

Enhancing Elementary Students' Vocabulary Mastery Through Duolingo: A pre- Experimental Study

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Abstract. *Language learning is crucial for understanding diverse cultures and academic disciplines, with vocabulary mastery being essential for effective communication. This study examines the effectiveness of Duolingo in improving vocabulary proficiency among fourth-grade students at SD Muhammadiyah 11 Randegan. Despite the increasing integration of technology in education, there remains a knowledge gap in understanding the impact of such tools on young learners' vocabulary acquisition. Addressing this gap, the research aims to assess Duolingo's impact on vocabulary mastery in an elementary school setting. Employing a pre-experimental design, the study involved 21 students who participated in pre-tests and post-tests surrounding a treatment period using Duolingo. The pre-test assessed the students' initial vocabulary knowledge, followed by three treatment sessions using Duolingo, and concluded with a post-test to measure vocabulary improvement. Statistical analysis using the paired sample t-test revealed a significant increase in vocabulary scores, with the mean score rising from 75.71 in the pre-test to 88.33 in the post-test. The results indicate that Duolingo effectively enhances vocabulary mastery, as evidenced by the significant improvement in test scores. The study highlights Duolingo's potential to engage students through interactive learning, making it a valuable tool for vocabulary acquisition in elementary education. The implications of this research suggest that integrating technology-based learning media like Duolingo can significantly improve language abilities, providing educators with innovative methods to support young learners' language development. Further research is recommended to explore the long-term effects of using such applications across different age groups and educational contexts.*

Keywords - Duolingo, Vocabulary Mastery, Language Learning

Abstrak. *Pembelajaran bahasa sangat penting untuk memahami beragam budaya dan disiplin ilmu, dengan penguasaan kosakata yang penting untuk komunikasi yang efektif. Penelitian ini menguji efektivitas Duolingo dalam meningkatkan penguasaan kosakata di kalangan siswa kelas empat SD Muhammadiyah 11 Randegan. Meskipun integrasi teknologi dalam pendidikan semakin meningkat, masih ada kesenjangan pengetahuan dalam memahami dampak dari alat bantu tersebut terhadap penguasaan kosakata siswa. Untuk mengatasi kesenjangan ini, penelitian ini bertujuan untuk menilai dampak Duolingo terhadap penguasaan kosakata di lingkungan sekolah dasar. Dengan menggunakan desain pra-eksperimen, penelitian ini melibatkan 21 siswa yang berpartisipasi dalam pre-test dan post-test selama masa perlakuan dengan menggunakan Duolingo. Pre-test menilai pengetahuan kosakata awal siswa, diikuti dengan tiga sesi perlakuan menggunakan Duolingo, dan diakhiri dengan post-test untuk mengukur peningkatan kosakata. Analisis statistik menggunakan uji-t sampel berpasangan menunjukkan peningkatan yang signifikan dalam nilai kosakata, dengan nilai rata-rata meningkat dari 75,71 pada pre-test menjadi 88,33 pada post-test. Hasil penelitian menunjukkan bahwa Duolingo secara efektif meningkatkan penguasaan kosakata, yang dibuktikan dengan peningkatan skor tes yang signifikan. Penelitian ini menyoroti potensi Duolingo untuk melibatkan siswa melalui pembelajaran interaktif, menjadikannya alat yang berharga untuk penguasaan kosakata dalam pendidikan dasar. Implikasi dari penelitian ini menunjukkan bahwa mengintegrasikan media pembelajaran berbasis teknologi seperti Duolingo dapat secara signifikan meningkatkan kemampuan bahasa, memberikan metode inovatif kepada para pendidik untuk mendukung perkembangan bahasa siswa. Penelitian lebih lanjut direkomendasikan untuk mengeksplorasi efek jangka panjang dari penggunaan aplikasi semacam itu di berbagai kelompok usia dan konteks pendidikan.*

