Similarity Report

Metadata

Name of the organization

Universitas Muhammadiyah Sidoarjo

Title

Hyan_057_postsemhas (1)
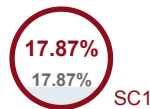
Coordinator

Author(s)**pbi**

Organizational unit

FPIP

Record of similarities

SCs indicate the percentage of the number of words found in other texts compared to the total number of words in the analysed document. Please note that high coefficient values do not automatically mean plagiarism. The report must be analyzed by an authorized person.

17.87%
17.87%
SC1

3996
Length in words

27385
Length in characters

Alerts

In this section, you can find information regarding text modifications that may aim at temper with the analysis results. Invisible to the person evaluating the content of the document on a printout or in a file, they influence the phrases compared during text analysis (by causing intended misspellings) to conceal borrowings as well as to falsify values in the Similarity Report. It should be assessed whether the modifications are intentional or not.

Characters from another alphabet	ß	0
Spreads	A→	0
Micro spaces	⸱	3
Hidden characters	ß	0
Paraphrases (SmartMarks)	a	53

Active lists of similarities

This list of sources below contains sources from various databases. The color of the text indicates in which source it was found. These sources and Similarity Coefficient values do not reflect direct plagiarism. It is necessary to open each source, analyze the content and correctness of the source crediting.

The 10 longest fragments

Color of the text

NO	TITLE OR SOURCE URL (DATABASE)	NUMBER OF IDENTICAL WORDS (FRAGMENTS)	
1	https://ijccd.umsida.ac.id/index.php/ijccd/article/view/1147	36	0.90 %
2	https://journal.uniku.ac.id/index.php/ERJEE/article/download/9120/4000/0	30	0.75 %
3	https://journal.lppmunindra.ac.id/index.php/SCOPE/article/view/21775	28	0.70 %
4	https://etheses.iainkediri.ac.id/5132/8/932508318_daftarpustaka.pdf	25	0.63 %

NO	TITLE	NUMBER OF IDENTICAL WORDS (FRAGMENTS)	
5	Digital storytelling: pre-service English teachers' experiences, difficulties and solutions Munir Ahmad,Nuroh Ermawati Zulikhatin, Pratiwi Retnaningdyah;	25	0.63 %
6	https://pubmed.ncbi.nlm.nih.gov/36687912/	25	0.63 %
7	https://www.elitejournal.org/index.php/ELITE/article/download/77/50/	24	0.60 %
8	https://journal.lppmunindra.ac.id/index.php/SCOPE/article/view/21775	22	0.55 %
9	https://journal.ikipsiliwangi.ac.id/index.php/project/article/view/12273	22	0.55 %
10	https://clt.kku.edu.sa/sites/clt.kku.edu.sa/files/inline-files/C2Research-Project_Student%204_May%20bint%20Mohammed%20bin%20Abdullah%20bin%20Mohammed%20Al-Ruwaih.pdf	21	0.53 %

from RefBooks database (3.20 %)

NO	TITLE	NUMBER OF IDENTICAL WORDS (FRAGMENTS)	
Source: Paperity			
1	Using Circle Game to Improve Students' Vocabulary Mastery of the Eighth Grade Students Usman Sriati,Ferayanti, Aminah, Mashuri;	26 (3)	0.65 %
2	Digital storytelling: pre-service English teachers' experiences, difficulties and solutions Munir Ahmad,Nuroh Ermawati Zulikhatin, Pratiwi Retnaningdyah;	**25 (1)**	**0.63 %**
3	The Effect Of Duolingo Application Toward Students Listening Achievement Of Seventh Grade Students At SMP Negeri 1 Pasaributobing Manalu Axnes Monica, Simarmata Rina Octavia,Sahlan Tampubolon;	20 (1)	0.50 %
4	Developing Mobile-Assisted Language Learning (MALL) Materials for ESL Learners Eko Sanjaya;	17 (1)	0.43 %
5	Development of a Virtual Laboratory for Bacterial Culture as a Biology Learning Media Fahmi Wahyunisa Maulia,Lopiani Salmanera Senja, Wardhani Irma Yuniar, Muzakki Muhammad Naufal, Fikri Achmad Ali;	13 (1)	0.33 %
6	Using Duolingo in Teaching and Learning Vocabulary: A Systematic Review Ridha Rouabhia, Kheder Khalefa;	12 (2)	0.30 %
7	The Effect of Using Duolingo Application on Students' English Learning Motivation and Vocabulary Enrichment : An Experimental Research at SMKN 1 Padang Sitti Fatimah,Vinni Nasrul;	7 (1)	0.18 %
Source: Paperity - abstrakty			
1	DAMPAK PANDEMI COVID-19 TERHADAP KINERJA BANK SYARIAH DI NEGARA ASEAN Eka Putri Widya Rizki;	8 (1)	0.20 %

from the home database (0.00 %)

