The Effect of Using Gemini AI on the Tenth-Grade Students' English Vocabulary of SMK YAPTA Takalar

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ABSTRACT

This research was conducted to investigate the effect of using Gemini AI on the English vocabulary of tenth-grade students at SMK YAPTA Takalar. The research had two main objectives: to measure the significant improvement in students' vocabulary and to explore their personal experiences while learning with the AI tool.The research employed an explanatory mixed-methods approach. Quantitative data were collected through pre-test and post-test vocabulary assessments from 22 students. Subsequently, qualitative data were gathered via semi-structured interviews with 9 selected students to gain deeper insights into their learning experiences. The findings revealed a statistically significant improvement in students' vocabulary scores. The mean score increased from 54.73 in the pre-test to 76.18 in the post-test, confirmed by a t-test result showing a significance value of 0.000. Qualitatively, students reported highly positive experiences, describing the learning process as entertaining, easier, and motivating. Students appreciated the instant feedback and contextual examples provided by Gemini AI, which boosted their confidence. Although minor challenges like complex AI language and internet dependency were noted, students did not overshadow the overall positive impact. In conclusion, the integration of Gemini AI has a significant effect on vocabulary acquisition and improves the student learning experience. These results suggest that AI-based tools like Gemini can be a valuable supplementary resource in English language teaching, supporting the creation of more dynamic and motivating learning environments for vocational high school students.

Keywords: *Artificial Intelligence, Gemini AI, English Vocabulary.*

1) INTRODUCTION

In the Indonesian educational context, English language learning has been a pivotal component for several decades. The importance of English as a global language has led to its integration as a compulsory subject from primary to secondary education levels (Fitriawan et al., 2021). Despite its prolonged emphasis, many students continue to face significant challenges in achieving proficiency, particularly in English vocabulary (Rofiki et al., 2022).

English vocabulary is widely recognized as a fundamental aspect of language learning, serving as a building block for effective communication across the four language skills: listening, reading, speaking, and writing (Suryanto & Yuliana, 2019). However, numerous obstacles impede students'

ability to develop English vocabulary. These obstacles include difficulties in memorizing English words, translating words between English and Indonesian, and mastering correct pronunciation (Fitriawan et al., 2021). Consequently, students often struggle to express themselves effectively, hindering their overall language development.

The Qur'an, as the divine revelation in Islam, underscores the importance of clear communication and understanding. In QS An-Nahl/16:4, Allah states:

خَلَقَ الْاِنْسَانَ مِنْ نُّطْفَةٍ فَاِذَا هُوَ خَصِيْمٌ مُّبِيْنٌ

> "He, The One and The Almighty, has also created humans from a drop of semen which outwardly seems insignificant, worthless, and powerless, yet it transforms into a strong and resilient human being, even changing into an outright denier of God and the essence of their own self."

This verse carries profound implications for the present study on vocabulary learning through Gemini AI. Just as Allah demonstrates how something seemingly simple can develop into something complex and meaningful, the process of vocabulary acquisition begins with basic words and gradually transforms into comprehensive language acquisition.

Traditional teaching methods and approaches have often fallen short in captivating students' attention and fostering active engagement in vocabulary learning (Reza, 2018). To overcome these challenges, educators and researchers have explored innovative strategies, including the incorporation of technology and multimodal approaches to language instruction (Blake, 2016). One promising avenue is the integration of artificial intelligence (AI) technologies, such as Gemini AI, a language model developed by Google.

Gemini AI combines advanced natural language processing capabilities with an intuitive user interface, enabling students to engage with vocabulary through various modalities, including visual representations, audio pronunciations, and contextualized examples (Islam & Ahmed, 2024). This multimodal approach caters to different learning styles and has the potential to improve English vocabulary and retention by providing personalized and interactive learning experiences (Suwastini et al., 2021).

By leveraging Gemini AI in the English language learning process, students at SMK YAPTA Takalar may benefit from an engaging and innovative approach to vocabulary instruction. This research aims to explore the effect of this AI-based tool of the tenth-grade students' English vocabulary, potentially paving the way for more effective and engaging language learning experiences.

2) METHODS

This research used Quan–Qual model, also known as the explanatory mixed method design. According to Mills & Gay (2019), in the explanatory mixed method design, quantitative data are collected first and are more heavily weighted than qualitative data. Following the quantitative phase, qualitative data was subsequently gathered and analyzed to provide deeper explanatory insights that elaborated on the initial quantitative results. This two-phase approach allowed researchers to first identify significant patterns or relationships through statistical analysis before using qualitative methods to explore the meanings and contextual understandings behind those quantitative findings (Creswell, 2018).

In this research, a Mixed-method approach was employed to answer the formulations of the problem. Mixed-method research designs integrated both quantitative and qualitative data within a single study. This approach aimed to leverage the combined strengths of these methods to achieve a more comprehensive understanding of a phenomenon than either could provide individually (Mills & Gay, 2019). The explanatory mixed method design was implemented, where a qualitative study or phase in a study came before a quantitative study or phase.