Kata Kunci - Duolingo, Penguasaan Kosakata, Pembelajaran Bahasa

I. INTRODUCTION

The ability to learn about diverse societies, cultures, and scientific disciplines is made possible by language. The mastery of language is greatly aided by vocabulary, which plays a significant role. Knowledge of vocabulary is usually believed to be vital for individuals who are learning a second language since having a limited vocabulary can significantly affect an individual's capacity to communicate effectively and achieve successful interactions [1]. Vocabulary is considered the foundation for communication and is widely acknowledged as the primary means of communication, nothing can be done without the vocabulary [2]. Vocabulary is the foundation of language and an essential component of learning a foreign language, connecting the four fundamental abilities of reading, writing, speaking, and listening [3]. For those learning a second language, vocabulary is often seen as an essential tool since inadequate vocabulary in the target language makes communication difficult [1]. The vocabulary is divided into two categories: Active vocabulary is taught to students for use in speech and writing and Passive vocabulary consists of the words that learners are familiar with and identify within a given context, usually present in reading and listening materials [4]. According to Brewster et al. [5], a vocabulary can be understood in four different ways: (a) through its form, (b) through its pronunciation, (c) through its meaning, and (d) through its usage.

Vocabulary mastery can be implemented as early as elementary school. English for Young Learners (EYL) refers to the initial group of English language learners, which is further categorized into two distinct groups: Individuals between the ages of 6 to 8 and individuals between the ages of 9 to 12. When compared to teaching adults, teaching young learners presents unique challenges because children at this age are typically more engaged, open to new experiences, and enthusiastic about learning. The process of learning English becomes complicated by a variety of issues, including the challenge of memorizing the meaning of a word, which leads to students feeling dull and hesitant in using the dictionary [6]. Therefore, teachers are expected to make the classroom a fun and interesting place for students to learn. In EYL learning, the teacher needs to give the students real-life examples of the things they are learning, like pictures of the words they need to learn or real objects [7]. This makes it undeniably different than learning at other levels. Pertiwi et al. [8] also state engaging students in the use of visuals and reality is one way for teachers to overcome delivery challenges when teaching English to EYL students and make learning more enjoyable. Teachers can utilize various forms of media to support the learning process within the classroom. Getting these issues is no longer difficult with technology.

These days, technology plays a part in both teaching and learning [9]. Technology integration has the potential to advance education in Indonesia by fostering an engaging and enjoyable learning environment through the implementation of technological teaching and learning processes [10]. The utilization of technology has facilitated new forms of representation, expression, and comprehension of languages, cultures, and the global landscape [11]. Language learning has also become more accessible with the development of new digital technologies. Using technology to learn a language helps students think more deeply, improves communication between teacher and student, focuses teaching on the learner, encourages independent learning, and boosts the effectiveness of teaching [12].

Many different applications make use of technology that can be utilized to support activities that are related to teaching and learning English. Various applications employ technology to facilitate English teaching and learning activities. Duolingo is an example of a widely recognized online language acquisition platform that received significant growing interest as a highly effective tool for teaching English to young learners. Luis Von Ahn and Severin Hacker created the free application Duolingo in November 2011, intending to provide free language education to people worldwide [13]. On its website, teachers may easily teach students the four English language abilities of reading, writing, speaking, and listening by using its platform. The four skills are present in Duolingo's learning activities, which include questions, small text to hear, and transcribed audio. To evaluate student's speaking proficiency, they are also required to record their pronunciation. To prevent students from becoming disinterested in the process of learning, one of the goals of using Duolingo is to make it easier for them to acquire new vocabulary through the use of games [14].

Numerous research has been conducted on how to increase English vocabulary through Duolingo. Research conducted by Irawan et al. [15], found that the Duolingo received a fairly good rating, so this application can be said to help teachers as a mobile application-based learning medium. Similar to Irawan, Habibie [9] also conducted research about the Duolingo that can be assumed Significantly impactful in shaping student's motivation to learn English. Ajisoko [16] also found that students' vocabulary mastery increased after being given the treatment. The questionnaire results indicate good responses from students. Hence, the objective of this study is to investigate the impact of Duolingo as an educational medium to increase student vocabulary in fourth-grade elementary school. After conducting an observation, SD Muhammadiyah 11 Randegan was chosen to be the research site. The location was selected because based on the observation, it shows that the learning process in the classroom primarily relies on traditional methods such as textbooks and whiteboards. According to the interview with the English teacher, it was discovered that the 4th-grade students at SD Muhammadiyah 11 Randegan were slightly lagging behind other schools

in their English language learning, particularly in terms of vocabulary. With this reason in mind, the researchers formulate the research Question: can Duolingo affect the students' vocabulary mastery at SD Muhammadiyah 11 Randegan?

