CHAPTER IV
RESEARCH FINDINGS AND DISCUSSION

A. Research Results
1. Identification

The search results analyzed were journals and articles published between 2017 and 2022. Search results from Google Scholar and Garuda (Digital Reference Images / Garba Rujukan Digital) were then identified and screened based on the title and abstract of the research criteria to obtain appropriate data. The Researcher, through identification stages with the keywords **"Vocabulary," "Duolingo," AND "INDONESIA,"** identified the data about using Duolingo in Indonesia for Learning Vocabulary from Google Scholar. (can be seen in Figure 4.1)
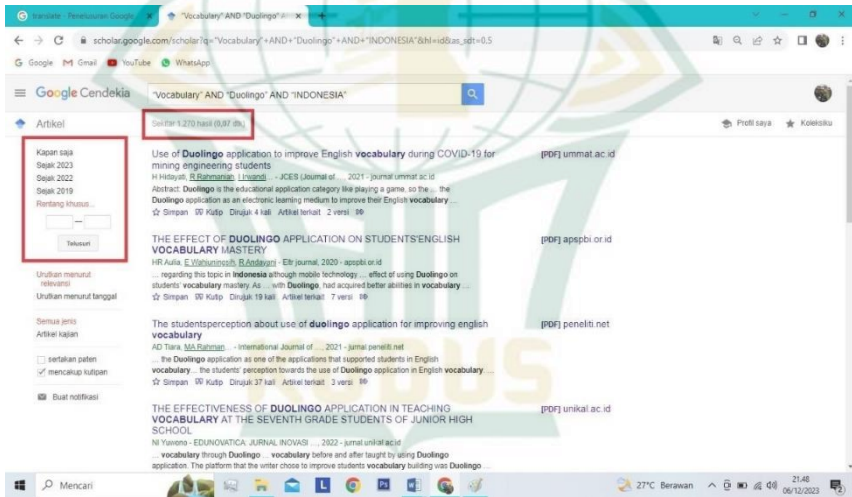

Figure 4.1 Identification Result Before Custom Range Years (Google Scholar)

After searching through the keyword chains (figure 4.1) that have been written, the Researcher found there are (1.270) results of studies or Research regarding the use of Duolingo. In the next step, the Researcher applied a custom range from 2017 to 2022 based on the area of Research.
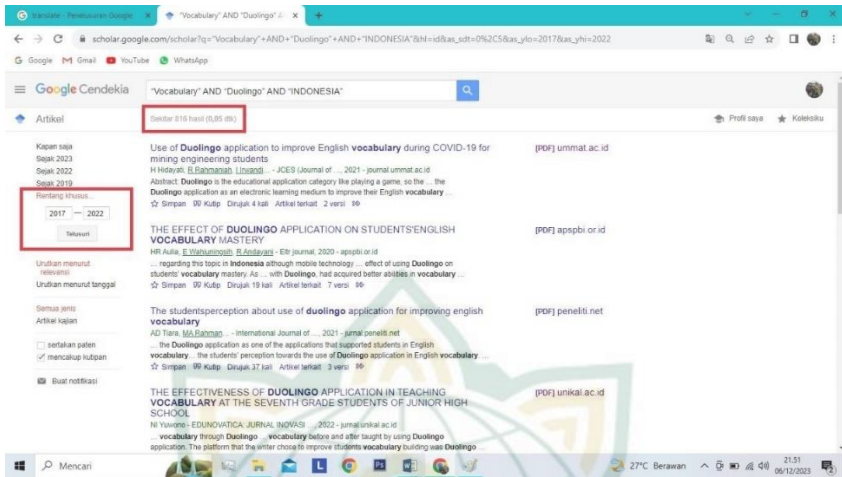
Figure 4.2 The result after the custom range year from 2017 to 2022
(Google Scholar)

In the resulting Research after the custom range (figure 4. 2), the researcher found that from (1.270) research about the use of Duolingo, there was remaining (816) research. From (816) research, the researcher should then Identify the type of Research, total Research per year, and the Research that meets the research criteria to be able to proceed to the next stage, namely the data screening stage. The researcher has applied a custom range per year to determine the total amount of Research every year.
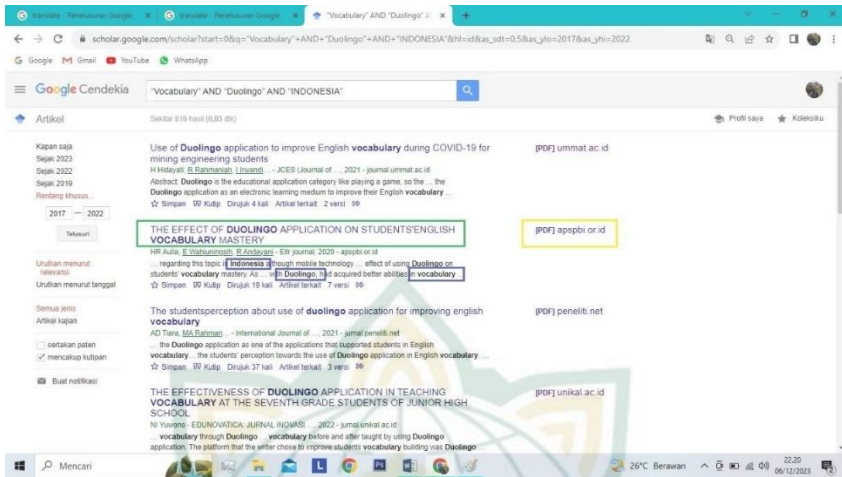
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Figure 4.3 One of the results in the year 2022

Based on the research result in Figure 4.3, there are research results about using Duolingo for English Vocabulary Learning, which has a given line colour. Then, the Researcher identified the and abstract based on the use of Duolingo in Learning English Vocabulary. So, the Title must contain the words *"Duolingo" and "Vocabulary"*. The word *"Indonesia"* does not have to be included in the title criteria restrictions because the specific criteria in this Research are journal articles in Indonesia. Furthermore, any Domain contained in Google Scholar as long as the Research was conducted in Indonesia regarding Vocabulary Learning using Duolingo. Especially Domain **.ID** and **.COM** are included because using a **.ID** domain in this Research is a strategic decision that enhances your study's relevance, visibility, and credibility within the Indonesian context. It aligns your Research with the local culture, geography, and potential audiences, contributing to a more targeted and impactful investigation into learning vocabulary using Duolingo in Indonesia by including **.COM**, Domain is widely recognized and used globally. Using it for your research website enhances the international visibility of your study, making it more