NO	TITLE	NUMBER OF IDENTICAL WORDS (FRAGMENTS)

from the Database Exchange Program (0.48 %)

NO	TITLE	NUMBER OF IDENTICAL WORDS (FRAGMENTS)	
1	Strategies and Tools of learning English vocabulary in secondary school ███ 5/15/2025 Korkyt Ata Kyzylorda State University (Korkyt Ata Kyzylorda University)	19 (3)	0.48 %

from the Internet (14.19 %)

NO	SOURCE URL	NUMBER OF IDENTICAL WORDS (FRAGMENTS)
1	**https://journal.lppmunindra.ac.id/index.php/SCOPE/article/view/21775**	**95 (5) 2.38 %**
2	https://ijsmsjournal.org/2023/volume-6%20issue-5/ijsms-v6i5p113.pdf	50 (5) 1.25 %
3	https://ejournal-fkip.unisi.ac.id/eji/article/view/2767	43 (4) 1.08 %
4	**https://ijccd.umsida.ac.id/index.php/ijccd/article/view/1147**	**36 (1) 0.90 %**
5	https://clt.kku.edu.sa/sites/clt.kku.edu.sa/files/inline-files/C2Research-Project_Student%204_May%20bint%20Mohammed%20bin%20Abdullah%20bin%20Mohammed%20Al-Ruwaih.pdf	35 (3) 0.88 %
6	**https://journal.uniku.ac.id/index.php/ERJEE/article/download/9120/4000/0**	**30 (1) 0.75 %**
7	**https://pubmed.ncbi.nlm.nih.gov/36687912/**	**25 (1) 0.63 %**
8	**https://etheses.iainkediri.ac.id/5132/8/932508318_daftarpustaka.pdf**	**25 (1) 0.63 %**
9	http://etheses.uin-malang.ac.id/78993/1/210107110042.pdf	24 (4) 0.60 %
10	https://www.elitejournal.org/index.php/ELITE/article/download/77/50/	24 (1) 0.60 %
11	http://vjes.edu.vn/sites/default/files/vjes_-_vol_20_-_is_03_-49-61.pdf	23 (4) 0.58 %
12	https://journal.ikipsiliwangi.ac.id/index.php/project/article/view/12273	22 (1) 0.55 %
13	https://pdfs.semanticscholar.org/2236/87b32d33a4c1fc4509e6979919c777fc90a9.pdf	21 (2) 0.53 %
14	https://archive.umsida.ac.id/index.php/archive/preprint/download/2831/21668/24243	20 (1) 0.50 %
15	https://journal.unismuh.ac.id/index.php/exposure/article/view/6452	19 (1) 0.48 %
16	https://etheses.iainkediri.ac.id/13712/7/932209320_daftarpustaka.pdf	19 (1) 0.48 %
17	https://www.ajol.info/index.php/ejhm/article/view/273812/258501	18 (2) 0.45 %
18	http://repositori.uin-alauddin.ac.id/27849/1/Andi%20Azizah%20Ade%20Zhuhrani%20-%20%2020400117055.pdf	12 (2) 0.30 %
19	http://repository.usd.ac.id/41577/1/171324026.pdf	10 (1) 0.25 %
20	https://jtls.shirazu.ac.ir/article_412_3ff92424e54a9bc14d442f961e6285dd.pdf	9 (1) 0.23 %
21	https://www.scitepress.org/Papers/2019/91045/91045.pdf	7 (1) 0.18 %

List of accepted fragments (no accepted fragments)

NO	CONTENTS	NUMBER OF IDENTICAL WORDS (FRAGMENTS)

The Effect of Using Duolingo App on Vocabulary Learning among Seventh-Grade Junior High School

Pengaruh penggunaan Aplikasi Duolingo terhadap Pembelajaran Kosakata Siswa Sekolah Menengah Pertama Kelas VII

Hyan Siswanto1), Yuli Astutik 2) 1) Program Studi Pendidikan Bahasa Inggris, Universitas Muhammadiyah Sidoarjo, Indonesia 2) Program Studi Pendidikan Bahasa Inggris, Universitas Muhammadiyah Sidoarjo, Indonesia Email Penulis Korespondensi: yuliastutik@ umsida.ac.id

Abstract.