II. METHODS

A. Research Design

This research uses a Quantitative research method that is based on experience and in the form of numbers that can be counted by determining data and measuring variables. This research will utilize the pre-experimental method, which includes a pre-test, treatment, and post-test. Sugiono [17] states that "the out comes of pre-experimental research are determined by dependent variables and are not solely affected by independent variables. This occurrence is possible due to the absence of a control variable and the non-random selection of samples".

Tables 1. One-Group Pretest-Posttest Design

Pre-test	Treatment	Post-test
O ¹	X	O ²

[18]

Description:

O1: Pre-test (before treatment is given)

O2: Post-test (after treatment is given)

X: Treatment

The researcher calculated the difference between two related samples using the Paired Sample t-test. The paired sample t-test is a statistical method used in comparative hypothesis testing to assess whether there is a significant difference in the means of two paired samples before and after given treatment [19]. In the paired sample t-test, the data are dependent since every value in the first sample pairs with a value in the second sample [20]. If the value of alpha (α) is less than 0.05, then the null hypothesis (H₀) is rejected and the alternative hypothesis (H_a) is accepted [21]. The procedure for doing a paired t-test in SPSS 22 involves performing the following steps: Analyze, Compare Means, Paired Samples T-Test, Enter Data, and Click OK.

B. Data Collection Techniques

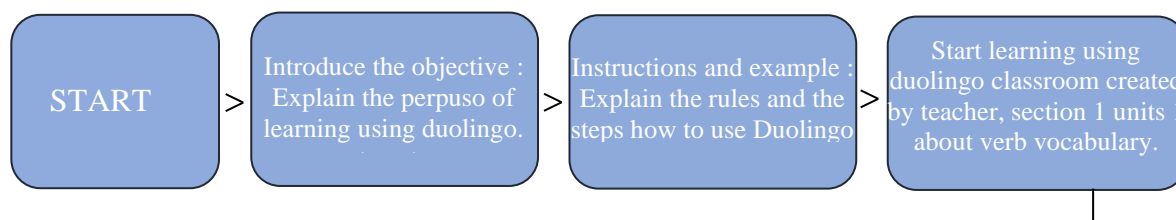
The research conducted at SD Muhammadiyah 11 Randegan, which is located at Randegan village, RT. 09 RW. 02, Tanggulangin, Sidoarjo, East Java. The research carried out in the even semester of the 2023/2024 school year, on May 2024. This research focused on a group of 21 students who are in the 4th grade at SD Muhammadiyah 11 Randegan. The researchers applied purposive sampling techniques. Sampling in this study is determined by the researchers and not taken randomly based on student learning activity since the number of students is fewer than 30. The researchers here employed instruments for pre-test and post-test assessments wich had been administered to students at other schools. The objective of this test is to assess the reliability of the questionnaire and other measurement tools. This is a valuable tool for assessing the suitability of the given questions and statements and determining if any should be excluded. Afterwards, the researchers established various phases to collect data, which are outlined as follows:

a. Pre-test

The pre-test were 20 multiple choices questions and 10 match the picture and the name question that contain basic vocabulary to assess student's comprehension of vocabulary.

b. Treatment

After the pre-test, the researchers provided treatment using Duolingo. Treatment was given for 3 meetings. with the following steps :