accessible to a broader audience.[63] For the example of the identification title and abstract in Figure 4.3, the words are given line colour: Green for the Title, Blue for the identification of the abstract, and yellow for the identification of the Domain Address. For the example (figure 4.3) the Title and abstract could be include in the research result, because the Title has contained the words of *"Duolingo"* and at the Title and the abstract there are words *"Vocabulary" "Duolingo" and "Indonesia".* So, this Research is included because it is available with the criteria.
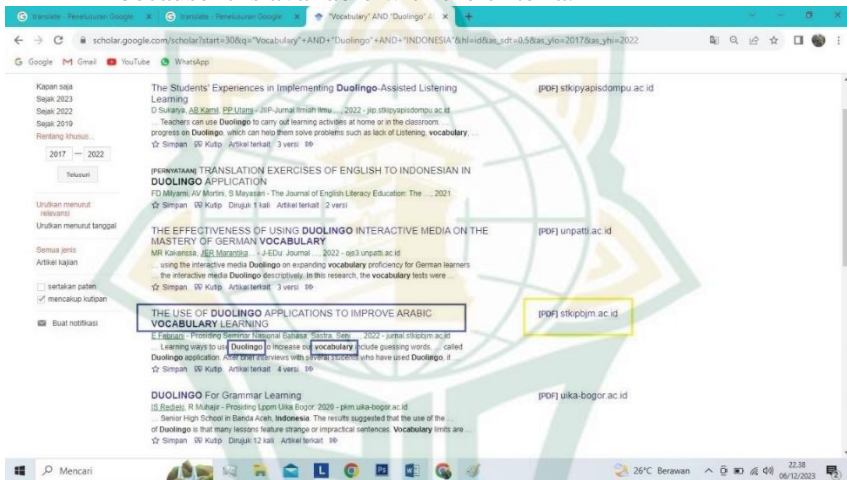

Figure 4.4 One of the results of research in the year 2022

The second example of Identification of the Title and abstract in Figure 4.4 as the words are given line colour, Green colour for the Title, Blue colour for the Identification of abstract, and Yellow colour for the identification Domain address. On the Title there are words "THE USE OF DUOLINGO APPLICATION TO IMPROVE ARABIC VOCABULARY LEARNING". The abstract contains the words "Duolingo" and "Vocabulary". The abstract and Domain in the Research could be included in the research objective, and the Title is excluded because this Research does not explain English Vocabulary. So, in this Research is

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[63] Jones, A. B. (2020). The Impact of Domain Extensions on Website Credibility: A Meta- Analysis. Journal of Online Research, 15(3), 123-145. DOI: 10.1234/jor.2020.56789

excluded because the Title is not included in the research criteria. From the example of Figure 4.4, the Researcher used to choose the research data in Google Scholar. From Google Scholar, the Researcher continued to identify (816) research using steps such as the example in Figure 4.4. So, the Researcher has found, based on the data from the Google Scholar platform, there is (n=178) Research about Learning Vocabulary Using Duolingo in Indonesia from 2012 to 2022.

From (178) research, journals and articles (115) proceedings (21) and thesis/dissertation (42). Then, the Researcher identified the type of Research and analyzed the research growth per year.
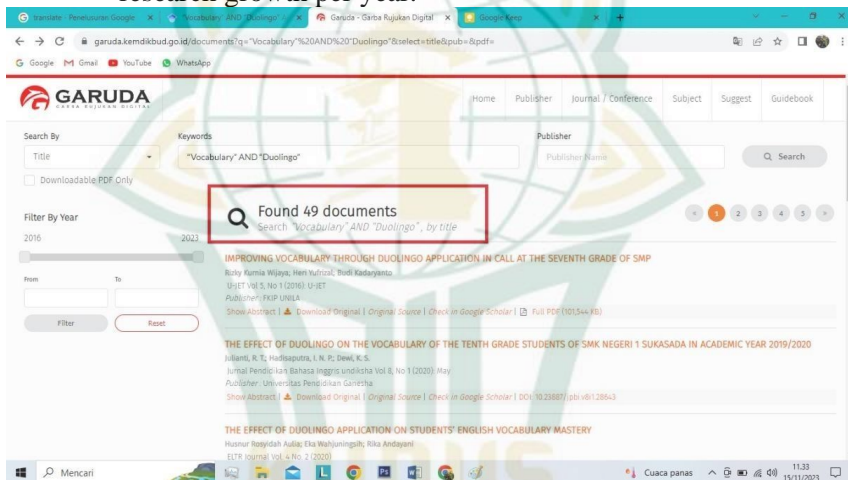

Figure 4.5 The Research result before custom range year from GARUDA (Garba Rujukan Digital)
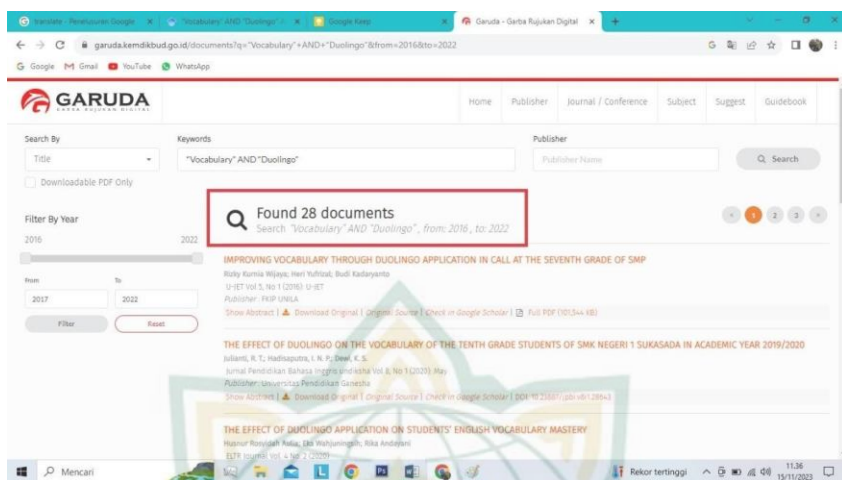
Figure 4.6 The Research results after custom range from 2017 to 2022

For the Garuda platform is different with Google Scholar because the scope is narrow from Google Scholar, but it" s helped the Researcher to found the articles or journals are contained and fulfilled the criteria of the Research but could not publish in Google Scholar. From Garuda platform the Researcher used the keyword chain *"Vocabulary" And "Duolingo"* found that there are (49) research data's before custom range year (Figure 4.6). After applying the custom range from 2017 to 2022, the Research left just (28) which can be seen in Figure 4.6.

After limiting the research scope of the Research results with a custom range from 2017 to 2022, then from (49) research, the Researcher identified the title and abstract, such as the systematic step in Google Scholar identification and example, as the Researcher has explained before. The result research which have identified the Title abstract and Domain, the Researcher has found that there are (28) journals and articles from Garuda which has completed the research criteria predetermined (based on Title and abstract).

The Research results from identification stages from Google Scholar and Garuda were combined and grouped by type and year to determine the number of each type and the number of Research per year. The Researcher found (143) research, (115) research from Google Scholar and (28) research from Garuda (table 4.2). The detailed information on the number of articles and journals, proceedings, and thesis/dissertation can be seen in (table 4.1) and the number growth of Research per year can be seen in Figure 4.7

Table 4.1 Type of Finding Data in Identification Stages

No.	Type	Database		Total
		Google Scholar	GARUDA (Garba Rujukan Digital)	
1.	Journal Article	115	28	143
2.	Proceedings	21	-	21
3.	Thesis/Dissertation	422	-	42
4.	The Research are not Retrieved	634	21	655
Total				861

Based on the results of the types of data findings in Table 4.1, the development of studies regarding the use of Duolingo in English Vocabulary Learning conducted in Indonesia is quite high, especially in journal and article studies, which amount (to 143). In Indonesia, seminars or conferences that discuss the digitalization of learning and teaching using Duolingo are also relatively high in five past years from Google Scholar.

