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The Effects of Vocabulary Breadth and Depth on Junior High School Students' Reading Comprehension

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ABSTRACT

This study investigated the effects of breadth and depth of vocabulary knowledge, both partially and simultaneously, on the reading comprehension of junior high school students. A quantitative associative research design was employed using multiple linear regression analysis. The sample consisted of 31 second-year students at UPT SPF SMP Negeri 48 Makassar, selected through cluster random sampling. Data were collected using the Vocabulary Levels Test (VLT) to measure breadth of vocabulary knowledge, the Word Associates Test (WAT) to measure depth of vocabulary knowledge, and a multiple-choice reading comprehension test. The data were analyzed using descriptive statistics and multiple linear regression analysis, consisting of the partial test (t-test) and the simultaneous test (F-test). The findings revealed that breadth of vocabulary knowledge had a significant partial effect on reading comprehension (t = 8.028, Sig. = 0.000, Beta = 0.700), and depth of vocabulary knowledge also had a significant partial effect on reading comprehension (t = 3.482, Sig. = 0.002, Beta = 0.303). Furthermore, breadth and depth of vocabulary knowledge simultaneously had a significant effect on reading comprehension (F = 199.181, Sig. = 0.000), with a coefficient of determination (R^2) of 0.934, indicating that 93.4% of the variance in students' reading comprehension could be explained by both variables, while the remaining 6.6% was influenced by other factors outside this study. These findings suggest that English teachers should design vocabulary instruction that balances the expansion of students' vocabulary size with the deepening of their understanding of word meaning, usage, and context in order to improve students' reading comprehension.

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1. Introduction

Reading comprehension is a critical skill for academic success and effective communication. It refers to the ability to understand, interpret, and analyze written texts, a competence that is essential for students to access knowledge across various subjects (Smith et al., 2021). Reading is not merely a basic skill but a gateway to learning, critical thinking, and lifelong academic and personal development (Cho et al., 2021). Furthermore, reading comprehension involves several interconnected components that enable readers to process linguistic information and construct meaning from written texts (Baker et al., 2022). Effective comprehension also requires readers to employ appropriate strategies to monitor their understanding and construct meaning during the reading process (Afflerbach et al., 2020). However, individuals differ considerably in their reading ability, and one of the factors most consistently associated with this variation is vocabulary knowledge.

Vocabulary knowledge is commonly divided into two interrelated dimensions: breadth and depth. Breadth of vocabulary refers to the number of words a learner knows, whereas depth of vocabulary refers to how well a learner understands those words, including their meaning, usage, and relationships with other words (Dagnaw, 2023). Vocabulary knowledge encompasses multiple components that extend beyond the number of words learners recognize, including their understanding of word meanings, forms, and relationships with other lexical items (González-Fernández & Schmitt, 2020; Nation, 2020). Similarly, vocabulary learning involves developing knowledge of word forms, meanings, and uses to enable learners to recognize and apply vocabulary in different language contexts (Nation, 2001). The development of vocabulary breadth and depth during middle childhood has been shown to mediate the enhancement of reading comprehension, underscoring the interrelated nature of vocabulary and reading skills (Li et al., 2021). A comprehensive vocabulary base facilitates a deeper understanding of reading material (Rahman & Iqbal, 2019), and a significant correlation between vocabulary knowledge and reading efficacy has repeatedly been observed in EFL settings (Zano, 2022).

Reading comprehension depends not only on the number of words a learner knows, but also on the quality of that lexical knowledge and the context in which it is used. Measuring vocabulary knowledge therefore requires attention to different dimensions of lexical competence, since recognizing a word does not necessarily indicate a complete understanding of its meaning and use (Read, 2019). Mastering academic vocabulary is particularly important in this respect, since academic texts often contain low-frequency, discipline-specific terms that are essential for understanding complex arguments and abstract concepts (Read & Dang, 2025). Learners with substantial knowledge of high-frequency vocabulary may nonetheless experience difficulties in reading comprehension when the depth of their vocabulary knowledge is insufficient, indicating that vocabulary learning must extend beyond surface-level recognition to include nuanced meaning, morphological form, and collocational patterns (Masrai, 2019). These challenges are also reflected in students' difficulties in developing English vocabulary, which may constrain their ability to understand and use lexical items effectively (Aji et al., 2023).