Vocabulary acquisition plays a central role in English language learning, especially for junior high school students who are developing foundational language skills. However, traditional vocabulary teaching methods-such as rote memorization and textbook-based instruction often fail to foster long-term retention or learner motivation. In response to these challenges, digital applications have emerged as promising tools in language education. Among them, Duolingo has gained global recognition for its gamified, interactive features that support vocabulary development. Despite its popularity, the integration of Duolingo into formal classroom settings in Indonesia remains limited, and empirical evidence on its effectiveness in secondary education is still underexplored. **This** study aimed to examine the **effectiveness of the Duolingo application in improving vocabulary mastery** among seventh-grade students at SMP Muhammadiyah 8 Tanggulangin. Employing a pre-experimental one-group **pre-test and post-test** design, the research involved 23 purposively selected students with low initial vocabulary proficiency. The intervention consisted of a one-week Duolingo-based treatment following a baseline assessment, with a post-test conducted in the third week. Quantitative data were analyzed using descriptive statistics and paired-sample t-tests. The findings revealed a significant improvement in students' vocabulary scores, with mean values increasing from 55.87 (pre-test) to 82.61 (post-test), and a p-value of 0.000. This result demonstrates that Duolingo has a positive and statistically significant impact on vocabulary acquisition. The application's gamified elements, repetitive practice, and user-friendly interface likely contributed to increased engagement and learning outcomes. The study contributes to the body of knowledge on Mobile-Assisted Language Learning (MALL) by providing context-specific evidence from an Indonesian junior high school. It highlights the potential of Duolingo as a supplementary vocabulary-learning tool and encourages educators to consider integrating digital applications into classroom instruction to enhance learner autonomy and motivation.

Keywords - Duolingo, Vocabulary, Gamified Learning, Junior High School, Mobile-Assisted Language Learning

Abstrak.
Perolehan kosakata memegang peranan penting dalam pembelajaran bahasa Inggris, khususnya bagi siswa sekolah menengah pertama yang tengah membangun keterampilan dasar berbahasa. Namun demikian, metode pengajaran kosakata konvensional-seperti hafalan semata dan pendekatan berbasis buku teks-sering kali kurang efektif dalam mendorong retensi jangka panjang serta motivasi belajar peserta didik. Seiring dengan perkembangan teknologi, aplikasi digital mulai dimanfaatkan sebagai alat bantu yang menjanjikan dalam pendidikan bahasa. Salah satu aplikasi yang memperoleh pengakuan secara global adalah Duolingo, yang menawarkan fitur-fitur gamifikasi dan interaktif untuk mendukung penguasaan kosakata. Meski demikian, pemanfaatan Duolingo dalam konteks pembelajaran formal di Indonesia masih terbatas, dan bukti empiris terkait efektivitasnya pada jenjang pendidikan menengah belum banyak dieksplorasi. Penelitian ini bertujuan untuk mengkaji efektivitas penggunaan aplikasi Duolingo dalam meningkatkan penguasaan kosakata siswa kelas VII di SMP Muhammadiyah 8 Tanggulangin. Metode yang digunakan adalah pre-experimental design dengan model one-group pre-test and post-test. Subjek penelitian terdiri atas 23 siswa yang dipilih secara purposif dengan mempertimbangkan tingkat penguasaan kosakata awal yang tergolong rendah. Perlakuan dilakukan selama satu minggu dengan menggunakan aplikasi Duolingo setelah pelaksanaan pre-test, dan diikuti dengan post-test pada minggu ketiga. Data kuantitatif dianalisis menggunakan statistik deskriptif dan **uji paired-sample t-test. Hasil** analisis menunjukkan adanya peningkatan yang signifikan pada skor penguasaan kosakata peserta didik, dengan rata-rata nilai pre-test sebesar 55,87 dan post-test sebesar 82,61. Nilai signifikansi (p-value) yang diperoleh adalah 0,000, yang menunjukkan adanya pengaruh yang positif dan signifikan secara statistik dari penggunaan Duolingo terhadap peningkatan penguasaan kosakata. Fitur gamifikasi, latihan berulang, serta antarmuka yang mudah digunakan diperkirakan turut mendukung keterlibatan siswa dalam pembelajaran dan pencapaian hasil yang lebih baik. Penelitian ini memberikan kontribusi terhadap literatur Mobile-Assisted Language Learning (MALL) dengan menyajikan bukti empiris yang relevan dalam konteks sekolah menengah pertama di Indonesia. Temuan ini menunjukkan bahwa Duolingo berpotensi menjadi alat pembelajaran kosakata yang efektif dan dapat dijadikan sebagai pendukung dalam proses pembelajaran di kelas. Oleh karena itu, para pendidik disarankan untuk mempertimbangkan pemanfaatan aplikasi digital dalam pembelajaran guna meningkatkan kemandirian dan motivasi belajar siswa secara berkelanjutan