It can be seen from the amount of proceeding data

found on Google Scholar. Likewise, with the growth of students" final assignments or theses as described in the table, as many as (42) theses raised Duolingo in Learning Vocabulary as the theme of their final assignments
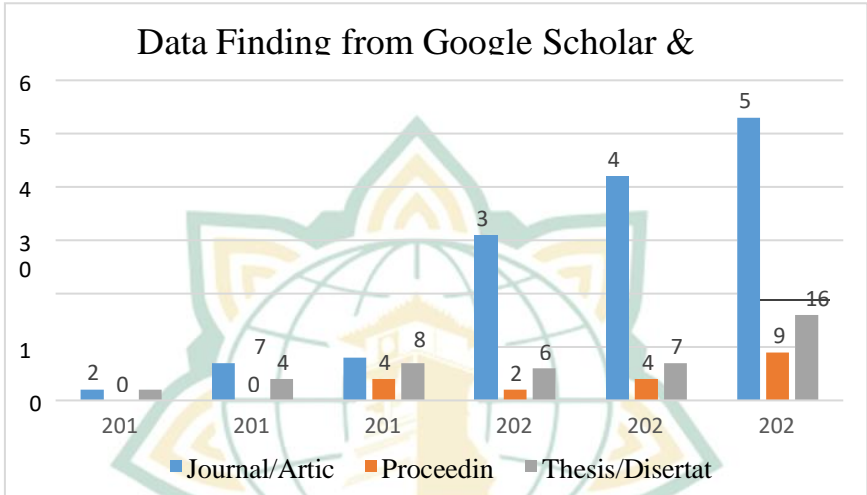

Figure 4.7 Distribution of the number of publications from 2017-2022 before the screening stages

Based on figure 4.7, the Research about Learning Vocabulary Using Duolingo in Indonesia in 2017, there is related Research only four (2 from Journal Articles and two from Thesis/Dissertation). It was only in the next year that there was some related research, and it began to develop in the following years, with the most Research in 2022.

2. **Screening Study and Assessment Process**

After finding the results of Identification of titles and abstracts, the Researcher proceeded to the next step, namely the screening research process. In the screening process, the Researcher reviewed the duplication of previous journals and articles from two combined platforms (Google Scholar and GARUDA). From 586 research, just the journals and articles are the object of this Research (proceeding and thesis are excluded), so just (143). From Table 4.1, the Researcher found articles and journals (115) from Google Scholar and (28) from GARUDA.

From Google Scholar results (115), furthermore

retrieved (75) articles and journals from Google Scholar (screening TitleTitle and abstract), (English vocabulary learning includes), (literature review, systematic Review, and meta-analysis same are included). Meanwhile, journals and articles from GARUDA results (28), and after checking the duplication in Google Scholar to avoid duplication so it only works once in the next process, the result is retrieved (16). The check duplication process can be seen in Figure 4.8
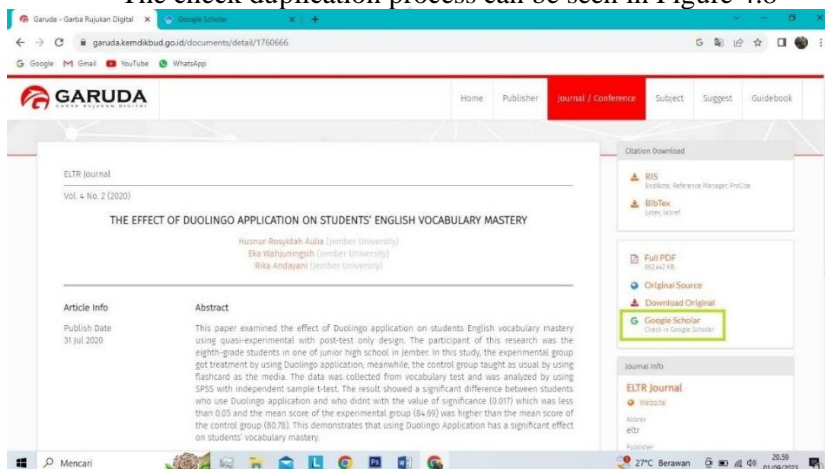

Figure 4.8 Duplication Check Process in GARUDA (Garba Rujuan Digital)

From Figure 4.8, the Researcher clicks on Google Scholar (in green circle), and the search has been processed will move to the Google Scholar platform; if it is declared unsuitable on Google Scholar, then the article does not have duplicates in Google Scholar (Figure 4.9).
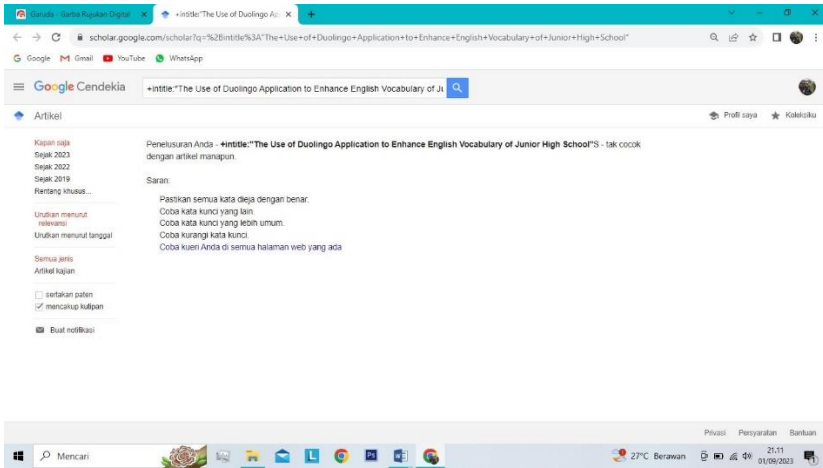
Figure 4.9 Duplication Check Process in Google Scholar

Furthermore, there are (N=46) articles and journals continued in process assessment for eligibility, (43) from Google Scholar, and (3) from GARUDA. Then, the articles and journals from Garuda are screened by the title, abstract, and finding or conclusion to find out the research objective of this Research to find out the impact of using Duolingo on vocabulary learning and to find out what problems there are in the process of learning vocabulary by using Duolingo in Indonesia. The journals and articles that are not relevant to the research objective of this Research are excluded from the research objective. Then, the research result's method, population, finding, and conclusion are assessed.

For example, the Journal from Imam Nur Aziz and Mariana Ulfah Hoesny, entitled *"Duolingo Application as Media in Teaching Vocabulary Mastery,"* Journal of English Education and Technology. The Title of the Research is included and appropriated with the inclusion of the Research. Assessment of the abstract of the Research:

"This study aims to see how the Duolingo application affects students' vocabulary competence in the seventh grade in junior high school. Vocabulary is crucial for pupils to acquire since it helps them communicate. A quasi-experimental design was adopted, with 20 students as the experimental group and 20 as the control group. The result demonstrates that at the 5% significance level, to= 2.881 is

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greater than tta= 1.672. It suggests that utilizing the Duolingo program might improve pupils' vocabulary proficiency". (Journal of English Education and Technology, Imam Nur Aziz & Mariana Ulfah Hoesny, Vol. 03 No. 02, June 2022, pp. 107-120).

