investigated working adults, this particular study investigated into the experiences of three Chinese working individuals who, having already graduated from college, continued their English language learning journey for various reasons. These participants, classified as basic, intermediate, and advanced level students, engaged with Duolingo for a month to enhance their English proficiency. Throughout this period, they documented their learning experiences using think-aloud procedures and



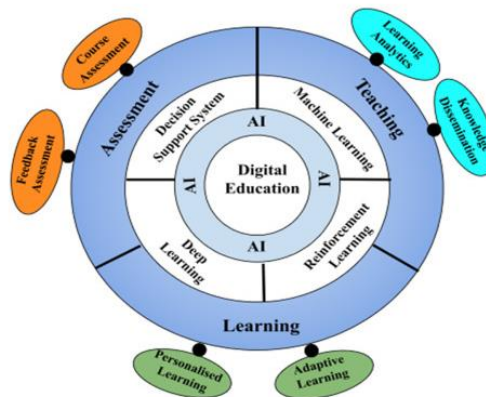
reflective learning journals, followed by comprehensive interviews. The study's findings revealed that basic-level learners employed a more varied array of methods compared to their intermediate- and advanced-level counterparts, contributing valuable insights to the existing literature. Impressively, all three participants expressed positive sentiments about Duolingo, progressing to higher course levels after just one month of study, suggesting that language learners should consider incorporating Duolingo into their self-access language learning endeavors. However, it is crucial to acknowledge a limitation in the study: it primarily focused on language learning and did not provide an in-depth explanation of the data collection process.

The study conducted by (Jašková, 2014) is titled "Duolingo As A New Language Learning Website and Its Contribution To E-Learning Education." This thesis primarily focuses on the new language learning portal Duolingo, offering free online language learning. It is divided into two main parts – theoretical and practical. The research employs a survey with questionnaires, each comprising 15 questions. Fourteen of these questions are closed, providing choices for answers, while the final question is open-ended. The questionnaire is gently divided into three sections: the first addresses language learning in general, the second covers e-learning, and the third explores Duolingo. Three hundred people received the questionnaires without any restrictions, and 118 of them cooperated and completed them. The results of the thesis present future projections for Duolingo in terms of translation and educational systems. It is essential to note a limitation in the study that the research does not explain the relationship between using Duolingo and student achievement.

A number prior studies have explored the utilization of the Duolingo application to enhance the English vocabulary of junior high school students. These investigations have delved into the effectiveness of Duolingo in English vocabulary learning, examined the experiences of three working adults at various proficiency levels as they learn English through the mobile language learning application 'Duolingo,' and assessed Duolingo as a new language learning website and its contribution to e-learning education. To further contribute to this body of research, our study aims to elucidate the relationship between Duolingo usage language learning retention and academic achievements in secondary school students. This investigation will specifically focus on students at SMA Istiqamah Muhammadiyah Samarinda.



Role of AI in education. AI, Artificial intelligence (Martinengo et al., 2020)



The researcher uses the role model above in this research because Duolingo is an AI-based online learning media and has assessments to refer to improving students English learning at SMA Istiqamah Muhammadiyah Samarinda.

2. Method

Correlation, commonly known as correlational research, serves as a valuable method for discerning the relationships and degrees of association between multiple variables. This research approach is characterized by its intent to unveil connections without manipulating the variables, thus avoiding intentional influence or control over their existence (Frankel & Wellen, 2008). While correlation is often perceived simply as an indicator of a relationship (Dean & Dunsmuir, 2016), its interpretation extends beyond this fundamental understanding. It functions as a statistical data analysis technique utilized to both identify and quantify the association between two or more quantitative variables. Variables are considered correlated when changes in one variable consistently coincide with corresponding changes in another, either in the same direction (positive correlation) or in the opposite direction (negative correlation). In the context of this study, the researcher employed correlation analysis, focusing on investigating the correlation between the use of Duolingo for language learning retention and language retention among students at SMA Istiqamah Muhammadiyah Samarinda. This analytical approach aims to provide insights into the potential relationship between Duolingo usage and language learning retention within the specified educational



setting.

2.1. Sample/Participants

The Population in this study was 50 student of SMA Istiqamah Muhammadiyah Samarinda . The sample in this study comprised 40 secondary school students who were first grade at SMA Istiqamah Muhammadiyah Samarinda. The selection criteria encompassed students who had engaged with the Duolingo language learning platform and demonstrated a willingness to participate in the experiment. These criteria were established to ensure that the participants had a genuine and active interest in utilizing the Duolingo platform for language learning. The chosen students were those who not only had experience with the platform but also expressed eagerness to be part of the research endeavor.