Kata kunci- Duolingo, Kosakata, Pembelajaran Gamifikasi, Pembelajaran Bahasa berbasis Mobile

1. Introduction
The rapid development of technology has significantly transformed the educational landscape, offering more effective and engaging ways for students to learn. In the realm of English language learning, vocabulary acquisition is one of the fundamental building blocks of language proficiency. Developing a strong vocabulary is essential for mastering a second language, as it enables learners to understand and use language effectively in various contexts [1].
1. Despite its centrality in language development, vocabulary learning remains a challenge for many students, especially in non-native English environments like Indonesia. In traditional classroom settings, vocabulary instruction often relies on memorization techniques using word lists, flashcards, or teacher-centered explanations. While such methods may be effective for short-term retention, they tend to lack contextualization, interactivity, and student engagementfactors that are essential for deep, long-lasting learning. These conventional approaches can also become monotonous, leading to low motivation, especially among young learners.
2. To address vocabulary learning challenges, digital tools have been increasingly integrated into educational settings. Smartphones, learning management systems (LMS), and mobile apps provide teachers with various resources to enhance student participation and improve learning outcomes [2][3][4]. In particular, the use of interactive learning media **plays a vital role in supporting** language skills such as speaking, reading, listening, and writing in **Mobile-Assisted Language Learning (MALL) has** become a growing field that leverages portable technologies to provide language learners with authentic, contextual, and autonomous learning experiences [5][6][7].
3. One widely used application in this context is Duolingo, a globally recognized language-learning platform that offers vocabulary, grammar, listening, and speaking practice through gamified activities. Duolingo's structured lesson system, point-based rewards, and adaptive algorithms make learning more dynamic and personalized. With its gamification features and multimedia integration, Duolingo fosters an interactive environment where students can learn independently and at their own pace. Studies have highlighted Duolingo's potential to improve vocabulary acquisition and enhance students' motivation to learn [8][9][10][11][12].
4. However, despite its growing popularity, many schools in Indonesia including SMP 8 Tanggulangin and similar institutions have not yet systematically integrated Duolingo or other MALL platforms into their English language curriculum, This indicates a persistent gap between the availability of educational technology and its pedagogical application in school-based instruction. Several factors may contribute to this, such as the lack of infrastructure, limited digital literacy among teachers, and the absence of curriculum-aligned integration strategies [13][14][15]. As emphasized many classrooms still rely heavily on printed textbooks and PowerPoint-based instruction, limiting the opportunity for learner autonomy and digital engagement [16][17].
5. Based on initial observations, many seventh grade students at SMP Muhammadiyah 8 Tanggulangin showed low vocabulary proficiency in English. In addition, the school has not integrated mobile applications such as Duolingo into the English curriculum, and still uses a more conventional approach.

Therefore, this school is a relevant environment to test whether a game-coupled vocabulary learning resource can affect the students' learning.

6. To fill this gap, the present study investigates the integration of Duolingo into classroom activities and its effectiveness in improving vocabulary mastery among seventh-grade students. By conducting pre- and post-test assessments, **this** study aims to **provide empirical evidence** on the contribution of gamified mobile applications to vocabulary development in a junior high school context, the primary **aim of this study is to** examine the affect **of the Duolingo application in enhancing** the **vocabulary mastery of seventh-grade students at** SMP Muhammadiyah 8 Tanggulangin. This study seeks to answer the following research question: Does the Duolingo application can affect seventh-grade students' vocabulary mastery at SMP Muhammadiyah 8 Tanggulangin?