The abstract mentioned the effect of Duolingo on vocabulary learning for seventh-grade junior high school students because vocabulary is very important for students to master. After all, it helps them communicate. With the concluding sentence globally explained in an abstract, namely, the Duolingo program might improve pupils' vocabulary proficiency.

"Based on the previous chapter's ideas, teaching vocabulary using the Duolingo program is suitable in class. The t-test result of the post-test demonstrates this: pupils scored 80.00 in the experimental class, which was higher than 74.25 in the controlled class. Meanwhile, data analysis shows that t0 (2.881) is greater than that (1.672) at a significance level of = 0.05 (5%). The impacts of Duolingo apps used throughout treatment periods are statistically visible in data analysis utilizing independent sample t-tests. The statistics evaluated show that the findings of t (df = 38) =2.881 and sig (2- tailed) are 0.006 lower than = 0.05 (5%). As a = result, t0>ttable indicates that the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. It demonstrates that students have excellent results in vocabulary study after being taught using the Duolingo program. As a consequence of the data analysis above, it is possible to infer that there is a considerable difference in student success before and after being taught using the Duolingo program. Furthermore, the Duolingo program is more successful and engaging than traditional teaching methods in teaching English vocabulary to pupils, particularly in junior high school". (Journal of English Education and Technology, Imam Nur Aziz & Mariana Ulfah Hoesny, Vol. 03 No. 02, June 2022, pp. 107-120)".

In the conclusion section of this Journal by Imam Nur Aziz & Mariana Ulfah Hoesny, This Research aimed to investigate the effect of the Duolingo application on students' vocabulary mastery. The study used a quasi-experimental

design with eighth-grade students as participants. The experimental group used the Duolingo application, while the control group used flashcards. The data was collected through a vocabulary test and analyzed using an independent sample t-test. The results showed a significant difference in the mean score between the two groups, with the experimental group scoring higher. This suggests that using the Duolingo application positively affects students' vocabulary mastery. The study concludes that Duolingo is effective in teaching vocabulary and suggests further Research on different educational levels and larger sample sizes.

Based on the results of the Research, Duolingo has a positive impact on the vocabulary learning process. Besides that, the population and method used also support the eligibility of the assessment of the article of the Research because it is an empirical study, so it can be said that this Research is included. In The Eligibility Process, the Researcher used the steps described in the sample; the Research also correlates Learning Vocabulary Using Duolingo in Indonesia. Besides that, the Researcher recommends the Duolingo application as a medium for learning English. Based on the result of this eligibility assessment, the article written by Imam Nur Aziz and Mariana Ulfah Hoesny is included. The results of The Eligibility Process are (9) from journals and articles, (6) from Google Scholar, and (3) from GARUDA (can be seen in Figure 4.10); the result in this process is reported using PRISMA 2020 by Page et al. (Figure 4.11).[64]

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[64] Page et al., "The PRISMA 2020 Statement : An Updated Guideline for Reporting Systematic Reviews Systematic Reviews and Meta-Analyses."

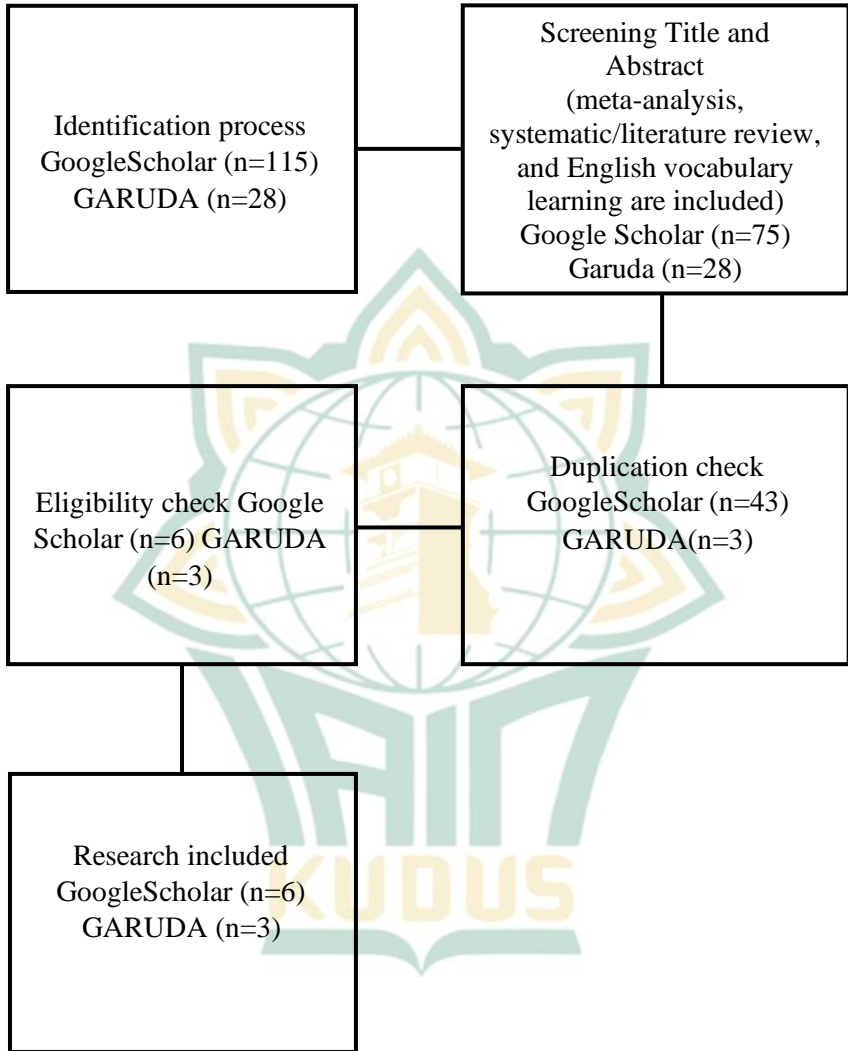|	
Identification process GoogleScholar (n=115) GARUDA (n=28)	Screening Title and Abstract (meta-analysis, systematic/literature review, and English vocabulary learning are included) Google Scholar (n=75) Garuda (n=28)
Eligibility check Google Scholar (n=6) GARUDA (n=3)	Duplication check GoogleScholar (n=43) GARUDA(n=3)
Research included GoogleScholar (n=6) GARUDA (n=3)	

Figure 4.10 Screening process and quality assessment

PRISMA 2020 FLOW DIAGRAM FOR NEW SYSTEMATIC REVIEW, WHICH INCLUDED SEARCHES OF DATABASE, REGISTER, AND OTHER SOURCES

Identification of Studies via Google Scholar	Identification of Studies via GARUDA

Identification

Records were identified from Google Scholar with the keywords "Vocabulary," "Duolingo," and "Indonesia." (1.270)

Record Removed Before Screening :

After Custom Range (816) and After Identified based on similarity of Suitability with Keyword and

Records Identified from GARUDA Before Custom Range (49)

After Custom Range (28)

Screening

Records screened Journals and Articles with Keychains "Duolingo," "Vocabulary," "Indonesia," "English Learning," and "English Teaching."