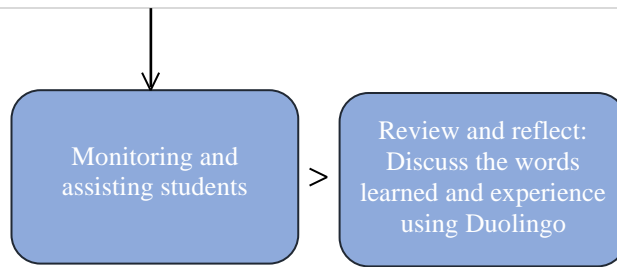


Figure 1. Meeting 1

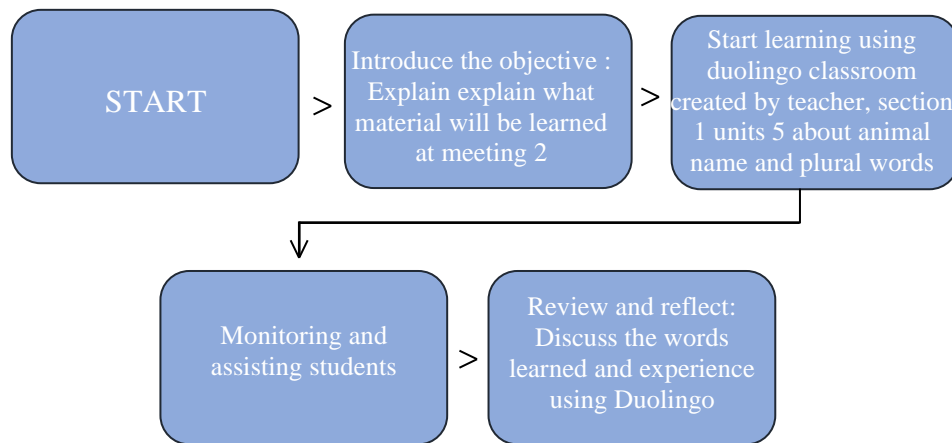


Figure 2. Meeting 2

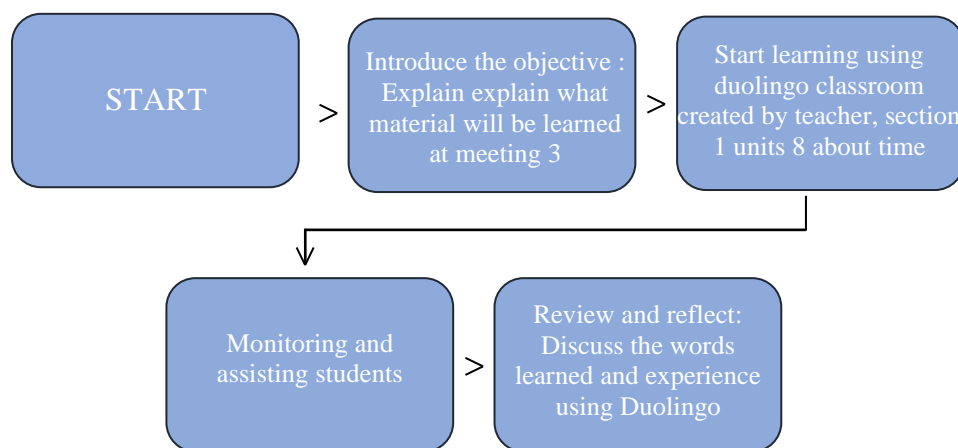


Figure 3. Meeting 3

c. Post-test

The post-test was conducted after the pre-test and treatment was given. The post-test is conducted to measure and find out whether students have improved after the treatment is carried out, and to assess the students' comprehension of the material taught using Duolingo as a learning media. The questions to be given are multiple choice with a total of 20 questions and 10 match the picture and the name question that contain basic vocabulary.

C. Data Analysis

A data analysis was performed to figure out the gaps in scores before and after the test. The analysis revealed the scores obtained both before and following the test. The researcher employed a statistical analysis, specifically the Paired Sample Test on SPSS, to evaluate the efficacy of Duolingo in enhancing students' vocabulary mastery.

III. RESULT AND DISCUSSION

A. Result

The research was conducted in class IV by starting with the pre-test, then giving treatment, and finally the post-test. The pretest was conducted to assess the students' abilities before any treatment was given. The purpose of the pretest was to establish a baseline understanding of the students' knowledge or skills before the intervention. Following this, the treatment was implemented to determine whether there would be an improvement in the students' abilities. This treatment involved using the Duolingo application, which was expected to enhance the student's skills in the tested area.

After the treatment, a posttest was administered to measure the final results and to determine if there was a significant change in the students' abilities compared to the pretest results. The posttest was designed to identify the differences in the student's abilities before and after the treatment, thereby evaluating the effectiveness of the Duolingo application in improving the students' abilities. By analyzing the results of both the pretest and posttest, the study aimed to understand the extent to which the intervention successfully enhanced the students' abilities.

Table 2. Paired Sample Statistic

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	75,7143	21	10,87264	2,37260
	Posttest	88,3333	21	12,28142	2,68003

The pretest and posttest scores were collected from the same 21 participants, indicating that the increase from an average of 75.7143 on the pretest to 88.3333 on the posttest was directly correlated to the treatment administered to this group.