In the Indonesian context, national data indicate that the Reading Interest Index increased from 66.77 to 72.44 points in 2024, reflecting a generally positive trend; nevertheless, challenges remain in sustaining reading habits, and strengthening the foundations of literacy requires effective educational interventions rather than policy support alone (Nasrullah et al., 2024). English is taught as a foreign language in Indonesia, and many secondary school students continue to face difficulties in reading comprehension due to limited vocabulary

knowledge. Understanding how both breadth and depth of vocabulary knowledge influence reading comprehension can therefore provide valuable insight for educators seeking to design more effective, needs-based teaching strategies.

Although many previous studies have examined the relationship between vocabulary knowledge and reading comprehension, most have focused on only one dimension of vocabulary at a time, without simultaneously examining both breadth and depth within the same context. In addition, most existing research has been conducted at the elementary or university level, leaving the secondary school population, particularly junior high school students, comparatively underexplored. This study therefore aims to fill this gap by investigating the effect of both breadth and depth of vocabulary knowledge on the reading comprehension of junior high school students. The research was conducted at UPT SPF SMP Negeri 48 Makassar, a public junior secondary school in Makassar, South Sulawesi, and is expected to contribute both theoretically, by providing empirical evidence on the multidimensional nature of vocabulary knowledge, and practically, by informing the design of vocabulary instruction that balances lexical breadth with lexical depth.

2. Method

This study employed a quantitative, non-experimental, associative research design, in which numerical data were collected to examine variables as they naturally occurred, without manipulating the independent variables (Creswell & Creswell, 2018). To answer the research question, a multiple linear regression analysis was used, a statistical technique appropriate for examining the relationship between one dependent variable and two or more independent variables (Creswell & Creswell, 2018; Hanley, 2016). In this study, breadth of vocabulary knowledge (X1) and depth of vocabulary knowledge (X2) served as the independent variables, while reading comprehension (Y) served as the dependent variable.

2.1 Research Design, Site, and Sample

Breadth of vocabulary knowledge is defined as the number of English words known by students and was measured using the Vocabulary Levels Test (VLT) developed by Nation (1983). Depth of vocabulary knowledge is defined as students' depth of understanding of English vocabulary, including meaning and word association, and was measured using the Word Associates Test (WAT) developed by Wesche and Paribakht (1996). Reading comprehension, the dependent variable, was measured using a multiple-choice reading comprehension test. The research was conducted at UPT SPF SMP Negeri 48 Makassar, located on Jl. Letjen Hertasning No. 4, Tidung, Makassar, South Sulawesi, during April-May 2026.

The population of this research consisted of the second-year students at UPT SPF SMP Negeri 48 Makassar. A sample of 31 students was selected through cluster random sampling, following two pilot studies (in Classes VIII.3 and VIII.4) that were conducted to examine the validity and reliability of the research instruments; items found to be invalid in the first pilot study were revised, and the second pilot study confirmed that all items were valid, with the reliability test indicating a high level of internal consistency (Cronbach's Alpha).

2.2 Technique of Data Collection and Analysis

Data collection proceeded through several steps: introducing the research to participants, preparing the instruments (VLT, WAT, and the reading comprehension test), conducting and revising the instruments based on a pilot study, administering the tests, and collecting and

scoring the data. Each correct answer was scored 2 points, while wrong or unanswered items were scored 0. Scores were converted to a 0-100 scale and classified into five achievement categories (Very Good, Good, Fair, Poor, Very Poor), adapted from Ha (2022).

Data were analyzed using descriptive statistics (frequency, mean, and standard deviation) to summarize the characteristics of each variable. Prior to the multiple linear regression analysis, classical assumption tests were conducted, comprising normality (Kolmogorov-Smirnov test), multicollinearity (Tolerance and Variance Inflation Factor/VIF), homoscedasticity (Glejser method), and linearity (ANOVA test of linearity). The multiple linear regression model used in this study is expressed as $Y = \beta0 + \beta1X1 + \beta2X2 + \varepsilon$, where Y denotes reading comprehension, X1 denotes breadth of vocabulary knowledge, X2 denotes depth of vocabulary knowledge, $\beta0$ is the constant, $\beta1$ and $\beta2$ are the regression coefficients, and ε is the error term. The partial effect of each independent variable was examined using the t-test, the simultaneous effect of both independent variables was examined using the F-test, and the coefficient of determination (R^2) was used to determine the proportion of variance in reading comprehension explained by the two predictors.