7.

8. Method

Research Design

This study employed a pre-experimental research design using a **one-group pre-test and post-test** format. This design was chosen due to its feasibility in a real classroom setting where random assignment and control groups were not possible, As the school only have one accesible class for intervention to measure the affect of the Duolingo application on vocabulary mastery among seventh-grade students by comparing their performance before and after the treatment.

Participants

The participants of this study were 23 seventh-grade students from SMP Muhammadiyah 8 Tanggulangin, selected through purposive sampling based on the results of a preliminary observation conducted in May 2025. These students were identified as having low vocabulary proficiency, making them appropriate subjects for intervention using digital tools.

Instruments

The main instrument used in this study was a vocabulary test consisting of 20 multiple-choice questions aligned with the junior high school English curriculum, particularly on vocabulary related to daily activities. Each item included four answer options.The test instrument was validated by two English education experts using a four-point Likert scale. The table below summarizes the results of the pre-test validation:

Table 1. Test Validity (Expert Judgment)

Indicator	Question Numbers	Avg. Score	Note
General daily activities	1-4	4.00	Valid
Vocabulary in sentences	5-8	4.00	Valid
Verb choices	9-12	4.00	Valid
Sequence of activities	13-16	3.50	Fairly valid
Similar meanings	17-20	3.50	Fairly valid

Table 1 presents that all items were considered valid (≥ 3.50), although items 13-20 required minor revisions to improve clarity. Then, Instrument validity was further tested using Pearson Product-Moment Correlation with a separate try-out group. The following is a sample of the pre-test try-out validity:

Table 2. Sample Pearson Correlation Validity Test (Selected Items)

Question	r-value	p-value	Note
Soal 2	0.760	0.001	Valid
Soal 5	0.774	0.000	Valid
Soal 10	0.322	0.074	Not Valid

Table 2 shows that nineteen out of twenty items were valid ($p < 0.05$), except question 10, which was removed or revised due to insignificant correlation. After that reliability was tested using Cronbach's Alpha. The results are shown below:

Table 3. Reliability Statistics

Test	Cronbach's Alpha	Interpretation
Pre-test	0.610	Sufficient reliability
Post-test	0.623	Sufficient reliability

Both instruments showed acceptable internal consistency (table 3), making them suitable for use in data collection.

Data Collection Procedure

The research was conducted over a period of three meetings, following these steps:

1. Pre-test: Students took an initial vocabulary test to determine their baseline vocabulary proficiency.

2. Treatment: For one meeting, Researcher used the Duolingo application during English class sessions to learn vocabulary through gamified, interactive exercises.

Picture 1. Flowchart of the treatment Procedure

Picture 1 show the flowchart illustrates the three main stages of the treatment procedure conducted in a single learning session, Orientation the teacher explains the purpose of using Duolingo and give the material daily activities. duolingo session students use the application to practice vocabulary through interactive exercises

Closing,The teacher facilitates a brief discussion, and students share new vocabulary they have learned.

3. Post-test: After the treatment, the same vocabulary test was administered to measure students' progress.

Data Analysis

The collected data were analyzed using quantitative methods. **A paired-sample t-test was** conducted in SPSS to **compare** **pre-test and post-test scores.** This analysis aimed to determine whether the difference in vocabulary **mastery before and after** the use of Duolingo was statistically significant.

9. Result and Discussion

The objective of this research is to examine the effectiveness of the Duolingo application in enhancing vocabulary mastery among seventh-

grade students at SMP Muhammadiyah 8 Tanggulangin. A total of 23 students were selected based on their low vocabulary proficiency. The data were collected in two phases: a pre-test conducted before the intervention and a post-test after the two-week treatment using the Duolingo application. Both tests consisted of 20 multiple-choice questions designed to assess basic English vocabulary related to daily activities.

A. Pre-Test and Post-Test Results

The learning program was conducted over a three-week period. In the first week, students took the pre-test; in the second week, they engaged with Duolingo as the treatment; and in the third week, the post-test was administered. The analysis includes the normality test, descriptive statistics, and paired sample t-test.