Record are Excluded :
- Proceedings (21)

Reports sought for Retrieval (16)

Reports not Retrieved (12)

Journal and Articles sought for Retrieval

Journals and Articles not retrieved because No Qualified for The Criteria (n=37)

Report Assessed for Eligibility (6)

Reports Excluded : (0)

Reports Assessed for Eligibility (3)

Reports Excluded :
Journals and Articles are not Breakout Duplicate Check (0)

Included

Studies included in Review (9)

Reports included Studies (9)
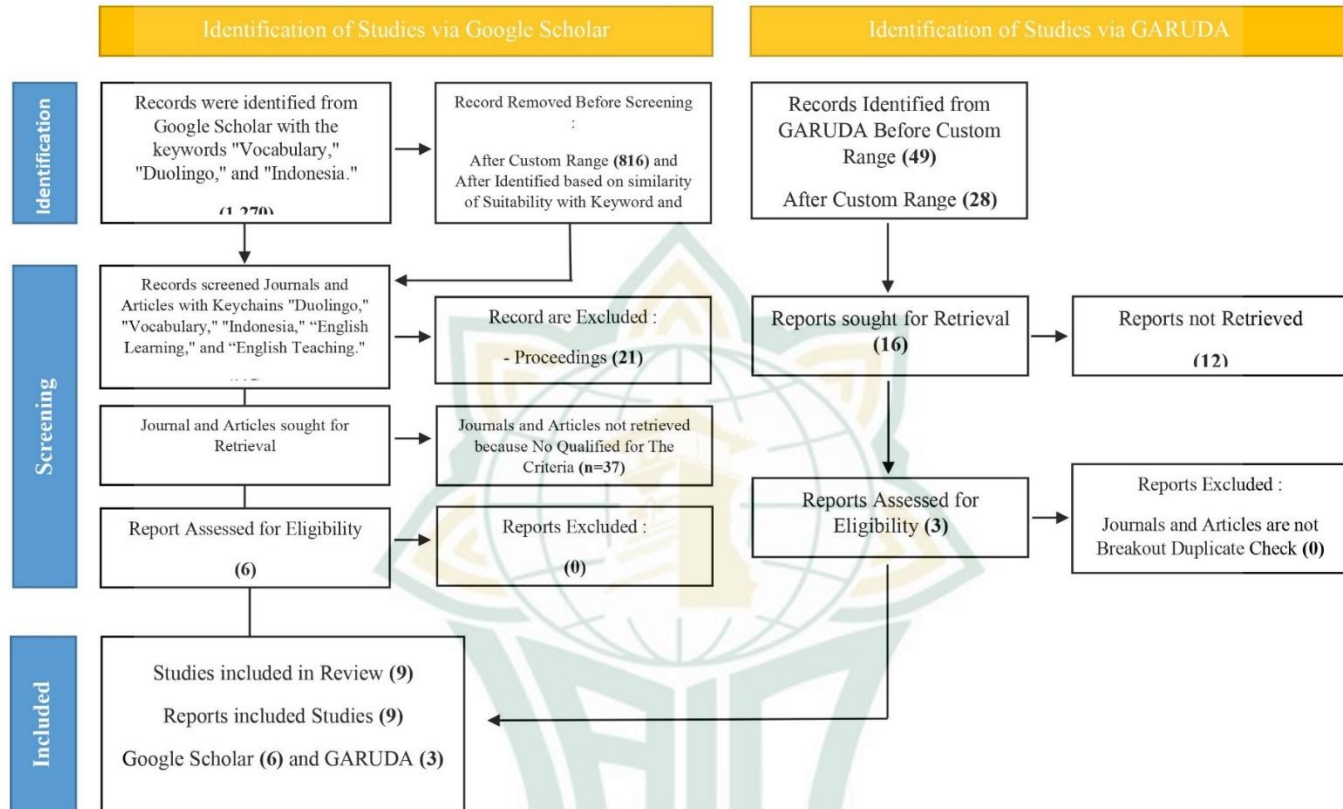
Google Scholar (6) and GARUDA (3)

Figure 4.11 PRISMA 2020 Taken From Page et al.

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3. **Data Extracting and Synthesis Data**

After screening and assessing the quality of the articles and journals, the Researcher extracted the data in the table (table 4.2). From 2017 to 2022, there were as many as nine articles. Analysis of 9 representative journals and articles showed Duolingo's effectiveness in learning vocabulary in Indonesia, including the study's objectives, methodology, summary, implications, recommendations, and limitations.

According to Nine Journals Articles, the research results were categorized into several things; the first study used an experimental methodology with college students and found that Duolingo improved vocabulary mastery. The second employed a quasi-experimental design with high school students and reported a positive impact on English vocabulary learning. The third utilized a longitudinal approach with adult learners and concluded that Duolingo is effective for long-term vocabulary retention. The fourth used mixed methods with ESL learners and found that Duolingo enhances language learning. The study used a comparative methodology with children and adults and found that Duolingo outperformed traditional methods. The sixth utilized a correlational approach with language learners and found that Duolingo usage correlates with vocabulary improvement. The seventh used a qualitative methodology with 33 participants and reported positive experiences with Duolingo for students' reflection. The eighth employed a survey methodology with the students and found that Duolingo aids in vocabulary acquisition. The ninth used mixed methods with various age groups and concluded that Duolingo is effective for vocabulary learning. Based on the nine journal articles, only five studies explain their limitations, while the other four do not explain the limitations. Furthermore, nine journal articles are explained in detail:

Table 4.2 Data Extracting of the Journal Articles

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
1.	The Implementation of Duolingo Mobile Application in English Vocabulary Learning	Ari Irawan, Agus Wilson, Sutrisno (2020)	The data was obtained through the implementation of Software Quality Assurance (SQA) to measure the quality of the Duolingo mobile application for English vocabulary learning.	10 Participants	The research objective of this study was to evaluate the implementation of the Duolingo mobile application in English vocabulary learning for elementary school teachers.	The article evaluates the effectiveness of the Duolingo mobile application in English vocabulary learning compared to traditional teaching methods. Results indicated that the Duolingo application received good scores and can be applied in English vocabulary learning.	The implication of the study is that the Duolingo mobile application can be an effective and varied learning tool for English language teachers, providing an alternative medium for vocabulary learning. However, the study does not explicitly mention any limitations.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
2.	Exploring The Preservices Teachers' Perception Toward The Useof Duolingo in Teaching Vocabulary To Young Learners	Dwi Ima Hermini ngsih (2021)	Qualitative: Thedata for this Research was obtained through the distribution of questionnair es and interviews with the pre-service teachers.The questionnair e consisted of 14 items related to vocabulary learning by using Duolingo.	104 Participants	To investigate thestudents' beliefs regarding using Duo lingo in vocabulary classes and to describe the advantages of using Duo lingo for vocabulary enrichment.	The Research explores pre-service teachers' perception of using the Duolingoapp to teach young learners vocabulary. The findings indicate that most respondents agree that Duolingo facilitates vocabulary learning, making it easier and more interesting for students.	The implication of this Research is that integrating Duolingointo vocabulary teaching can benefit students, as it is perceived as making vocabulary learning more accessible and more engaging. However, a limitationof the study is that it focuses solely on the perception of pre- service teachers.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
3.	The Students` Perception Of Useof Duolingo Application for Improving English Vocabulary	Anisa Dwi Tiara, M. Arinal Rahman, Ciptro Handrianto (2021)	Literature Review The data was obtained through a literature reviewof previous studies on using the Duolingo application for teaching English vocabulary. Thespecific years ofthe data were not mentioned in the provided text.	Not Mentioned	To discuss and review previous studies on using the Duolingo application for improving English vocabulary. The research also aimed to provide information aboutstudents' perceptions of theDuolingo application for learning English vocabulary.	The article discusses the use of the Duolingo application for improving English vocabulary and explores its effectiveness in making language learning more engaging. It highlights the benefitsof Duolingo in increasing student interest, motivation, and achievement in learning English.	The implication of this Research is that Duolingo can be a valuable tool for teachers and studentsto improve English vocabulary and language learning. However, no specificlimitations were mentioned in this Research.