3. Result

a. Descriptive Statistics

Data were collected from 31 students who served as the respondents of this study. Descriptive statistics and multiple linear regression analysis were used to answer the research question.

Table 1. Descriptive Statistics

Variable	N	Mean	SD	Min	Max
VLT (X1)	31	71.39	24.77	40	100
WAT (X2)	31	73.76	23.34	33.33	100
RC (Y)	31	65.80	29.18	25	100

The Vocabulary Level Test (VLT), which measures breadth of vocabulary knowledge, obtained a mean score of 71.39 with a standard deviation of 24.77, ranging from 40 to 100. This indicates a fairly considerable degree of variation among students, with some demonstrating a still-limited vocabulary while others approached the upper end of the score range. The Word Associates Test (WAT), which measures depth of vocabulary knowledge, obtained a slightly higher mean of 73.76 (SD = 23.34), suggesting that students performed somewhat better in understanding semantic relationships between words than in recognizing words broadly. Reading Comprehension (RC) recorded a mean of 65.80 with a considerably larger standard deviation of 29.18, indicating that students' reading comprehension ability was more heterogeneous than their vocabulary knowledge and was likely influenced by a range of individual factors.

Table 2. Classification of Students' Breadth of Vocabulary Knowledge

Category	Score Range	Frequency	Percentage
Very Good	78-100	16	51.61%
Good	66-77	2	6.45%
Fair	56-65	0	0.00%
Poor	46-55	5	16.13%
Very Poor	0-45	8	25.81%
Total	-	31	100%

Table 3. Classification of Students' Depth of Vocabulary Knowledge

Category	Score Range	Frequency	Percentage
Very Good	78-100	15	48.39%
Good	66-77	4	12.90%
Fair	56-65	4	12.90%
Poor	46-55	4	12.90%
Very Poor	0-45	4	12.90%
Total	-	31	100%

Table 4. Classification of Students' Reading Comprehension

Category	Score Range	Frequency	Percentage
Very Good	78-100	15	48.39%
Good	66-77	2	6.45%
Fair	56-65	0	0.00%
Poor	46-55	1	3.23%
Very Poor	0-45	13	41.94%
Total	-	31	100%

Most students (51.61%) were categorized as Very Good in breadth of vocabulary knowledge, although 25.81% remained in the Very Poor category, indicating considerable variation. A similar pattern emerged for depth of vocabulary knowledge, where the largest proportion of students (48.39%) achieved the Very Good category, with the remainder distributed relatively evenly across the other categories. For reading comprehension, 48.39% of students achieved the Very Good category, while 41.94% fell into the Very Poor category, reflecting a wide gap between high- and low-performing students.

b. Classical Assumption Tests

Table 5. Normality Test of Regression Residuals

Test	Statistic	Sig.	Decision
Kolmogorov-Smirnov	0.087	0.200	Normally distributed

Table 6. Multicollinearity Test Results

Variable	Tolerance	VIF	Conclusion
Breadth of Vocabulary Knowledge (X1)	0.309	3.237	No multicollinearity
Depth of Vocabulary Knowledge (X2)	0.309	3.237	No multicollinearity

Table 7. Homoscedasticity Test (Glejser Method)

Variable	P-value	Decision
X1	0.246	No heteroscedasticity
X2	0.308	No heteroscedasticity

Table 8. Linearity Test Results

Relationship	Sig. (Deviation from Linearity)	Interpretation
X1-Y	0.287	Linear

X2-Y	0.120	Linear

The Kolmogorov-Smirnov test yielded a significance value of 0.200 ($p > 0.05$), indicating that the regression residuals were normally distributed. The multicollinearity test showed Tolerance values of 0.309 and VIF values of 3.237 for both independent variables, both within acceptable limits (Tolerance > 0.10; VIF < 10), indicating no multicollinearity. The Glejser test produced significance values of 0.246 (X1) and 0.308 (X2), both greater than 0.05, indicating homoscedasticity. Finally, the linearity test showed non-significant deviation-from-linearity values for both X1-Y (0.287) and X2-Y (0.120), confirming that the relationships between each predictor and reading comprehension were linear. All classical assumptions of multiple linear regression were therefore satisfied.