2.1.1 Instruments

This study seeks to investigate the correlation between learning retention through the use of Duolingo and academic achievements. To accomplish this objective, a comprehensive questionnaire, titled "Duolingo Usage and English Language Learning," has been adapted from Mahmudah (2015) and modified slightly to achieve research objectives on whether there is a positive relationship between the retention of utilization of Duolingo, leading to an enhancement in language academic achievement for secondary school students. This survey is structured to gather information and assess the levels of activity and engagement of students while utilizing Duolingo. For the Questionnaire and Involved Achievement can be access in appendix.

In the assessment of student academic achievement, this study employed a simulated exam tool consisting of questions extracted from the Duolingo program. The selected questions were meticulously crafted to gauge the correlation between the use of Duolingo and the development of language skills among Muhammadiyah High School students. Over the two- month experimental period, the Duolingo language learning platform served as the primary material, ensuring participants had continuous access to the resource. In tandem with this immersive learning experience, Involved Achievement, designed as language proficiency assessments, were administered to measure and analyze the outcomes of the experimental



intervention. This comprehensive approach sought to illuminate the effectiveness of Duolingo in enhancing language proficiency among the participating students.

2.1.2 Data collection process

The data collection process took place at SMA Istiqamah Muhammadiyah Samarinda. Data collection involved achievement test developed by Duolingo and questionnaires administered to students. Involved Achievement comprised questions adapted from the Duolingo application as many as 10 questions, covering three skills: writing, reading, and speaking. These tests aimed to assess students' proficiency after utilizing Duolingo. Additionally, questionnaires were distributed to students upon completing their Duolingo learning sessions to measure their language proficiency and explore the relationship between Duolingo usage and language learning. The questionnaires were facilitated through the Google Forms platform, encompassing four sections: 1) demographic information, 2) Duolingo usage patterns, 3) learning retention, and 4) satisfaction. The data collection spanned a period of 2 months in a class X with a total 40 student.

2.1.2.1 Data analysis

In analyzing the relationship between Duolingo usage, language learning retention, and academic achievements in secondary school students, the chosen statistical analysis would likely involve correlation analysis. Specifically, the study may employ the Pearson correlation coefficient (r) to quantify the strength and direction of the linear relationship between the variables under investigation. The Pearson correlation coefficient is suitable for assessing the extent to which the utilization of Duolingo correlates with language learning retention and subsequently influences academic achievements. A positive correlation coefficient (closer to +1) would indicate a positive linear relationship, suggesting that increased Duolingo usage is associated with improved language learning retention and, potentially, enhanced academic performance. On the other hand, a negative correlation coefficient (closer to -1) would suggest a negative linear relationship. The analysis would provide valuable insights into the interplay between Duolingo usage, language learning retention, and academic achievements in the context of secondary school students.



2.1.3 Correlation analysis

Correlation analysis determines the strength and direction of a between two variables. Product Moment Correlation Analysis Technique Pearson is a parametric statistical approach that use interval data to fulfill specific requirements (Sugiyono, 2016). The researched used the categories in classifying the correlation which is submitted by Sugiyono (2016) The level of correlation strength is measured based on the correlation coefficient interpretation table, as follows:

Table 1 Coefficient Correlation Interpretation

Interval	Category
0.00 – 0.199	Very Low
0.20 – 0.399	Low
0.40 – 0.599	Moderate
0.60 – 0.7999	Strong
0.80 – 1.000	Very Strong

3. Findings and Discussion

The central focus revolves around addressing the key question: "Is there a positive relationship between the retention of utilization of Duolingo, leading to an enhancement in language academic achievement for secondary school students?" The research is designed to find out whether the use of Duolingo retention and academic achievements levels of secondary school students.

Before finding that Duolingo has a positive effect on student learning, a data comparison will be performed before and after the Duolingo test, followed by a data normality test and a data correlation test to determine whether the data is significant.

Below is the percentage comparison of students' scores between answering the test and the Duolingo questionnaire to an enhancement in language academic achievement for secondary school.