Table 4. Test of Normality (Shapiro-Wilk)

Test Type	Statistic	df	Sig. (p)
Pre-Test	0.939	23	0.175
Post-Test	0.937	23	0.153

Table 4 presents that the significance values for **both pre-test and** post-test are greater **than 0.05,** indicating that the data are normally distributed. Therefore, it is appropriate to proceed with parametric statistical analysis **such as the paired sample t-test.**

Table 5. Descriptive Statistics of Pre-Test and Post-Test

Test Type	Mean	N	Std. Deviation	Std. Error Mean
Pre-Test	55.87	23	8.07	1.68
Post-Test	82.61	23	6.01	1.25

From table 5 shows that students' average vocabulary score increased from 55.87 (pre-test) to 82.61 (post-test). This improvement of approximately 26.74 points indicates a positive impact of the Duolingo intervention on students' vocabulary mastery.

Table 6. Paired Sample t-Test

Test Pair	Mean Difference	Std. Deviation	Std. Error	t-value	df	Sig. (2-tailed)
Pre - Post	-26.74	5.56	1.16	-23.06	22	0.000

The paired sample t-test shows a statistically significant difference between **pre-test and post-test** scores ($p < 0.05$). The negative mean difference (-26.74) indicates that students scored higher after using Duolingo. The t-value of -23.06 reflects a strong effect of the intervention (table 6).

The results demonstrate that **the use of Duolingo** significantly improved students' **vocabulary mastery. The** combination of interactive activities and gamified elements likely contributed to increased motivation and engagement. These findings support the integration of educational technology, particularly mobile-assisted language learning tools like Duolingo, in junior high school English instruction.

B. Discussion

The results of **this** study indicate that **students' vocabulary** mastery significantly improved after the **integration of the Duolingo** application into the learning process. The increase in the mean score from 55.87 (pre-test) to 82.61 (post-test), with a p-value of 0.000, confirms the statistical significance of this gain. These findings suggest that the gamified and interactive features of Duolingo provide an engaging platform that effectively supports vocabulary acquisition in junior high school students when used in a structured instructional setting.

The implementation of Duolingo in the classroom followed a clear sequence: the teacher launched the Duolingo app in a web browser, chose English as the target language, logged in with an email address or social media account, and then projected the screen for the students to follow. After that, students finished assignments in Duolingo, ranging from the most basic to the most complex test stages. Students shown excitement and enthusiastically participated in the activities throughout this process. This excitement and active engagement are a reflection of the allure of Duolingo's gamified design, which incorporates interactive activities, levels, and points to keep learners interested. This practical implementation **aligns with constructivist learning theory, which emphasizes that** learners build **knowledge through** interaction and experience. Duolingo's methodology featuring contextual repetition, real-time feedback, and interactive content-supports long-term vocabulary retention. At the same time, its gamified features align with motivation theories, suggesting that rewards and progress tracking can sustain student interest and persistence. As a result, the integration of Duolingo not only facilitated vocabulary learning but also promoted greater learner autonomy, aligning with the broader principles of Mobile-Assisted Language Learning (MALL) [18].

This finding aligns with previous studies highlighting the effectiveness of technology-enhanced language learning. found that Duolingo significantly increased students' vocabulary mastery due to its visual and repetitive exposure to target words revealed that Duolingo significantly enhanced both vocabulary acquisition and student motivation in an experimental study with vocational high school learners in Indonesia [19][20][21]. These findings support the idea that digital gamified tools foster more engaging and autonomous learning environments who conducted a meta-analysis on the impact of MALL on vocabulary learning. The study reported that mobile apps, particularly those with gamified feedback and spaced repetition such as Duolingo, consistently led to better vocabulary retention compared to traditional methods. This suggests that interactive language applications not only enhance engagement but also promote deeper learning through frequent exposure and immediate feedback [22][23][23].

From a practical standpoint, the findings underscore the potential of Duolingo to support classroom instruction by offering personalized, self-paced practice that caters to different learning styles. Educators may consider incorporating such tools to complement face-to-face lessons, particularly for vocabulary reinforcement. also advocated for the integration of Duolingo in formal instruction, noting that it enhances learner autonomy and encourages consistent practice even outside the classroom [24][25]. Despite its promising outcomes, this study has several limitations. First, the absence of a control group limits the ability to determine whether the observed improvements were solely due to the Duolingo intervention. Second, the **short** intervention **period of** two weeks may **not capture long-term** vocabulary retention. Lastly, the small sample size and single-school context restrict **the generalizability of the findings to broader** populations.