c. Multiple Linear Regression Analysis

Table 9. Model Summary

Statistic	Value
R	0.967
R Square	0.934
Adjusted R Square	0.930
Std. Error of Estimate	3.097

Table 10. ANOVA Test Results (F-test)

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3820.257	2	1910.128	199.181	<.001
Residual	268.517	28	9.590	-	-
Total	4088.774	30	-	-	-

Table 11. Coefficients (t-test)

Model	B	Std. Error	Beta	t	Sig.
(Constant)	-8.403	1.889	-	-4.449	0.000
X1	1.099	0.137	0.700	8.028	0.000
X2	0.506	0.145	0.303	3.482	0.002

The correlation coefficient (R) was 0.967, indicating a very strong positive relationship between breadth of vocabulary knowledge, depth of vocabulary knowledge, and reading comprehension. The coefficient of determination (R^2) was 0.934, indicating that 93.4% of the variance in students' reading comprehension could be explained jointly by breadth and depth of vocabulary knowledge, while the remaining 6.6% was attributable to factors outside this study.

The F-test produced an F value of 199.181 with a significance value below 0.001 ($p < 0.05$), leading to the rejection of the null hypothesis and confirming that breadth and depth of vocabulary knowledge simultaneously had a significant effect on students' reading comprehension. The t-test showed that breadth of vocabulary knowledge (X1) obtained t = 8.028 (Sig. = 0.000, Beta = 0.700), and depth of vocabulary knowledge (X2) obtained t = 3.482 (Sig. = 0.002, Beta = 0.303). Since both significance values were below 0.05, the null hypothesis was rejected for each variable, confirming that both breadth and depth of vocabulary knowledge had a significant partial effect on reading comprehension, with breadth exerting the stronger individual effect.

4. Discussion

This study aimed to investigate the effects of breadth and depth of vocabulary knowledge on the reading comprehension of junior high school students at UPT SPF SMPN 48 Makassar. The findings revealed that both breadth and depth of vocabulary knowledge had a significant partial effect on reading comprehension, and that the two variables also had a significant simultaneous effect, jointly accounting for 93.4% of the variance in students' reading comprehension scores. Students who possess a larger vocabulary and a deeper understanding of word meanings tend to comprehend texts more effectively because they experience fewer difficulties in recognizing vocabulary, interpreting contextual meaning, and constructing the overall meaning of a passage. These findings are discussed below in relation to the research question, the theoretical framework, and previous empirical studies.

The descriptive findings revealed noticeable differences in students' vocabulary knowledge and reading comprehension. Some students demonstrated strong vocabulary knowledge and performed well in reading comprehension, whereas others experienced considerable difficulty in both areas. This wide distribution suggests that vocabulary knowledge and reading ability are not uniformly developed among students in this setting, which is consistent with Nasrullah et al.'s (2024) observation that strengthening literacy foundations in Indonesia requires sustained and differentiated educational intervention rather than a one-size-fits-all approach. Students' difficulties in developing English vocabulary may also contribute to differences in their ability to recognize and understand lexical items during reading (Aji et al., 2023).

The findings indicate that students with broader vocabulary knowledge tend to achieve better reading comprehension. Knowing a larger number of words enables students to recognize key vocabulary in a text more easily, reducing lexical barriers during reading and allowing them to identify main ideas, understand supporting details, and construct the overall meaning of a passage. This finding is consistent with Fan (2020), who argues that breadth of vocabulary knowledge enables learners to recognize a wider range of words encountered in texts, thereby facilitating meaning construction, and with Firda et al. (2021), who explain that students with a larger vocabulary repertoire are more capable of understanding written texts because they encounter fewer unfamiliar words during reading. Nation (2001) similarly emphasizes the importance of vocabulary knowledge in second language learning, as learners need sufficient lexical resources to understand and process language input. Furthermore, Nation (2020) explains that vocabulary knowledge encompasses several dimensions, highlighting the importance of developing learners' lexical knowledge beyond the mere accumulation of individual words. These perspectives support the present finding that a broader vocabulary provides students with greater access to lexical information when processing written texts.