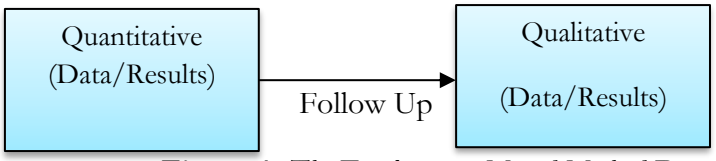


Figure 1: *The Explanatory Mixed Method Design*

(Mills & Gay, 2019)

In this research, the quantitative study's results guided the selection of qualitative data for a second phase involving its collection, analysis, and interpretation. Subsequently, the researcher utilized the qualitative analysis to explain or expand upon the initial quantitative outcomes.

3) RESULTS AND DISCUSSION

Results

The Significance of Using Gemini AI in Teaching English Vocabulary

This section presents the results of a quantitative descriptive study that investigates the significance of using Gemini AI in teaching English vocabulary. The data were collected through vocabulary tests administered to 22 students from class X-A of SMK YAPTA Takalar. A pre-test was conducted to measure the students' initial vocabulary knowledge before the implementation of Gem ini AI. The treatment was carried out in four sessions, where the researcher integrated Gemini AI as a learning tool to improve students' understanding and improving of English vocabulary. After the completion of all treatment sessions, a post-test was administered to evaluate the students' progress in learning English vocabulary through the use of Gemini AI.

This stage aimed to determine whether there was a significant improvement in students' English vocabulary after being taught using Gemini AI. The results of the vocabulary tests are presented in the form of tables to provide a clear visual representation of the students' vocabulary performance before and after the use of Gemini AI. This presentation serves as a descriptive analysis of the effect of Gemini AI on students' English vocabulary. Furthermore, the collected data were analyzed inferentially to determine the statistical significance of the differences between the students' pre-test and post-test scores.

a. Pre-test

In the pre-test, 22 students were given a test before using Gemini AI in learning English vocabulary, which took place on May 21, 2025, at SMK YAPTA Takalar.

Table 1. *Pre-test Score*

No.	Students	Pre-test Score	
		Correct Score	Score
1.	AJ	11	44

2.	A	16	64
3.	AA	13	52
4.	A	6	24
5.	A	15	60
6.	A	17	68
7.	FA	12	48
8.	F	17	68
9.	HWR	8	32
10.	KAL	14	56
11.	MARZ	18	72
12.	MRM	14	56
13.	NA	12	48
14.	NF	18	72
15.	P	17	68
16.	PA	12	48
17.	RAM	12	48
18.	R	15	60
19.	RW	16	64
20.	S	16	64
21.	SNF	11	44
22.	SR	11	44

Table 1 presents the pre-test scores of twenty-two tenth-grade students from SMK YAPTA Takalar, assessed before the implementation of Gemini AI in English vocabulary instruction. The scores ranged considerably, with the lowest score being 24 (Student A, No. 4) and the highest reaching 72 (Students MARZ and NF). The mean score of 54.73 indicates that students possessed moderate baseline vocabulary knowledge. However, the wide distribution of scores, spanning 48 points, suggests significant variability in students' initial English vocabulary proficiency. This disparity highlights the

diverse learning levels within the classroom, with some students demonstrating stronger foundational vocabulary skills while others require substantial improvement before the intervention.

An examination of individual student performance in Table 2. reveals specific patterns worthy of attention. Multiple students clustered at certain score points: three students scored 44, four scored 48, and three achieved 64, indicating common performance levels. The highest-performing students, MARZ and NF, both scored 72, demonstrating the pre-intervention ceiling of achievement. Conversely, Student A (No. 4) scored merely 24, representing the lowest vocabulary proficiency in the class. The standard deviation of 12.79 confirms substantial variation in students' baseline vocabulary knowledge. These initial measurements establish a critical baseline for evaluating the subsequent impact of Gemini AI integration on vocabulary acquisition and retention.

Table 2. *Pre-test Classification*

No.	Classifications	Scores	Frequencies	Percentage
1.	Excellent	80 – 100	0	0%
2.	Good	65 – 79	5	23%
3.	Fairly	50 – 64	8	36%
4.	Poor	0 – 49	9	41%
Total			**22**	**100%**

Table 3. categorizes the pre-test scores into four classification levels, revealing the initial vocabulary proficiency distribution among the twenty-two students. The data demonstrates a predominance of lower achievement levels, with nine students (41%) falling into the "Poor" category (0-49), representing the largest group. Eight students (36%) were classified as "Fairly" proficient (50-64), while five students (23%) achieved "Good" scores (65-79). Most significantly, zero students attained the "Excellent" classification (80-100), indicating that no participant demonstrated superior English vocabulary prior to the Gemini AI intervention. This distribution pattern suggests that the majority of students entered the study with an inadequate to moderate English vocabulary.

The pre-test classification results highlight critical gaps in students' English vocabulary knowledge before the implementation of Gemini AI. The cumulative percentage shows that 77% of students scored below 65, indicating that more than three-quarters of the class possessed below-average vocabulary proficiency. Only 23% demonstrated good performance, and the complete absence of excellent scores underscores the limited vocabulary expertise within the group. These findings establish a clear initial that emphasizes the necessity for effective instructional interventions. The concentration of students in the poor and fairly categories suggests substantial room for improvement and validates the rationale for integrating AI-assisted learning tools to improve English vocabulary outcomes.

b. Post-test

In the post-test, 22 students were given a test after using Gemini AI in learning English vocabulary, which took place on May 28, 2025, at SMK YAPTA Takalar.