10. Conclusion

The use of Duolingo provided a meaningful learning experience that aligned with current educational trends promoting student autonomy, digital

literacy, and interactive engagement. By shifting vocabulary learning from conventional memorization to interactive practice, the tool offered learners opportunities to explore language in more dynamic and personalized ways. The study **contributes to the growing body of research** in **Mobile-Assisted Language Learning (MALL)** by providing localized evidence from an Indonesian junior high school context. These findings support the feasibility of implementing mobile learning applications in formal education, particularly when integrated with clear instructional goals and classroom support. Given the positive outcomes observed, educators and curriculum developers are encouraged to consider incorporating mobile-based tools such as Duolingo as supplementary media in vocabulary instruction. Future research is recommended to address these limitations by using a quasi-experimental or true experimental design with a control group, larger and more diverse sample populations, and a longer treatment duration. In addition, variables such as student motivation, digital literacy, and prior experience with language-learning apps should be explored to gain a deeper understanding of the mechanisms driving the effectiveness of gamified mobile learning tools. Nevertheless, the 26.74-point improvement in vocabulary scores provides encouraging evidence of Duolingo's value as a supportive tool in English language instruction.

11. References

[1] U. J. Rosyidah, E. Dewanti Laksmi, and M. Anugerahwati, " Gamification in Duolingo App on Improving English Listening Proficiency of Junior High School Students," ENGLISH Fr. Acad. J. English Lang. Educ., vol. 7, no. 1, p. 119, 2023, doi: 10.29240/ef.v7i1.5377.

[2] C. Handrianto, A. J. Jusoh, Y. K. Nengsih, A. Alfurqan, M. Muslim, and A. Tannoubi, " Effective Pedagogy in Primary Education: A Review of Current Literatures," Abjadia Int. J. Educ., vol. 6, no. 2, pp. 134-143, 2021, doi: 10.18860/abj.v6i2.12978.

[3] S. Nita, E. R. N. Sari, K. Sussolaikah, and S. M. F. Risky, "The Implementation of Duolingo Application to Enhance English Learning for Millennials," J. Int. Ling. Technol., vol. 2, no. 1, pp. 1-9, 2023, doi: 10.55849/jiltech.v2i1.215.

[4] L. D. Anggraini and S. Wahyuni, " The Influence of Duolingo Application in Improving Vocabulary : A Literature Review," vol. 01, pp. 284-290, 2024.

[5] R. Abin and N. H. Andas, " The Effect of Using Autonomous Learning Model by Duolingo-Assisted to Improve Students' Vocabulary Mastery at VIII Class of SMPN 3 Buton Tengah," EduLine J. Educ. Learn. Innov., vol. 2, no. 4, pp. 415-426, 2022, doi: 10.35877/454ri.eduline1258.

[6] V. H. Nguyen and H. T. P. Nguyen, " EFL Learners' perceptions of the Effectiveness of Duolingo," Int. J. Sci. Manag. Stud., no. October, pp. 204-223, 2023, doi: 10.51386/25815946/ijsms-v6i5p113.

[7] R. Rintaningrum, "Technology integration in English language teaching and learning: Benefits and challenges," Cogent Educ., vol. 10, no. 1, pp. 1-21, 2023, doi: 10.1080/2331186X.2022.2164690.

[8] M. P. Suci, "The Perceptions of Using Duolingo Application in Learning English for Student's Vocabulary Mastery," Batara Didi, vol. 1, no. 2, pp. 78-89, 2022.

[9] M. Nushi and M. H. Eqbali, " Duolingo: A mobile application to assist second language learning," Teach. English with Technol., vol. 17, no. 1, pp. 89-98, 2017.

[10] C. H. Anisa Dwi Tiara, M. Arinal Rahman, " The Students ` Perception about Use of Duolingo Application for Improving International Journal of Education , Information Technology and Others (IJEIT)," no. December, 2021, doi: 10.5281/zenodo.5775915.