The findings also demonstrate that depth of vocabulary knowledge contributes independently to reading comprehension. Beyond recognizing words, students need to understand their meanings, contextual usage, collocations, and relationships with other words. Such knowledge enables students to interpret texts more accurately, especially when they encounter unfamiliar expressions, implied meanings, or complex sentence structures. Students with deeper vocabulary knowledge are more capable of making inferences, understanding figurative meaning, identifying relationships among ideas, and interpreting information that is not explicitly stated in a text. Reading comprehension therefore depends not only on the number of words students know, but also on how well those words are understood and applied in different contexts. This interpretation is supported by González-

Fernández and Schmitt (2020), who examine the relationships among different components of word knowledge and their order of acquisition. Their perspective reinforces the understanding that lexical competence involves interconnected dimensions rather than isolated knowledge of word meanings. Read (2019) also emphasizes the importance of considering different dimensions of vocabulary knowledge when assessing learners' lexical competence. Accordingly, the present findings suggest that students' understanding of word meanings, relationships, and contextual usage makes an independent contribution to their reading comprehension.

An important finding of this study is that breadth and depth of vocabulary knowledge complement each other in supporting reading comprehension, rather than functioning as separate abilities. Breadth of vocabulary knowledge provides students with access to a larger number of words encountered in a text, while depth of vocabulary knowledge enables them to interpret those words accurately according to their meaning and context. Students who know many English words but possess only superficial knowledge of them may still struggle to fully comprehend a text, whereas students who combine a wide vocabulary with a deep understanding of word meaning are better positioned to construct accurate and complete interpretations of what they read. This complementary relationship is consistent with the multidimensional perspective of vocabulary knowledge discussed by González-Fernández and Schmitt (2020) and Nation (2020), which recognizes that lexical competence involves multiple interconnected aspects of word knowledge. Read (2019) further highlights the importance of distinguishing different dimensions of vocabulary knowledge rather than treating vocabulary as a single, undifferentiated ability.

The very high R^2 value (0.934) obtained in this study supports the alternative hypothesis proposed in the theoretical framework, which posited that breadth and depth of vocabulary knowledge jointly and cumulatively influence reading comprehension rather than operating in isolation. This finding reinforces Li et al. (2021), who emphasized the interrelated nature of vocabulary breadth and depth in the development of reading comprehension during middle childhood, and is consistent with Rabadi (2023), who similarly found that both dimensions of vocabulary knowledge made substantial joint contributions to reading comprehension among English language learners. The magnitude of R^2 obtained in this study is notably high compared to several previous studies, which may be attributable to the relatively homogeneous educational context of the sample, all of whom were drawn from a single school, as well as the specific instruments used to measure breadth and depth of vocabulary knowledge. Nevertheless, the high explanatory power should be interpreted within the boundaries of the research sample and the variables included in the regression model.

This study contributes to the existing literature on vocabulary knowledge and reading comprehension in three key ways. First, it supports the multidimensional view of vocabulary knowledge suggested by Fan (2020); in the context of Indonesian junior high school EFL students, breadth and depth are shown to be distinct constructs that each make an independent, important contribution to reading comprehension rather than a single measure of vocabulary size. This interpretation is also consistent with González-Fernández and Schmitt's (2020) discussion of the interconnected components of word knowledge and Nation's (2020) explanation of the different aspects of vocabulary knowledge. Second, the finding that breadth exerts a stronger partial effect than depth provides context-specific data relevant to the ongoing debate about the relative importance of these two aspects in predicting reading comprehension, suggesting that their relative significance may change according to learners' developmental stage and overall proficiency. Third, the high combined explanatory

power of the two variables strongly supports the theoretical framework introduced in this study, reinforcing the views of Li et al. (2021) and Rabadi (2023) regarding the connected and complementary nature of these two vocabulary dimensions.