Table 2 Score of student Achievement and Language Retention

No	English Score	Duolingo Usage Retention
1.	83	71
2.	80	68
3.	90	86
4.	78	68
5.	88	75
6.	85	71
7.	76	61
8.	86	71
9.	89	79
10.	89	79
11.	78	64
12.	85	71
13.	86	75
14.	89	75
15.	94	89
16.	73	50
17.	78	68
18.	92	89
19.	89	86
20.	76	64
21.	76	61
22.	85	71
23.	95	89
24.	90	86
25.	86	75
26.	88	75
27.	82	71
28.	75	57
29.	78	64
30.	92	88
31.	90	89
32.	89	72
33.	71	50
34.	78	67
35.	96	88
36.	88	71
37.	66	56
38.	71	45
39.	95	88
40.	72	60



After the data is collected, the researcher continued with the data normalization process which is carried out using the Shapiro-Wilk method. To determine data normality, the researcher used the Shapiro-Wilk test To assess normally distributed data.

Table 3 Test of The Normality Between English Score and Duolingo Usage Score

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
English_Score	.143	40	.037	.952	40	.092
Duolingo	.130	40	.088	.946	40	.054

a. Lilliefors Significance Correction

Based on the normality test results displayed in the SPSS table, analysis was performed to test the data distribution of the variables English score and Duolingo usage in the context of the research. The normality test was conducted using two statistical methods: Kolmogorov-Smirnov and Shapiro-Wilk. In this study, the Shapiro-Wilk normality test was used to examine if the distribution of data for English scores (English_Score) and Duolingo usage followed the assumption of normal distribution. The Shapiro-Wilk test was selected while it is sensitive to small sample sizes. The Shapiro-Wilk test for English scores (English_Score) produced a statistic of 0.952 and a significance level (p-value) of 0.092. Because the p-value is larger than 0.05, we cannot reject the null hypothesis, which claims that the data is normally distributed. Thus, based on this exam, English results can be considered frequently distributed. The Shapiro-Wilk test the results for Duolingo utilize was 0.946 with a p-value of 0.054. Similarly, since this p-value is larger than 0.05, we cannot reject the null hypothesis, indicating that the Duolingo use data is similarly frequently distributed. Overall, the Shapiro-Wilk test results show both data sets—English scores and Duolingo usage have a normal distribution. However, it is important to note that the English scores are near the significance value of 0.05. This is important for subsequent research that rely on the assumption of data normality.



Table 4. The Pearson Correlation Between English Score and Duolingo Usage Score

Correlations			
		English_Score	Duolingo
English_Score	Pearson Correlation	1	.933**
	Sig. (2-tailed)		.000
	N	40	40
Duolingo	Pearson Correlation	.933**	1
	Sig. (2-tailed)	.000	
	N	40	40

** . Correlation is significant at the 0.01 level (2-tailed).

Based on the data in the table, an analysis of the relationship between student English scores and Duolingo usage provided significant results. The impact of gamified learning utilizing the Duolingo app on language retention and academic performance in secondary school students was evaluated. One of the analyses conducted was to figure out the correlation between students' English scores (English_Score) and their usage of the Duolingo application. The Pearson correlation value for English_Score and Duolingo use was 0.933, showing a very high correlation between the two variables. The significance level (Sig. 2-tailed) was 0.000, which is less than 0.01, indicating that this association is statistically significant. With a sample size of 40, the results show the more frequently students used the Duolingo application, the higher their English scores were. The strong connect indicates that gamified learning through applications like Duolingo can have a positive

The findings show that there is a positive correlation between constant Duolingo usage and language retention, with students who use it on a regular basis retaining more vocabulary and grammar structures. This shows that Duolingo's utilized method encourages learning and improves long-term memory. Statistical analysis using Pearson correlation coefficients showed that Duolingo use positively affected language learning retention and students' academic achievement. This is also consistent with previous research that found using games, can significantly improve students' English vocabulary by increasing their mean scores (Putra Perkasa & Nur, 2020)



This study presents proof on the usefulness of Duolingo in formal education at the high school level, specifically in Indonesia. Recent research by (Purwanto, 2023) found that utilizing Duolingo helped students at Madrasah Tsanawiyah 01 Darussalam Kepahiang acquire English vocabulary more effectively. These findings are consistent with those from this research, which found that using Duolingo increased language learning retention. However, Syafryadin and Purwato's study centered on student views, whereas this study investigates the identified relationship between Duolingo use and achievement in school.