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No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
4.	Children Language Learning Vocabulary Through Mobile Applications: Duolingo	Gusti Ayu Komang Friska Sri Devi (2022)	Pre-Experimental Study: The data in this study wascollected through a pre-test and post-test, as well as a closed-ended questionnaire completed by the children. The questionnaire contained ten questions.	10 Participants	To investigate the use of the Duolingo app in English learning, improve children's vocabulary, and investigate the impact of Duolingo on children.	This Research investigated the impact of the Duolingo app on children's vocabulary learning using a pre- experimental design. Ten children practised Duolingo for ten days, resulting in improved vocabulary,as indicated by higherpost-test scores. The children responded positively to using Duolingo.	The study's implications include the potential for the Duolingo app to enhance children's vocabulary learning effectively. However,the study's limitationsmay include the small sample size and the focus on a specific age group, which could affect the generalizability of thefindings.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
5.	University Students' Perception ofLearning Vocabulary Through Duolingo	Renilza Nurshiyam, Sriati Usman, Agussatriana, Rofiqoh(2022)	Qualitative Descriptive by using questionnaires and interviews in data collection. The research participants consisted of 10 Tadulako University English Language Education Studystudents who were or had used Duolingo.	10 Participants	To identify university students' perception of learning vocabulary through Duolingoat Tadulako University.	The study found that university students have a predominantly positive perception oflearning vocabulary through the language learning app Duolingo. They foundthe app to be helpful, easy to use, and motivating but noted difficulties with sentence arrangementand the need for an internet connection toaccess the material.	The study's findings suggest that Duolingocan be a valuable tool for independent vocabulary learning among university students. One potential limitation ofthe study is that the study did not address the long-term retention of vocabulary learned through Duolingo, which could be a valuable area for further investigation.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
6.	TPR or Duolingo: Which One Is Suitable for Vocabulary Mastery?	Aprilia Pensi Sun Azizah, Aulia Firdausi, Dina Putriana, Nadia Farah Adriyanti, Zeni Susanti (2021)	The data in this study was obtained through a literature review, which involved gathering previous studies on Total Physical Response (TPR) and the Duolingo application, including their advantages and disadvantages.	6 Participants	The research objectives of this study were to investigate the effectiveness of teaching English vocabulary using Total Physical Response (TPR) compared to using the Duolingo application.	The article compares the effectiveness of teaching English vocabulary using the Duolingo application and the Total Physical Response (TPR) method. It concludes that Duolingo is more effective due to its gamified and interactive approach, accessibility, and adaptability to current circumstances.	The implication of this study is integrating technology; the findings suggest that digital platforms like Duolingo offer a more engaging and accessible approach to language learning compared to traditional methods like Total Physical Response (TPR). As for limitations, the study did not explicitly mention any specific limitations.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
7.	Students' Reflection Toward Learning Vocabulary Using Duolingo Application	Retno Wiyati & Shakilatasya Amelia (2018)	Involved the employment of a case study design, which falls under the Qualitative Research type. The data was collected through ObservationObs ervationObser vation and interviews conducted in thestudent's first language, Bahasa.	3 Participants	The research objective was to explore the attitudes and experiences of learning English vocabulary using Duolingo. The study aimed to understand the students' reflections on Duolingo, including its benefits and drawbacks.	The article discusses a study of students' reflections on learning English vocabulary using the Duolingo application.The study found that students had positive attitudes toward the application due to its advanced features, immediate feedback, and well-structured materials.	The study's implications suggest that the Duolingo application positively influences students' attitudes and motivation toward learning English vocabulary. However, the study also identified limitations, such as the presence of unnatural sentences, repeated questions, and a lack of grammar guidance within the application.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
8.	The Use of Duolingo in Enhancing Students' Vocabulary Mastery at SMA Negeri 3 Bangko Pusako During Pandemic Covid-19	Erfiani & Cut Raudhatul Miski (2019)	Quasi-experimental design with pre-tests and post-tests in experimental and control classes. The data was analyzed using SPSS software, including descriptive statistics and t-tests.	30 participants	The research objectives of this study were to determine the effectiveness of using Duolingo in teaching vocabulary mastery and to compare the vocabulary mastery of students taught with Duolingo and those taught without Duolingo.	The results of the study indicated that students' vocabulary mastery taught usingDuolingo was categorized as "VeryGood". Additionally, there was a significant differencein students' vocabulary mastery between those taughtwith Duolingo and those taught without Duolingo.	The implication of this study is that incorporating Duolingo as a teaching tool can significantly enhance students' vocabulary mastery, interest, motivation, and overall language learning outcomes. However, the study did not explicitly mention any limitations.

No.	Title	Writer	Methodology	Population	Research Objectives	Summary	Implication and Limitation
9.	The Effect of Using Autonomous Learning Model by Duolingo-Assisted to Improve Students' Vocabulary Mastery at VIII Class of SMPN 3 Buton Tengah	Rais Abin & Netty Huzniati Andas (2020)	The methodology used in the study is the pre-experimental method with a one-group pretest-posttest design. The datawas collected through a vocabulary test, questionnaire, and semi-structured interviews.	29 Participants	To determine the effect of using the Autonomous Learning Model assisted by Duolingo on improving students' vocabulary mastery and to compare students' vocabulary mastery before and after the treatment.	The study examined using the Autonomous Learning Model assisted by the Duolingo app to improve vocabulary mastery in eighth- grade students. The study concluded that the approach effectively enhanced vocabulary skills and promoted independent learning.	This implies that incorporating technology and autonomous learning methods can positively impact language education. One potential limitation of the studyis the study was conducted in a specific middle schoolin Buton Tengah, Indonesia, which may limit the applicability of the results to other educational settings.