Table 3: *Post-test Score*

No.	Students	Post-test Score	
		Correct Score	Score
1.	AJ	20	80
2.	A	17	68
3.	AA	17	68
4.	A	14	56
5.	A	21	84
6.	A	24	96
7.	FA	14	56
8.	F	21	84
9.	HWR	16	64
10.	KAL	18	72

11.	MARZ	22	88
12.	MRM	18	72
13.	NA	22	88
14.	NF	23	92
15.	P	22	88
16.	PA	14	56
17.	RAM	18	72
18.	R	22	88
19.	RW	19	76
20.	S	21	84
21.	SNF	13	52
22.	SR	23	92

Table 3. presents the post-test scores of twenty-two students following four sessions of Gemini AI-integrated vocabulary instruction at SMK YAPTA Takalar. The results demonstrate remarkable improvement across all performance levels, with scores ranging from 52 to 96, compared to the pre-test range of 24 to 72. The minimum score increased by 28 points, while the maximum score rose by 24 points, indicating substantial growth in vocabulary proficiency. Notably, eleven students achieved scores of 80 or above, placing them in the "Excellent" category. The mean score elevated to 76.18, representing a 21.45-point increase from the pre-test average. This significant upward shift suggests that Gemini AI effectively improved students' vocabulary learning outcomes.

Individual student performance reveals consistent improvement patterns following the Gemini AI intervention. Student A (No. 6) achieved the highest score of 96, demonstrating exceptional English vocabulary. Three students—NF and SR—scored 92, while four students attained 88, indicating strong performance in the excellent range. Even students who initially struggled showed notable progress; Student A (No. 4), who scored lowest in the pre-test with 24, improved to 56 in the post-test, gaining 32 points. Similarly, Student HWR advanced from 32 to 64, doubling their initial

score. These individual improvements demonstrate Gemini AI's effectiveness across diverse proficiency levels, benefiting both high-achieving and struggling learners.

Table 4: *Post-test Classification*

No.	Classifications	Scores	Frequencies	Percentage
1.	Excellent	80 – 100	11	50%
2.	Good	65 – 79	6	27%
3.	Fairly	50 – 64	5	23%
4.	Poor	0 – 49	0	0%
Total			**22**	**100%**

Table 4. illustrates the dramatic shift in score distribution following the Gemini AI intervention, with students demonstrating substantially improved ocabulary proficiency. The post-test classification reveals that eleven students (50%) achieved "Excellent" scores (80-100), a remarkable increase from zero students in this category during the pre-test. Six students (27%) attained "Good" scores (65-79), representing a slight increase from the pre-test's 23%. Five students (23%) remained in the "Fairly" category (50-64), down from 36% previously. Most notably, no students scored in the "Poor" range (0-49), completely eliminating the 41% who struggled initially. This redistribution demonstrates that Gemini AI effectively elevated student performance across all proficiency levels.

The post-test classification results provide compelling evidence of Gemini AI's positive impact on vocabulary learning outcomes. The 50-percentage-point increase in the "Excellent" category represents the most significant change, with half the class achieving superior English vocabulary. Combined with the "Good" category, 77% of students now scored above 65, a complete reversal from the pre-test where 77% scored below this threshold. The elimination of poor-performing students indicates that even the weakest learners benefited substantially from the AI-assisted instruction. This upward mobility across classification levels validates the effectiveness of integrating Gemini AI as a pedagogical tool for improving English vocabulary acquisition among vocational high school students.

c. Descriptive Analysis of Pre-test and Post-test

After computing the outcomes of the students' scores, the table below shows the value of the mean and standard deviation of the tenth-grade students at SMK YAPTA Takalar.

Table 5: *The Descriptive Analysis of Pre-test and Post-test*

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PreTest	22	24	72	54.73	12.792
PostTest	22	52	96	76.18	13.436
Valid N (listwise)	22				

Table 5. provides a comprehensive statistical comparison between pre-test and post-test results, revealing significant improvements in students' English vocabulary proficiency following the Gemini AI intervention. The mean score increased substantially from 54.73 in the pre-test to 76.18 in the post-test, representing a 21.45-point gain or approximately 39% improvement. The minimum score rose from 24 to 52, indicating that even the lowest-performing student achieved considerable progress. Similarly, the maximum score increased from 72 to 96, demonstrating improved performance among high-achieving students. The standard deviation slightly increased from 12.79 to 13.44, suggesting maintained variability in student performance despite overall improvement. These descriptive statistics collectively indicate that Gemini AI effectively improved English vocabulary learning outcomes.