Another research, (Pokrivcakova, 2019) highlights the utilization of AI in language learning, specifically Intelligent Computer Assisted Language Learning (ICALL). Duolingo's use of artificial intelligence to personalize learning experiences supports up Pokrivcakova's claim that AI may significantly enhance motivation, engagement, and language learning effectiveness. Bicknell et al. (2023) described Duolingo's AI-powered features as "Explain My Answer" and "Roleplay" in their "Called Max" participation tier, which customize and improve the learning skills. Our study's findings, which show improved academic performance and language retention although using Duolingo, validate Bicknell et al.'s insights into the benefits of AI integration in language learning.

(Martinengo et al., 2020) highlighted the importance of a structured, gamified learning approach, which Duolingo provides. This study recognizes the same critical factors for student engagement and retention, echoing Mehtala's emphasis on the effectiveness of structured language learning platforms. (Savira, 2020) discovered that Duolingo was successful in increasing English vocabulary among junior high school students. Savira studies revealed a significant improve in test scores following the Duolingo intervention. Cheng and Chen, (2018) focused on the importance of vocabulary in language proficiency. Duolingo's emphasis on vocabulary-building supports their conclusion that a strong vocabulary foundation enhances language proficiency and academic success. The positive correlation between Duolingo usage and academic achievements found in this study aligns with their findings. While (Jašková, 2014) provided a broad overview of Duolingo's potential in e-learning, this study adds concrete evidence of its impact on academic achievement, contributing valuable insights for educators



and policymakers. By integrating Duolingo into the curriculum, schools can leverage digital tools to foster better learning outcomes and greater student engagement.

This study backs up previous findings by demonstrating that Duolingo use improves academic achievement, not only vocabulary factors. (Su & Zou, 2022) study of the learning experiences of three working individuals with different levels of English ability on Duolingo discovered that all participants improved after one month of studying. Although the emphasis of this study is on high school students, the positive findings are consistent with data that show the benefits of using Duolingo in a variety of learning environments. This study improves our understanding of Duolingo's effectiveness as a language learning helps in the high school setting, indicating that this technology can improve language learning retention and academic performance. These findings are useful for teachers, curriculum creators, and academics seeking novel strategies to improve student learning outcomes.

4. Conclusion

This study investigates the relationship between Duolingo usage, language learning retention, and student achievement among secondary school students. Using a quantitative approach with a correlational design, the researcher focused on class X students at SMA Istiqamah Muhammadiyah, selecting twenty-nine participants through sampling techniques. The analysis revealed a significant positive correlation, with a relevance level of 0.945, less than the alpha value of 0.05. This strong correlation indicates that consistent use of Duolingo is closely linked to higher rates of language retention and academic achievement. The findings support the hypothesis that incorporating digital tools like Duolingo into the school curriculum can enhance student performance, contributing to the growing evidence that gamified learning platforms can improve educational outcomes, particularly in language learning. Future research should explore the specific mechanisms by which Duolingo enhances learning and whether these findings can be generalized to higher or different groups of learners. The study underscores the potential positive impact of integrating technology-based teaching tools into formal education to improve student achievement and retention in language learning.

For Teacher Incorporating technology into the curriculum is highly recommended, as Duolingo usage shows a substantial positive correlation with language learning retention and



achievement among students. Teachers can enhance conventional learning methods by using Duolingo to provide a motivational and interactive language learning platform. Teacher training is essential to fully utilize Duolingo's potential, focusing on evaluating student progress, integrating Duolingo's material with the school curriculum, and encouraging consistent application use.

Next, for Students using Duolingo has been shown to significantly enhance language retention and academic performance. Students are encouraged to set specific goals within the app, such as completing a certain number of lessons each week, to maintain motivation and track progress. Integrating Duolingo's vocabulary and grammar exercises with classroom learning can reinforce language skills, while participating in Duolingo's interactive features, like challenges and community events, can boost engagement and provide practical language usage opportunities. These strategies can help students effectively improve their language proficiency and academic achievements over time.

Also, further research is needed to understand the specific methods contributing to Duolingo's success. Future studies may investigate Duolingo's impact on particular aspects of language learning, such as vocabulary acquisition, speaking abilities, and listening comprehension. Additionally, research could be expanded to larger populations or different learning groups to evaluate the generalizability of these findings.

Crucially, collaboration between educational institutions and application developers holds immense potential. Such partnerships could facilitate the adaptation of Duolingo's learning materials to the specific needs of students across various educational levels. This could involve aligning content with national or international education standards and developing specialized modules for targeted learning goals. By implementing these suggestions, secondary schools can significantly enhance language learning experiences and maximize the benefits technology offers in education.



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