B. Discussion
   1. **The Overall Effects of Using Duolingo as a Language Learning Platform on Vocabulary Acquisition among Indonesian Learners According to the Journal Articles Published From 2017 to 2022**

Referring to the research result based on the journal articles published in Indonesia from 2017 to 2022, it is known that Based on the nine journal articles, the overall effect of using the Duolingo mobile application for English vocabulary learning appears to be positive. The studies generally found that Duolingo is effective in improving vocabulary learning. However, it's important to note that some limitations were identified, such as small sample sizes, focus on specific populations, and lack of long-term retention assessment. Implementing the Duolingo mobile application in English vocabulary learning has been extensively studied, focusing on various populations such as elementary school teachers, pre-service teachers, university students, children, and EFL instructors. Journal articles consistently demonstrate the effectiveness of Duolingo in improving vocabulary mastery and highlight its potential as a valuable tool for language instruction. Participants in the studies reported positive perceptions of Duolingo, finding it easy to use, helpful, and motivating in their vocabulary learning journey. Incorporating technology-based language learning platforms like Duolingo has enhanced engagement, motivation, and overall language learning outcomes. However, it is important to consider limitations such as the need for stable internet connections and the affordability of data packages. Overall, the findings suggest that Duolingo can significantly contribute to vocabulary acquisition, but it should be supplemented with other resources and explanations to maximize its benefits.

Meanwhile, The data extracting and data synthesis from 2017 to 2022 the data presented has different research objectives between, the first study evaluated the implementation of the Duolingo mobile application in English

vocabulary learning for elementary school teachers.[65] The second study investigated students' beliefs regarding the use of Duolingo in vocabulary classes and described the advantages of using Duolingo for vocabulary enrichment.[66] The third study Discussed and reviewed previous studies on using the Duolingo application to improve English vocabulary.[67] The fourth study investigated university students' perception of learning vocabulary through the Duolingo app.[68] The fifth study Identified university students' perception of learning vocabulary through Duolingo at Tadulako University.[69] The sixth study compared the effectiveness of teaching English vocabulary using Total Physical Response (TPR) and the Duolingo application. The aim was to determine which method was more effective in improving students' vocabulary mastery.[70] The seventh study was to explore the attitudes and experiences to learning English vocabulary by using Duolingo and to understand the students' reflections on Duolingo, including its benefits and

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[65] Ari Irawan, Agus Wilson, Sutrisno., The Implementation of Duolingo Mobile Application in English Vocabulary Learning, Scope: Journal of English Language Teaching - Vol. 05 Issue 01(September, 2020) 08-14., 2020.

[66] Herminingsih Dwi Ima, Exploring The Preservices Teachers' Perception Toward The Use of Duolingo in Teaching Vocabulary To Young Learners, Jurnal Bahasa Lingua Scientia, Vol. 13, No. 1, Juni., 2021.

[67] Anisa Dwi Tiara, M. Arinal Rahman, Ciptro Handrianto., The Students` Perception About Use of Duolingo Application for Improving English Vocabulary, International Journal of Education, Information Technology and Others (IJEIT), Vol. 4, No.4, December 2023.

[68] Gusti Ayu Komang Friska Sri Devi, Children Language Learning Vocabulary Through Mobile Applications: Duolingo., STILISTIKA (Journal of Indonesian Language and Literature), ISSN: 2808-8336, Vol.01, No.02: April 2022, pp-88-98., 2022.

[69] Renilza Nurshiyam, Sriati Usman, Agussatriana, Rofiqoh., University Students' Perception in Learning Vocabulary Through Duolingo, E-Journal of ELTS (English Language Teaching Society),p-ISSN 2338-1841, e-ISSN 2721-2157 Vol. 10 No. 3, September-December, 2022

[70] Aulia Firdausi, Dina Putriana, Nadia Farah Adriyanti, Zeni Susanti. Promoting Vocabulary Mastery: A Comparison of Total Physical Response (TPR) and Duolingo Application. International Journal of Applied Linguistics and English Literature, 10(2), 23-32. 2021

drawbacks.[71] The eighth study was to determine the effect of using the Autonomous Learning Model assisted by Duolingo on improving students' vocabulary mastery and to compare students' vocabulary mastery before and after the treatment.[72] The ninth study investigated the effectiveness of using the Autonomous Learning Model assisted by Duolingo in improving students' vocabulary mastery.[73]

Overall, The Overall Effects of Using Duolingo as a Language Learning Platform on Vocabulary Acquisition among Indonesian Learners According to the Journal Articles Published From 2017 to 2022, According to Nine Journals and Articles, the Research on implementing Duolingo in English vocabulary learning has consistently demonstrated its effectiveness in improving vocabulary mastery among various populations, including elementary school teachers, pre-service teachers, university students, and children. The studies have highlighted the positive perceptions of English instructors and students regarding using Duolingo as a language learning tool. Duolingo has been found to enhance classroom management, engagement, motivation, and overall language learning outcomes. Furthermore, the findings suggest that Duolingo can significantly contribute to vocabulary acquisition and enhance language learning experiences. Furthermore, it provides valuable insights for educators and policymakers in incorporating Duolingo as a gamified language learning tool in various educational settings has a positive impact.

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[71] Retno Wiyati & Shakilatasya Amelia., Students' Reflection Toward Learning Vocabulary Using Duolingo Application: The Journal of English Language Teaching, Literature, and Applied Linguistics [JELA]. Volume 4, Number 1, April (2018).

[72] Erfaini, E., & Miski, C. R. (2019). The Use of Duolingo in Enhancing Students' Vocabulary Mastery at SMA Negeri 3 Bangko Pusako During Pandemic Covid-19. Indonesian Journal of Integrated English Language Teaching, 8(1)

[73] Rais Abin & Netty Huzniati. The Effect of Using Autonomous Learning Model by Duolingo- Assisted to Improve Students' Vocabulary Mastery at VIII Class of SMPN 3 Buton Tengah. EduLine: Journal of Education and Learning Innovation. Vol. 2 No. 3 (2020).

2. **The Best Practices and Recommendations for Optimizing Vocabulary Learning Using Duolingo among Indonesian Learners Based on Journal Articles Published From 2017 to 2022**

Based on the articles journals published from 2017 – 2022 explained the scenario of using Duolingo to find out the Best Practices; the first study evaluated the implementation of the Duolingo mobile application as a learning tool for English language teaching, aiming to measure its effectiveness compared to traditional teaching methods. The researchers tested ten respondents and used software quality measurement techniques to assess the application. The results showed that the Duolingo application received a good score and can be applied in English vocabulary learning. The study also assessed the software quality and user requirements of the application, indicating a good performance. Furthermore, it can be concluded that the Duolingo application can make teaching and learning activities more effective and varied, providing alternative learning media for English language teachers. They also suggested that teachers actively motivate and encourage students to develop their vocabulary regularly.[74]

The second study involved using the Duolingo application to teach young learners vocabulary. The Research explores pre-service teachers' perceptions regarding using Duolingo for vocabulary learning. The findings indicate that most respondents agree that Duolingo can facilitate vocabulary learning, making it easier and more interesting for students. The app's features, such as customizable schedules and native speaker pronunciation, are seen as beneficial for students' vocabulary mastery. The study suggests that integrating Duolingo into vocabulary teaching can benefit students. The references also cover various topics related to teaching English vocabulary, including technology and

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[74] Ari Irawan, Agus Wilson, Sutrisno., The Implementation of Duolingo Mobile Application in English Vocabulary Learning, Scope: Journal of English Language Teaching - Vol. 05 Issue 01(September, 2020) 08-14., 2020

teaching methods.[75]