The descriptive analysis underscores the intervention's comprehensive impact across the entire student population of twenty-two participants. The 28-point increase in minimum scores (from 24 to 52) demonstrates that Gemini AI particularly benefited struggling learners, elevating them from poor to fairly proficient levels. The 24-point rise in maximum scores (from 72 to 96) shows that high-performing students also experienced significant growth, reaching excellent proficiency. The mean

score improvement of 21.45 points positions the average student performance from the "Fairly" category into the "Good" range. The relatively stable standard deviation suggests that while individual differences persisted, the intervention systematically improved vocabulary knowledge across all proficiency levels, validating Gemini AI as an effective educational tool.

d. Test of Normality

To determine if the sample is normal or non-normal, the sample distribution must be examined prior to evaluating the research hypothesis. That test is known as the normality test. The purpose of the normality test is to examine all tests of hypotheses that compare a null hypothesis to a different hypothesis. The following hypotheses are addressed by the normality test result:

H0 = The null hypothesis

The sample has a normal distribution when the significance value is greater than 0.05 (sig > 0.05)

H1 = The alternative hypothesis

The sample is not normally distributed when the significance is less than 0.05 (sig < 0.05)

The normality test results are shown in the following table.

Table 6: *The Test of Normality*

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest	.129	22	.200*	.938	22	.178
PostTest	.174	22	.081	.928	22	.109

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From the table above, the significant value of the pre-test = 0.200 > 0.05 and the post-test = 0.081 > 0.05. It means that the samples are normally distributed.

e. T-Test

After finding out that the samples of the pre-test and post-test are normally distributed, the implication of this research is:

If significance (2-tailed) < 0.05, H0 is rejected and H1 is accepted,

If Significance (2-tailed) > 0.05, H0 is accepted and H1 is rejected.

The independent t-test is used to test the hypothesis and determine whether or not H0 or H1 is accepted.

Table 7: *One-Sample T-Test*

Paired Samples Test

		Paired Differences					Significance			
		MMean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	ddf	One-Sided p	Two-Sided p
Pair 1	PreTest - PostTest	-21.455	11.283	2.406	-26.457	-16.452	-8.919	21	<.001	<.001

Table 7. presents the paired samples t-test results, which statistically examine the significance of differences between pre-test and post-test scores following the Gemini AI intervention. The analysis reveals a mean difference of -21.455 points between the two tests, with a standard deviation of 11.283 and a standard error mean of 2.406. The 95% confidence interval ranges from -26.457 to -16.452, indicating that the true mean difference lies within this range with high certainty. The negative values signify that post-test scores were substantially higher than pre-test scores. The t-statistic value of -8.919 with 21 degrees of freedom demonstrates a strong statistical relationship between the intervention and improved vocabulary performance among the twenty-two participating students.

The significance value (2-tailed) of 0.000, which is considerably less than the alpha level of 0.05, provides definitive evidence that the improvement in students' English vocabulary scores was statistically significant rather than occurring by chance. This p-value indicates an extremely low probability that the observed

differences could have resulted from random variation. Consequently, the null hypothesis (H0), which assumes no significant difference between pre-test and post-test scores, is rejected. The alternative hypothesis (H1), proposing that Gemini AI significantly impacts students' English vocabulary learning, is accepted. These statistical findings validate the effectiveness of Gemini AI as a pedagogical intervention, demonstrating its measurable positive influence on vocabulary acquisition and improvement.

The robust t-test results confirm that the 21.45-point mean improvement observed in descriptive statistics represents genuine educational gains rather than statistical anomaly. The standard deviation of 11.283 indicates that while individual improvement varied among students, the overall positive effect remained consistent across the sample population. The narrow confidence interval strengthens the reliability of these findings, suggesting that similar results would likely occur with different student groups under comparable conditions. These inferential statistics, combined with the dramatic shift in score distributions from predominantly poor-to-fair performance toward good-to-excellent achievement, provide compelling quantitative evidence that integrating Gemini AI into English vocabulary instruction significantly improved learning outcomes for vocational high school students at SMK YAPTA Takalar.

The Students' Experience of Using Gemini AI in Learning English Vocabulary

This part provides the results of a qualitative descriptive study that investigates students' experience of using Gemini AI in learning English Vocabulary. Semi-structured interviews were used to gather data from nine students, outlined by O.Ajlouni et al. (2023) was used for analysis.

a. The Experience in Using Gemini AI

Table 8: *Frequency of the experience in using Gemini AI*

No.	Code	Respondents (R)	Frequency
1.	Entertaining	R1, R3, R6, R7, R8, R9	6
2.	Fairly entertaining	R2	1
3.	Improving English vocabulary	R4	1
4.	Helping to learn English vocabulary	R5	1

5.	Learning English vocabulary is easier.	R8	1

The majority of students found using Gemini AI for English vocabulary learning to be an entertaining experience. Six out of nine respondents (R1, R3, R6, R7, R8, R9) explicitly described their experience as entertaining, indicating a strong positive reception of the AI-assisted learning approach. This high frequency suggests that Gemini AI successfully created an engaging learning environment that differed from traditional vocabulary instruction methods. One respondent (R2) characterized the experience as "fairly entertaining," while others highlighted specific benefits such as improving English vocabulary (R4) and helping to learn English vocabulary (R5). The entertainment factor appears to be a crucial element in maintaining student motivation and engagement throughout the vocabulary learning process.