Table 3. Paired Sample Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Different		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pretest-posttest	-12,6190	10,79572	2,35582	-17,5332	-7,70489	-5,357	20	,000

Referring to the paired samples test output table, the Sig. (2-tailed) value is 0.00, which is less than 0.05. with degrees of freedom of 20 and table value is 1,725, which indicated that the t-test value is greater than the t-table (5,357>1,725). Therefore, it can be concluded that there is an increase in student vocabulary after treatment using Duolingo.

B. Discussion

The research was conducted at SD Muhammadiyah 11 Randegan demonstrated the potential of Duolingo as an effective tool for enhancing vocabulary mastery among fourth-grade students. Over the course of three sessions, the study observed a significant improvement in students' vocabulary performance. The sessions included various instructional phases, starting with a pre-test to establish a baseline, followed by treatment using Duolingo, and concluding with a post-test to measure the effectiveness of the intervention. During the pre-test, students' initial vocabulary comprehension was assessed through multiple-choice questions and picture-word matching tasks. The average pre-test score was 75.71, indicating a moderate level of vocabulary knowledge prior to the intervention. The treatment phase involved three 30-minute sessions where students engaged with Duolingo's interactive language learning activities. Each session focused on different aspects of vocabulary, including verbs, animal names, plural forms, and time-related vocabulary such as days, months, and seasons.

The post-test results revealed a significant improvement, with the average score rising to 88.33. This increase in scores indicates that students' vocabulary mastery was positively impacted by the use of Duolingo. The paired sample t-test further validated these findings, showing a statistically significant difference between the pre-test and post-test scores. The null hypothesis, which posited no difference between the pre-test and post-test scores, was rejected in favor of the alternative hypothesis, confirming the efficacy of Duolingo as a vocabulary learning tool. The improvement in students' vocabulary can be attributed to several features of Duolingo that enhance the learning

experience. The application's gamified approach to language learning makes the process more engaging and enjoyable for students. By incorporating elements of play and competition, Duolingo captures students' attention and motivates them to participate actively in their learning. Additionally, the interactive exercises, which include listening, speaking, reading, and writing tasks, provide a comprehensive language learning experience that reinforces vocabulary acquisition.

The study's findings align with previous research on the effectiveness of technology-based language learning tools. For instance, [15] and [9] found that Duolingo significantly enhances students' motivation and vocabulary mastery. [16] also reported similar results, highlighting the positive impact of Duolingo on students' language learning outcomes. These studies support the conclusion that Duolingo can be a valuable addition to traditional classroom instruction, providing an alternative medium for vocabulary learning that is both effective and enjoyable. Moreover, the use of technology in education, as demonstrated by Duolingo, offers several advantages. It facilitates individualized learning, allowing students to progress at their own pace and revisit challenging concepts as needed. Technology also provides immediate feedback, which is crucial for reinforcing learning and correcting errors in real time. This interactive and responsive learning environment can significantly enhance students' engagement and retention of new vocabulary.

IV. CONCLUSION

In conclusion, SD Muhammadiyah 11 Randegans' vocabulary mastery significantly improved as a result of Duolingo's incorporation into the curriculum. The findings of this study highlight how technology and language learning combined can increase learning impact and engagement. The ongoing advancement of technology offers novel prospects for augmenting academic achievements, and resources such as Duolingo can assume a crucial function in this metamorphosis. The study can add to the expanding body of knowledge on the efficacy of educational technology by offering data-driven insights that can advise developers, policymakers, and educators on areas for improvement and best practices. The length of the study may be too short to observe long-term effects of using Duolingo on student performance. Longer-term studies would be needed to assess sustained benefits and potential drawbacks. Subsequent investigations may examine the utilization of Duolingo in various academic domains and grade levels to confirm its efficacy and adaptability as a teaching aid.