The findings of this study carry several practical implications for teaching English at the junior high school level. For teachers, the results suggest that vocabulary instruction should focus not only on increasing the number of words students recognize but also on deepening their understanding of these words through activities such as contextual usage practice, collocation exercises, and discussions about word meanings. This approach is consistent with Nation's (2001) perspective on vocabulary learning, which emphasizes the development of knowledge about word forms, meanings, and uses. Previous instructional research has also demonstrated the use of activities such as Show and Tell to support students' vocabulary development (Manda et al., 2022). Similarly, storytelling can provide opportunities for students to encounter and learn vocabulary through meaningful narrative contexts (Jannah et al., 2022). These instructional approaches may therefore be adapted to provide meaningful opportunities for developing both vocabulary breadth and depth. For curriculum designers and material developers, the strong combined effect of breadth and depth ($R^2 = 0.934$) indicates that reading materials and vocabulary exercises should be designed to develop both dimensions together rather than as separate or sequential goals. For students, the findings suggest that an effective vocabulary-learning strategy should balance the acquisition of new words with deliberate attention to how those words are used, since relying on breadth or depth alone may be less effective for reading comprehension than developing both dimensions simultaneously. For school administrators and policymakers, the significant effect found in this study highlights the need to dedicate sufficient time and resources to vocabulary development as a vital component of the English reading curriculum.

Despite these findings, several limitations should be acknowledged. The relatively small sample size of 31 students from a single junior high school limits the extent to which the findings can be generalized. In addition, this study focused only on breadth and depth of vocabulary knowledge as predictors of reading comprehension, without considering other potentially influential factors such as reading motivation, reading strategies, or background knowledge, which together accounted for the remaining 6.6% of unexplained variance. Future research should therefore replicate this study with larger and more diverse samples across multiple schools and include additional variables to better understand how vocabulary knowledge interacts with other factors in shaping reading comprehension among secondary school students.

5. Conclusion

This research was conducted to examine the effects of breadth and depth of vocabulary knowledge, both partially and simultaneously, on the reading comprehension of junior high school students at UPT SPF SMPN 48 Makassar. Data obtained from 31 students through the Vocabulary Levels Test (VLT), the Word Associates Test (WAT), and a reading comprehension test were analyzed using descriptive statistics and multiple linear regression analysis, consisting of the partial test (t-test) and the simultaneous test (F-test), with the coefficient of determination (R^2) used to determine the proportion of variance explained by the independent variables.

Breadth of vocabulary knowledge was found to have a significant partial effect on students' reading comprehension ($t = 8.028$, Sig. = 0.000), confirming that the number of words a student is able to recognize and understand at different frequency levels plays a substantial

role in determining how well that student comprehends a written text. Depth of vocabulary knowledge was likewise found to have a significant partial effect on reading comprehension (t = 3.482, Sig. = 0.002), demonstrating that understanding a word's precise meaning, synonyms, antonyms, collocational partners, and contextual usage remains an important, independent contributor to comprehension even after accounting for vocabulary breadth. Finally, breadth and depth of vocabulary knowledge simultaneously and significantly affected students' reading comprehension (F = 199.181, Sig. = 0.000), jointly explaining 93.4% of the variance in reading comprehension scores.

Taken together, these findings indicate that vocabulary knowledge, encompassing both its breadth and depth dimensions, is a powerful and statistically robust predictor of reading comprehension among junior high school students. Breadth of vocabulary knowledge exerted the stronger individual effect, suggesting that vocabulary size remains a foundational requirement for comprehension at this educational level, while depth of vocabulary knowledge contributed an additional, independent, and meaningful effect that should not be overlooked in teaching practice or future research.

Based on these conclusions, English teachers are encouraged to design vocabulary instruction that develops both the breadth and depth of students' vocabulary knowledge in a balanced way, combining regular exposure to diverse reading materials with explicit teaching of word meaning, collocation, and contextual usage. Students are encouraged to take a more active and strategic role in expanding their vocabulary through extensive reading, while also paying closer attention to how words are used in context rather than relying on isolated memorization. Future researchers may consider conducting longitudinal studies across a wider range of schools and educational levels, and may consider incorporating qualitative methods to gain deeper insight into how students draw upon their breadth and depth of vocabulary knowledge during the reading comprehension process.

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Conflict of Interest
The authors declare no conflict of interest.

Author Contributions
Novita Indriani: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft.
Samtidar Samtidar: Supervision, Validation, Writing – Review & Editing.
Nur Aeni: Supervision, Validation, Writing – Review & Editing.

Statement of the Use of AI

Artificial intelligence (AI) tools were used solely for grammar checking and language editing. The authors take full responsibility for the originality, accuracy, interpretation, and final content of the manuscript.

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