The diversity of responses demonstrates that while entertainment was the dominant theme, students also recognized practical educational benefits from using Gemini AI. Respondent R8 specifically noted that learning English vocabulary became "easier" suggesting that the platform successfully combined pedagogical effectiveness with engaging features. The fact that only one student described the experience as merely "fairly entertaining" while the rest expressed stronger positive sentiments indicates widespread satisfaction with the AI-assisted learning approach. This overwhelmingly positive reception suggests that Gemini AI addresses both the affective and cognitive dimensions of vocabulary learning, making it not only an effective educational tool but also an enjoyable one that students willingly engage with.

b. The Enjoyment in Using Gemini AI in Learning English Vocabulary

Table 9: *Frequency of enjoyment in using Gemini AI in learning English vocabulary*

No.	Code	Respondents (R)	Frequency
1.	Very enjoy	R1, R3, R5, R7, R8, R9	6
2.	Enjoy	R4, R6	2

3.	Fairly enjoy	R2	1

When examining students' enjoyment levels while learning English vocabulary with Gemini AI, the data demonstrates overwhelmingly positive responses. Six respondents (R1, R3, R5, R7, R8, R9) reported that they "very enjoy" the learning experience, representing the highest level of satisfaction and comprising two-thirds of the interviewed students. Two additional students (R4, R6) expressed enjoyment without the intensifier "enjoy," while only one respondent (R2) indicated they "fairly enjoy" the experience. This distribution pattern reveals that all nine interviewed students experienced some degree of enjoyment, with the vast majority expressing strong positive sentiments. The reasons cited for their enjoyment varied, including Gemini AI's ease of understanding, practical learning approach, speed of processing, ability to answer any question instantly, helpfulness in vocabulary learning, and the interactive nature of the platform.

The high enjoyment levels suggest that Gemini AI successfully transformed vocabulary learning from a potentially tedious task into an engaging and pleasurable educational activity. Students particularly appreciated the interactive and autonomous nature of the learning experience, with several respondents noting that they could ask questions freely and receive immediate answers, making them feel more engaged with the learning process. The fact that even the student who expressed the least enthusiasm (R2) still found the experience "fairly enjoy" indicates a baseline level of satisfaction that exceeded neutral or negative experiences. This universal positive reception is particularly significant in educational contexts where student motivation and engagement directly correlate with learning outcomes and long-term educational persistence.

c. Difficulties or Challenges of Using Gemini AI in Learning English Vocabulary

Table 10: *Frequency of difficulties or challenges of using Gemini AI in English Vocabulary*

No.	Code	Respondents (R)	Frequency
1.	Never	R1, R3, R4, R7, R9	5

2.	Hard to understand the word's meaning	R2	1
3.	AI's Language	R5, R6	2
4.	Many answers appeared.	R6, R8	2

Regarding difficulties and challenges encountered while using Gemini AI, the findings reveal that most students experienced minimal obstacles during their vocabulary learning journey. Five respondents (R1, R3, R4, R7, R9) reported never facing any difficulties, representing over half of the interviewed students and suggesting the platform's user-friendly interface and accessible functionality. This substantial majority experiencing no challenges indicates that Gemini AI was successfully designed to accommodate learners at various proficiency levels without creating significant barriers to use. The absence of difficulties for these students suggests effective implementation and possibly adequate training or orientation in using the AI tool.

However, some students did encounter specific challenges that warrant attention. Two respondents (R5, R6) mentioned that the AI's language was sometimes too complex, formal, or difficult to understand, indicating that the sophistication of AI-generated responses could occasionally exceed students' current English proficiency levels. Additionally, two students (R6, R8) noted that sometimes too many answers appeared simultaneously or responses were excessively long, which could create confusion or cognitive overload when seeking specific information. One student (R2) found it difficult to *understand* word meanings or explanations at times. These challenges, while present for some learners, represent minority experiences within the overall positive feedback. The nature of these difficulties suggests areas for potential improvement, such as adjusting AI response complexity to match learner levels or providing more concise, focused answers. Nevertheless, the fact that the majority experienced no difficulties demonstrates Gemini AI's general accessibility and usability for vocabulary learning purposes.

d. The Main Benefits of Using Gemini AI in Learning English Vocabulary

Table 11: *Frequency of the main benefits of using Gemini AI in learning English vocabulary*

No.	Code	Respondents (R)	Frequency
1.	Learning English vocabulary is easier.	R1, R5, R8, R9	4
2.	Knowing the meaning and how to use the word.	R2, R6, R9	3
3.	Getting quick feedback	R3	1
4.	Getting an answer is easier.	R4	1
5.	Improving English vocabulary	R7	1

The benefits students experienced while using Gemini AI for vocabulary learning were diverse and significant, revealing multiple dimensions of educational value. Four respondents (R1, R5, R8, R9) reported that learning English vocabulary became easier through the AI platform, suggesting enhanced accessibility to language learning resources and improved comprehension processes. Three students (R2, R6, R9) specifically appreciated gaining comprehensive knowledge about word meanings and how to use words in context, indicating that Gemini AI provided holistic vocabulary instruction beyond mere dictionary definitions. This contextual understanding is particularly valuable for vocabulary acquisition, as knowing how to use words appropriately in sentences is essential for genuine language proficiency.