The third study discussed the challenges in education and how technology, specifically Duolingo, can be utilized to make teaching English more appealing. It emphasizes the importance of vocabulary in language learning. It describes Duolingo as a free language- learning tool that offers courses in multiple languages and incorporates gamification elements to motivate and engage students. The article also highlights the positive effects of using Duolingo, citing various studies demonstrating its benefits in increasing student interest, motivation, and achievement in learning English. Additionally, it mentions that Duolingo can be a valuable tool for teachers and students in face-to-face activities, ultimately concluding that Duolingo is an effective and exciting way to learn English.[76]

The fourth study involved ten children from a junior high school who were instructed to practice using the Duolingo app for ten days. During this period, the children engaged with the app to enhance their English vocabulary skills. The study aimed to assess the impact of using Duolingo on children's vocabulary learning. Pre-test and post- test scores were collected to measure any improvement in vocabulary mastery after the 10-day practice period. Additionally, the children's perceptions of using Duolingo were gathered through a questionnaire, which revealed their positive responses to the application, including finding it easy to use and helpful in learning vocabulary. The study concluded that Duolingo effectively improved the children's vocabulary and enhanced their learning experience.[77]

The fifth study explored university students'

[75] Herminingsih Dwi Ima, Exploring The Preservices Teachers' Perception Toward The Use of Duolingo in Teaching Vocabulary, Jurnal Bahasa Lingua Scientia, Vol. 13, No. 1, Juni., 2021

[76] Anisa Dwi Tiara, M. Arinal Rahman, Ciptro Handrianto., The Students` Perception About Use of Duolingo Application for Improving English Vocabulary, International Journal of Education, Information Technology and Others (IJEIT), Vol. 4, No.4, December 2023

[77] Gusti Ayu Komang Friska Sri Devi, Children Language Learning Vocabulary Through Mobile Applications: Duolingo., STILISTIKA (Journal of Indonesian Language and Literature), ISSN: 2808-8336, Vol.01, No.02: April 2022, pp-88-98., 2022.

perceptions of learning vocabulary through the language learning app Duolingo. The researchers used a qualitative descriptive research design and collected data through questionnaires and interviews. The results indicated that the students had a predominantly positive perception of learning vocabulary through Duolingo. The app was found to be easy to use, interesting, and helpful in learning vocabulary. However, it was noted that Duolingo requires an internet connection to access the material. Overall, the findings suggest that Duolingo is a beneficial tool for independent vocabulary learning. It was concluded, the study focused on university students' experiences with Duolingo for vocabulary learning, and the results indicated that the app was generally well-received, with students finding it helpful and motivating. However, they also faced some challenges, such as the need for an internet connection and difficulties with sentence arrangement.[78]

The sixth study discussed the suitability of Duolingo for vocabulary mastery in English language learning, highlighting its gamified and interactive approach, which has been proven to improve vocabulary acquisition and retention. The application's accessibility on smartphones, gadgets, and laptops is emphasized, making it convenient for students to learn anytime and anywhere. The limitations of the Total Physical Response (TPR) method are also mentioned, such as the inability to express opinions and ideas creatively and the need for face-to-face activities, which are unsuitable for the current pandemic situation. Overall, the scenario suggests that Duolingo offers students a more varied and effective learning experience than TPR.[79]

The seventh study explored the attitudes and experiences of three students using the Duolingo application

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[78] Renilza Nurshiyam, Sriati Usman, Agussatriana, Rofiqoh., University Students' Perception in Learning Vocabulary Through Duolingo, E-Journal of ELTS (English Language Teaching Society), p-ISSN 2338-1841, e-ISSN 2721-2157 Vol. 10 No. 3, September-December, 2022

[79] Aulia Firdausi, Dina Putriana, Nadia Farah Adriyanti, Zeni Susanti. Promoting Vocabulary Mastery: A Comparison of Total Physical Response (TPR) and Duolingo Application. International Journal of Applied Linguistics and English Literature, 10(2), 23-32. 2021

to learn English vocabulary. The students found the application helpful in providing detailed and structured learning materials and motivating them to continue learning. However, they also faced some drawbacks, such as unnatural sentences and repeated questions. Overall, the students had positive attitudes towards using Duolingo for vocabulary learning. The study found that students had positive attitudes toward the application due to its advanced features, immediate feedback, and well-structured materials. However, they also faced drawbacks such as unnatural sentences and a lack of grammar guidance. The study used a case study design, and data collection techniques included Observation and interviews. The findings showed that students found the application helpful in learning vocabulary and hoped to become more fluent in English.[80]

The eighth study investigated using the Duolingo app to enhance students' vocabulary mastery during the COVID-19 pandemic. It employed a quasi-experimental design with an experimental group using Duolingo and a control group without it. The results indicated that the students in the experimental group had significantly higher vocabulary mastery than the control group. The study suggests that Duolingo can effectively improve vocabulary skills in language learning, enhancing students' interest, motivation, and learning outcomes.[81]

The ninth study involved the use of the Duolingo application as a tool to assist language learning, particularly in the context of vocabulary mastery among eighth-grade students. The study utilized an experimental method with a one-group pretest-posttest design, involving 29 students from a middle school in Buton Tengah, Indonesia. Data was collected through vocabulary tests, questionnaires, and interviews to assess the impact of the Autonomous Learning Model assisted by Duolingo on students' vocabulary skills.

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[80] Retno Wiyati & Shakilatasya Amelia., Students' Reflection Toward Learning Vocabulary Using Duolingo Application: The Journal of English Language Teaching, Literature, and Applied Linguistics [JELA]. Volume 4, Number 1, April (2018)

[81] Erfaini, E., & Miski, C. R. (2019). The Use of Duolingo in Enhancing Students' Vocabulary Mastery at SMA Negeri 3 Bangko Pusako During Pandemic Covid-19. Indonesian Journal of Integrated English Language Teaching, 8(1)

The results indicated a significant improvement in students' vocabulary mastery after the treatment, demonstrating the positive impact of the autonomous learning model and the effectiveness of Duolingo as a medium for independent vocabulary learning. The study's findings also contribute to the broader discussion on using technology, such as the Duolingo app, to foster students' interest, independence, and improved learning activities in language education.[82]

Overall, Recommendations for Optimizing Vocabulary Learning Using Duolingo among Indonesian Learners Based on nine journal articles published from 2017 - 2022, the use of the Autonomous Learning Model assisted by Duolingo appears to be the most effective method for improving students' vocabulary skills. The Autonomous Learning Model, assisted by the Duolingo application, effectively improves students' vocabulary mastery, promoting independent learning and enhancing student motivation. This research has implications for language education, highlighting the potential of technology and autonomous learning methods to impact language learning positively. The findings also underscore the effectiveness of Duolingo in providing a new learning experience for students, with features such as image visualization, audio, and translation contributing to an enriched vocabulary learning experience. Autonomous Learning by using Duolingo can influence future educational practices, encouraging the integration of technology and autonomous learning methods to enhance language education and promote independent learning.

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[82] Rais Abin & Netty Huzniati. The Effect of Using Autonomous Learning Model by Duolingo- Assisted to Improve Students' Vocabulary Mastery at VIII Class of SMPN 3 Buton Tengah. EduLine: Journal of Education and Learning Innovation. Vol. 2 No. 3 (2020).