REFERENCES

1. ALQAHTANI, M. (2015). The importance of vocabulary in language learning and how to be taught. *International Journal of Teaching and Education*, III(3), 21–34. <https://doi.org/10.20472/te.2015.3.3.002>
2. Dakhi, S. (2019). The Principles and the Teaching of English Vocabulary: A Review Tira Nur Fitria. *Journal of English Teaching*, 5(1).
3. Wahyuni, R. (2020). *VOCABULARY GAMES TO INCREASE THE STUDENTS' VOCABULARY MASTERY AT DIFFERENT LEVEL OF LEARNING INTEREST*.
4. Jeremy Harmer. (2007). *Harmer_J_2007_The_Practice_of_English_La* (fourth edition). Harlow: Pearson Longman.
5. Brewster, J. E. G. & G. D. (2003). The Primary English Teacher's Guide New Edition. In *London: Penguin English*.
6. Rahmah, A., & Astutik, Y. (2020). EnJourMe (English Journal of Merdeka): Culture, Language, and Teaching of English Charades game: does it affect students' learning on English vocabulary? *English Journal of Merdeka): Culture, Language, and Teaching of English*, 5(1), 75–83. <https://doi.org/10.26905/enjourme.v4i2.4258>
7. Novitasari, E. D., & Malik, M. (2023). *THE EFFECTIVENESS OF DUOLINGO APPLICATION IN VOCABULARY MASTERY FOR ENGLISH FOR YOUNG LEARNERS IN MIN 1 MALANG THESIS ENGLISH EDUCATION DEPARTMENT FACULTY OF EDUCATION AND TEACHER TRAINING*.
8. Pertiwi, R. S., Salabiyati, I., Damara, D., & Pratolo, B. (2020). *The Teacher's Perspectives About Challenges of Teaching English for Young Learners: A Case Study at English Course for Young Learners*.
9. Alvons Habibie IAIN Sultan Amai Gorontalo, E. (2020). *DUOLINGO AS AN EDUCATIONAL LANGUAGE TOOL TO ENHANCE EFL STUDENTS' MOTIVATION IN LEARNING* (Vol. 9, Issue 1).
10. Matra, S. D., & Kunci, K. (2020). Duolingo Applications as Vocabulary Learning Tools. In *Journal of English Literature* (Vol. 1, Issue 1). <https://englishtest.duolingo.com>.
11. Chun, D., Smith, B., & Kern, R. (2016). Technology in Language Use, Language Teaching, and Language Learning. *Modern Language Journal*, 100, 64–80. <https://doi.org/10.1111/modl.12302>
12. I.H. SAYDAKHMATOVA. (2020). Use of Technology in Language Learning. *JournalNX- A Multidisciplinary Peer Reviewed Journal*, 6(11), 209–211. <https://doi.org/10.13189/ujer.2013.010317>

13. Munday, P. (2016). *The case for using DUOLINGO as part of the language classroom experience Duolingo como parte del curriculum de las clases de lengua extranjera*. 19(1), 83–101.
14. Anisa Dwi Tiara, M. Arinal Rahman, & Ciptro Handrianto. (2021). The Students` Perception About Use of Duolingo Application for Improving English Vocabulary. *International Journal of Education, Information Technology and Others (IJEIT)*, vol.4, 690–701.
15. Irawan, A., Wilson, A., & Sutrisno, S. (2020). The Implementation of Duolingo Mobile Application in English Vocabulary Learning. *Scope: Journal of English Language Teaching*, 5(1), 08. <https://doi.org/10.30998/scope.v5i1.6568>
16. Ajisoko, P. (2020). The use of duolingo apps to improve English vocabulary learning. *International Journal of Emerging Technologies in Learning*, 15(7), 149–155. <https://doi.org/10.3991/IJET.V15I07.13229>
17. Prof. Dr. Sugiyono. (2013). *METODE PENELITIAN KUANTITATIF KUALITATIF DAN R&D*. Alfabeta, Bandung.
18. Prof. Dr. Sugiyono. (2016). *Metode Penelitian Kuantitatif, Kualitatif dan R&D* (Cet. 23.). Bandung : Alfabeta.
19. Djoni Aminuddin, & Mulyadi. (2019). Efektivitas Layanan Informasi Karir Dalam Meningkatkan Kemampuan Perencanaan Karir siswa. *Consilium Berkala Kajian Konseling Dan Ilmu Keagamaan*, 6(2), 52–62. <http://jurnal.uinsu.ac.id/index.php/consilium>
20. Wilkerson, S., & Wilkerson, S. D. (2008). Application of the Paired t-test. In *Undergraduate Research Journal. Scholarly Note* (Vol. 5, Issue 1).
21. Sarah, M., Muna, K., & Rahmawati, H. (2022). THE EFFECT OF INFOGRAPHIC MEDIA USING THE DISCOVERY LEARNING MODEL ON STUDENTS' UNDERSTANDING OF THE CHEMICAL EQUILIBRIUM CONCEPT. *SPIN*, 4(2), 197–206. <https://doi.org/10.20414/spin.v4i2.5847>