Individual students mentioned additional unique benefits that further demonstrate the multifaceted value of Gemini AI. Respondent R3 highlighted receiving quick feedback and evaluation, which supports the immediate reinforcement crucial for effective learning. Respondent R4 appreciated the ease of obtaining answers, suggesting reduced barriers to information access. Respondent R7 noted improvement in acquiring specific vocabulary types, such as office-related terminology, indicating the platform's ability to support specialized vocabulary development. This variety of perceived benefits demonstrates that Gemini AI addressed multiple dimensions of vocabulary

learning, from immediate comprehension support and quick information retrieval to long-term vocabulary development and practical application skills. The platform appears to function not merely as a digital dictionary but as a comprehensive vocabulary learning companion that facilitates understanding, usage, and retention of English words.

e. The Disadvantages or Weaknesses of Using Gemini AI in Learning English Vocabulary

Table 12: *Frequency of the disadvantages or weaknesses of using Gemini AI in learning English vocabulary*

No.	Code	Respondents (R)	Frequency
1.	None	R1, R4, R5, R8, R9	5
2.	Internet connection	R2, R7	2
3.	Dependence on a specific prompt	R3	1
4.	AI's language	R6	1

The disadvantages and weaknesses students identified while using Gemini AI were relatively limited, with five respondents (R1, R4, R5, R8, R9) reporting no disadvantages whatsoever. This overwhelming majority represented over half of the interviewed students experiencing no drawbacks speaks to the generally positive implementation and reception of the AI tool. The absence of identified weaknesses among these students suggests that Gemini AI met or exceeded their expectations for vocabulary learning support and that any potential limitations were either minimal or did not significantly impact their learning experience. This finding is particularly noteworthy given that students were explicitly asked to reflect on negative aspects, yet many could identify none.

However, some students did identify specific limitations that deserve consideration. Two students (R2, R7) mentioned internet connection issues as a practical limitation, highlighting the dependency on stable network access for effective AI utilization. This technical constraint is particularly relevant in educational contexts where infrastructure may be inconsistent. One respondent (R3) noted a dependence on specific prompts, suggesting that the quality of AI responses was contingent upon how questions were formulated, which could disadvantage students less skilled in query formulation. Another student (R6) mentioned the AI's overly formal or complex language as a weakness, echoing

concerns about language accessibility raised in the challenges section. These identified weaknesses primarily relate to technical infrastructure and communication clarity rather than fundamental pedagogical flaws in the AI system itself, suggesting that addressing these practical concerns could further enhance the learning experience.

f. Boosting Confidence in Using Gemini AI in Learning English Vocabulary

Table 13. *Frequency of boosting confidence in using Gemini AI in learning English vocabulary*

No.	Code	Respondents (R)	Frequency
1.	Improving	R1, R2, R4, R5, R6, R7, R8, R9	8
2.	Only helps when that vocabulary is used.	R3	1

Gemini AI's impact on students' self-confidence in learning English vocabulary was remarkably positive, with eight out of nine respondents (R1, R2, R4, R5, R6, R7, R8, R9) reporting improved self-confidence. This near-unanimous agreement represents approximately 89% of interviewed students and indicates a significant psychological benefit beyond mere vocabulary acquisition. Students articulated various mechanisms through which confidence increased, including enhanced understanding of English vocabulary, the ability to learn independently and autonomously, reduced dependency on teacher availability, the ease and enjoyment of the learning process, and trust in the accuracy and comprehensiveness of AI-generated explanations. The confidence-building aspect is particularly important because learner self-efficacy strongly predicts sustained engagement, willingness to practice, and ultimately, successful language learning outcomes.

Only one respondent (R3) provided a more qualified response, suggesting that Gemini AI helped improve confidence specifically when the learned vocabulary was actually used in interactive and personal experiences, implying that confidence gains were contingent upon practical application rather than automatic. This nuanced perspective highlights an important consideration: that confidence may

require not just learning support but also opportunities for authentic language use. Nevertheless, the widespread improvement in self-confidence represents a crucial educational outcome that extends beyond immediate vocabulary knowledge to affect students' overall relationship with English learning. The ability to learn independently, access reliable information instantly, and experience success in vocabulary acquisition appears to have created a positive feedback loop where successful learning experiences fostered greater confidence, which in turn likely encouraged further learning engagement.

g. The Improvement of English Vocabulary by Using Gemini AI

Table 14: *Frequency of the improvement of English vocabulary by using Gemini AI*

No.	Code	Respondents (R)	Frequency
1.	Improving English vocabulary	R1, R2, R3, R4, R5, R6, R7, R8, R9	9

The effect of Gemini AI in improving students' English vocabulary received universal affirmation, with all nine respondents (R1, R2, R3, R4, R5, R6, R7, R8, R9) confirming that using the AI platform enhanced their vocabulary knowledge. This complete consensus represented 100% agreement stands as the strongest finding in the qualitative data, indicating that regardless of individual differences in enjoyment levels, challenges encountered, or specific benefits perceived, every interviewed student recognized tangible vocabulary improvement. Students attributed this improvement to various factors including better understanding and increased knowledge of English vocabulary, frequent exposure to new words and their usage, the ability to learn flexibly anytime and anywhere, encountering previously unknown words, and acquiring specialized vocabulary such as office-related terminology. The unanimity of this finding validates the quantitative results showing significant pre-test to post-test score improvements.