[11] Retno Wiyati and Shakilatasya Amelia, " Students' Reflection Toward Learning Vocabulary Using Duolingo Application," JELA (Journal English Lang. Teaching, Lit. Appl. Linguist., vol. 4, no. 1, pp. 17-26, 2022, doi: 10.37742/jela.v4i1.75.

[12] R. Kurnia Wijaya, H. Yufrizal, and B. Kadaryanto, " Improving Vocabulary Through Duolingo Application in Call at The Seventh Grade of SMP," U-JET Unila J. English Teach., vol. 5, no. 1, pp. 1-11, 2016, [Online]. Available: http://jurnal.fkip.unila.ac.id/index.php/123/article/view/11139

[13] R. A. Mevia, A. T. Shofi, L. Masruroh, E. Language, E. Program, and U. Qomaruddin, "The Effect of Using Duolingo Application as Teaching Media to Improve Vocabulary Mastery of Eleventh Grades," vol. 6, no. 2, pp. 19-33, 2024.

[14] A. Haleem, M. Javaid, M. A. Qadri, and R. Suman, "Understanding the role of digital technologies in education: A review," Sustain. Oper. Comput., vol. 3, no. May, pp. 275-285, 2022, doi: 10.1016/j.susoc.2022.05.004.

[15] A. Z. Chasanah and A. Halim, "Cendikia : Media Jurnal Ilmiah Pendidikan The effectiveness of using duolingo as an interactive learning media," vol. 14, no. 6, pp. 638-646, 2024.

[16] A. Zakiyah, S. S. Rohmah, and H. Afriani, "'Students'' Perception of Learning Vocabulary Through Duolingo Applrication: The Case of Secondary School in Banyuwangi",'" vol. 8, no. 2, pp. 1806-1813, 2024, doi: 10.36526/js.v3i2.4134.

[17] P. Ajisoko, " The use of duolingo apps to improve English vocabulary learning," Int. J. Emerg. Technol. Learn., vol. 15, no. 7, pp. 149-155, 2020, doi: 10.3991/IJET.V15I07.13229.

[18] V. Cosentino, S. Gérard, and J. Cabot, "A model-based approach to gamify the learning of modeling," CEUR Workshop Proc., vol. 1954, no. Scme, pp. 15-24, 2017.

[19] V. Nasrul and S. Fatimah, " The Effect of Using Duolingo Application on Students English Learning Motivation and Vocabulary Enrichment : An Experimental Research at SMKN 1 Padang," J. English Lang. Teach., vol. 12, no. 3, pp. 933-952, 2023, doi: 10.24036/jelt.v12i3.125020.

[20] H. Kusumadewi and M. Widyastuti, " The Effects of Using Duolingo Towards Students' Vocabulary Mastery," Indraprasta PGRI, vol. 13, no. 2, pp. 172-186, 2018.

[21] E. Nursyamsiah, " Penggunaan Media Aplikasi Duolingo Dalam Meningkatkan Penguasaan Kosakata Bahasa Inggris Siswa Kelas VII SMP Negeri 3 Agrabinta Cianjur," J. Paedagogy, vol. 8, no. 1, p. 67, 2021, doi: 10.33394/jp.v8i1.3251.

[22] P. Permatasari, A. Sudirman, and T. Munawaroh, " The Effect of Using Duolingo Application Towards Students' Vocabulary Mastery at the Eighth Grade of SMPN 2 Banjarsari Lebak-Banten," J. English Lang. Learn., vol. 6, no. 2, pp. 142-148, 2022, doi: 10.31949/jell.v6i2.3624.

[23] J.-J. Lin and H. and Lin, " Mobile-assisted ESL/EFL vocabulary learning: a systematic review and meta-analysis," Comput. Assist. Lang. Learn., vol. 32, no. 8, pp. 878-919, Nov. 2019, doi: 10.1080/09588221.2018.1541359.

[24] P. Munday, " the Case for Using Duolingo As Part of the Language Classroom Experience," RIED. Rev. Iberoam. Educ. a Distancia, vol. 19, no. 1, pp. 83-101, 2015, doi: 10.5944/ried.19.1.14581.

[25] H. R. Aulia, E. Wahjuningsih, and R. Andayani, " Effect of Duolingo Application on Students' English Vocabulary Mastery," ELTR J., vol. 4, no. 2, pp. 131-139, 2020, doi: 10.37147/eltr.v4i2.71.