h. The Less of Effectiveness of Gemini AI in Learning English Vocabulary

Table 15: *Frequency of the less of effectiveness of Gemini AI in Learning English vocabulary*

No.	Code	Respondents (R)	Frequency

1.	None	R1, R3, R4, R5, R8, R9	6
2.	Complicated explanation	R2, R6	2
3.	Internet connection	R7	1

Regarding situations where Gemini AI might be less effective in helping students learn English vocabulary, six respondents (R1, R3, R4, R5, R8, R9) identified no such situations, representing two-thirds of the interviewed students. This substantial majority finding no circumstances where the AI was ineffective suggests consistent reliability and broad applicability across different learning contexts and vocabulary needs. These students felt that Gemini AI remained helpful and effective regardless of the specific vocabulary type, learning situation, or individual needs they encountered. This perception of consistent effectiveness indicates that the AI platform successfully adapted to various learner requirements and maintained its educational value across diverse vocabulary learning scenarios.

However, some students did identify specific situations where effectiveness was diminished. Two students (R2, R6) mentioned that overly complicated, circular, or indirect explanations occasionally reduced effectiveness, particularly when answers did not directly address their intended questions or when the language used was too complex for their comprehension level. This feedback suggests that clarity and directness of communication remain important factors in AI effectiveness. One student (R7) again referenced internet connectivity issues as a limiting factor, noting that lack of mobile data or poor signal reduced the platform's effectiveness by preventing access altogether. These situational limitations, while identified by a minority of students, highlight practical considerations for implementing AI-assisted learning. The technical dependency on internet connectivity represents an infrastructural challenge beyond the AI's pedagogical design, while communication clarity issues suggest potential areas for improving AI response calibration to learner proficiency levels.

Discussion

The findings of this study clearly demonstrate that the use of Gemini AI had a significant positive impact on the vocabulary learning outcomes of tenth-grade students at SMK YAPTA Takalar. Both quantitative and qualitative data confirm that integrating Gemini AI into English vocabulary instruction improved students' performance, engagement, and confidence. These findings align with the growing body of research supporting the effectiveness of Artificial Intelligence (AI) in improving English language learning (O.Ajlouni et al., 2023)

a. The Effect of Gemini AI in Improving English Vocabulary

The quantitative results revealed a substantial improvement in students' English vocabulary after learning with Gemini AI. The mean score increased from 54.73 to 76.18, showing a 21.45-point gain, and the t-test result (Sig. 2-tailed = 0.000 < 0.05) confirmed a statistically significant effect. This indicates that Gemini AI effectively enhanced vocabulary learning outcomes.

This finding is supported by O.Ajlouni et al. (2023), who reported that AI-assisted platforms promote individualized learning experiences that significantly improve learners' understanding and vocabulary retention. Similarly, Kohnke et al. (2022) found that using AI-based applications facilitates personalized vocabulary practice and provides immediate feedback, helping students recall and apply new words more efficiently.

In line with Nation's (2001) theory, effective vocabulary learning occurs through repeated exposure and meaningful use of words. Gemini AI's interactive features provide contextual examples and immediate explanations, fulfilling these essential conditions. The improvement across all proficiency levels from poor to excellent indicates that the AI tool supported diverse learners, making vocabulary learning more inclusive and accessible (Rahman & Irmawati, 2023).

Therefore, the significant quantitative improvement in test scores, supported by established theories of vocabulary acquisition, confirms that Gemini AI is not merely a technological novelty but

a potent pedagogical tool that effectively facilitates vocabulary growth by providing the repeated, contextualized exposure essential for learning.

b. Students' Experiences and Perceptions of Using Gemini AI

The qualitative findings reinforce the quantitative results, showing that students perceived Gemini AI as entertaining, engaging, and effective. Most participants stated that learning vocabulary through Gemini AI was "fun" and "not boring," and that they could "ask anything and get answers instantly." Such positive affective responses demonstrate the motivational power of AI-based learning environments. Alnajdi (2023) highlights that enjoyable and interactive learning experiences increase student motivation, which directly contributes to improved achievement.

Students also reported that Gemini AI helped them understand word meanings and usage, offering examples in context. This finding echoes Kessler (2023), who stated that AI-driven feedback enhances autonomous learning and deepens students' comprehension. The ability to interact freely and receive instant, personalized responses makes AI an effective "digital tutor," fostering both independence and curiosity among learners.

In essence, the positive student feedback highlights that Gemini AI's value extends beyond academic outcomes; it successfully transforms vocabulary learning from a tedious task into an engaging and motivating process, thereby addressing crucial affective factors that are fundamental to sustained language learning.

c. Challenges and Limitations in Using Gemini AI

Despite the overall positive perception, some students reported challenges such as difficulty understanding Gemini AI's complex or formal language, or confusion when too many answers appeared at once. These issues suggest that AI output sometimes exceeds learners' linguistic proficiency. This aligns with Godwin-Jones (2023), who emphasized the importance of linguistic adaptability in AI tools to prevent information overload and maintain clarity.

Additionally, internet connectivity was mentioned as a technical barrier by a few participants. Similar challenges were noted by Alshammari (2023), who argued that infrastructural limitations can hinder the full potential of digital learning tools in schools. Nevertheless, these issues were minimal and did not affect the overall effectiveness of the AI-based learning process.

Consequently, while these challenges were minor and did not detract from the overall success of the intervention, they underscore the importance of pedagogical mediation, such as training students on effective prompting and ensuring reliable infrastructure to fully optimize the use of AI in educational settings.

d. The Psychological and Motivational Impact of Gemini AI

Another important finding of this study is the improvement in students' self-confidence when learning English vocabulary with Gemini AI. Eight out of nine interviewees stated that they felt more confident and motivated to learn English after using the AI. This finding supports Dörnyei's (2001) theory that motivation and self-efficacy are key determinants of successful language learning.

Students attributed their increased confidence to the ease of understanding, instant feedback, and non-judgmental environment offered by Gemini AI. These results are consistent with Rahman and Irmawati (2023), who found that AI-assisted instruction enhances learner confidence by providing flexible, student-centered learning opportunities. The immediate and accurate feedback offered by Gemini AI also reduced students' anxiety and hesitation when exploring new words, fostering a supportive learning atmosphere that promotes active participation.

Ultimately, this boost in confidence and self-efficacy, fostered by a supportive and responsive learning environment, is a critical outcome, as it empowers students to take ownership of their learning journey and builds the psychological resilience needed for long-term language acquisition.

e. Pedagogical Implications

The overall findings suggest that Gemini AI can be an effective pedagogical tool for teaching English vocabulary, particularly for vocational school students who often have limited exposure to

authentic English environments. The combination of statistical improvement, positive perception, and increased self-confidence implies that AI integration supports both cognitive and affective learning domains.

This result aligns with Lin and Mubarok (2022), who noted that AI technologies not only improve language competence but also improve learners' attitudes toward English learning. By enabling real-time feedback, contextual understanding, and learner autonomy, Gemini AI helps transform traditional, teacher-centered classrooms into technology-enhanced, learner-centered environments. Therefore, the use of AI tools like Gemini can be a valuable innovation in English education, especially in contexts where teachers aim to promote independent learning and motivation among students.

In summary, the findings strongly advocate for the integration of AI tools like Gemini into the English curriculum, as they offer a viable means to create a more dynamic, learner-centered classroom that supports both the cognitive and affective dimensions of learning, particularly in vocational contexts.

4) CONCLUSIONS

The results of the quantitative data show that the use of Gemini AI significantly improved students' English vocabulary. The mean score increased from 54.73 in the pre-test to 76.18 in the post-test, and the significance value of $0.000 < 0.05$ indicates a statistically significant difference between the two tests. This means that the improvement was not random but the result of the AI-assisted learning intervention. This finding proves that Gemini AI can effectively improve vocabulary learning because of its interactive, responsive, and adaptive features. The application offers instant explanations, examples in context, and opportunities to practice using words meaningfully. These features help students understand not only the definition of a word but also how it is used in sentences.

From the qualitative analysis, it was evident that the students' responses toward Gemini AI were highly positive. Most participants described the learning process as fun, interesting, and helpful, saying that it made learning vocabulary easier and less boring. The majority of students also mentioned that they enjoyed the interactive nature of Gemini AI, especially because it allowed them to ask any question and receive immediate feedback. Furthermore, almost all students stated that Gemini AI

increased their motivation and self-confidence in learning English. They felt more independent because they could learn anytime and anywhere without always relying on the teacher. However, a few students mentioned challenges such as internet connection issues and difficulty understanding complex responses from the AI. These limitations, however, did not diminish their overall satisfaction and perception of Gemini AI as a useful and enjoyable tool for learning vocabulary.

Suggestion

Based on the research findings, several suggestions can be offered to improve the implementation of Gemini AI in English vocabulary instruction. Teachers should provide initial training sessions to help students formulate effective prompts and navigate the AI interface efficiently, addressing the challenge of dependence on specific prompts mentioned by some participants. Additionally, educators should monitor AI-generated responses to ensure they match students' proficiency levels, as several students reported difficulty understanding overly complex or formal language. Schools should also consider establishing backup learning strategies for situations where internet connectivity is unreliable, such as preparing offline vocabulary materials or scheduling AI-assisted sessions during periods of stable connection. Furthermore, teachers could integrate Gemini AI with traditional teaching methods rather than replacing them entirely, creating a blended learning approach that combines AI's instant feedback with human guidance and peer interaction.

For future research, scholars should investigate the long-term retention effects of vocabulary learned through Gemini AI by conducting delayed post-tests several weeks or months after the intervention. Comparative studies examining different AI platforms or comparing Gemini AI with other digital vocabulary learning tools would provide valuable insights into optimal technology selection. Additionally, research involving larger and more diverse student populations across different grade levels and school types would strengthen the generalizability of findings. Researchers should also explore strategies to customize AI responses according to individual learner proficiency levels, potentially developing guidelines for teachers to adjust AI settings or prompt formulations. Finally, investigating the effectiveness of Gemini AI for teaching other language skills beyond vocabulary, such as grammar, reading comprehension, or writing, would expand understanding of AI's comprehensive role in English language education.

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