THE CORRELATION BETWEEN THE USE OF STUDENT-CENTERED STRATEGIES AND STUDENTS' UNDERSTANDING OF ENGLISH VOCABULARY TESTS IN ELECTRICAL ENGINEERING CLASSES

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Abstract: Effective vocabulary acquisition is essential for students to engage with technical materials and succeed in professional environments in vocational education. This study investigates the correlation between student-centered learning strategies and students' understanding of English vocabulary in electrical engineering classes at SMKN 6 Bandung. Using a quantitative correlational method, data were collected from 36 tenth-grade electrical engineering students through a structured questionnaire and a vocabulary comprehension test. The instruments were validated, and reliability was confirmed with a Cronbach's Alpha value of 0.729. To analyse the data, descriptive statistics and Pearson's correlation were applied. The results revealed a strong positive correlation ($r = 0.852$, $p < 0.001$) between the implementation of student-centered strategies and students' performance on the vocabulary test. Moreover, 69.5% of students scored at or above the 70th percentile, with 36.1% achieving perfect scores. These findings are consistent with Gagné's instructional model, indicating that a structured and student-centered learning approach enhances cognitive processing and promotes better vocabulary retention. The study concludes that incorporating student-centered strategies in technical English instruction significantly improves student outcomes and recommends further research across diverse vocational disciplines to confirm the generalizability of these results.

Keywords: English vocabulary, electrical engineering, student-centered learning, technical education, vocabulary acquisition

INTRODUCTION

Despite increasing support for student-centred pedagogy, teacher-centred practices remain widespread, especially among novice teachers who may rely on authoritative methods due to limited experience or low confidence (Karasova & Nehyba,

2025). Many educators prefer teacher-led instruction to maintain classroom control, and some resist student-centred methods because of long-held beliefs about what constitutes effective teaching (Karasova & Nehyba, 2023). Teaching itself is a multifaceted process aimed at transmitting knowledge and skills across educational levels (Ayua, 2017). Broadly, teaching strategies fall into two categories: teacher-centred approaches, where teachers serve as the main source of knowledge and students take a passive role (Mascolo, 2009), and student-centred approaches, which promote active learning through inquiry, cooperation, and problem-solving.

Both approaches are essential for effective teaching, and successful instruction requires balancing them to meet students' diverse needs. In this model, the teacher shifts from being a direct instructor to a facilitator who guides learning. Petrovic et al. (2022) describe student-centred pedagogy as a collaborative partnership that empowers learners to take an active role in constructing knowledge. This environment encourages students to express ideas and think critically (Keiler, 2018). Implementing such approaches also requires teachers to engage in reflective practice and adapt instruction to diverse learning styles and backgrounds (Nazim et al., 2024).

Communicative Language Teaching (CLT) exemplifies a student-centred approach that emphasizes authentic language input as essential for meaningful learning experiences. According to Kaygisiz (2020), language input plays a vital role in developing learners' skills in the target language, especially through

message-oriented tasks. The use of authentic materials and real-life contexts enhances learners' interest and prepares them for genuine communication. Similarly, Eroz and Akbarov (2016) note that CLT connects language learning to real-world use, thereby creating relevant and engaging learning experiences. This student-centred nature of CLT promotes learner autonomy and motivation by encouraging students to take responsibility for their learning. Ilyas et al. (2021) highlight that CLT prioritizes interaction, using the target language as a medium for communication and collaboration rather than for rote memorization. Consequently, CLT not only improves language skills but also fosters critical thinking and problem-solving abilities. In vocational settings such as SMKN 6 Bandung, where students focus on electrical engineering, specific English instruction related to technical materials is crucial to ensure language use is relevant to future workplace contexts. Thus, integrating communicative and context-based strategies can strengthen students' language proficiency and prepare them for professional communication in their field.

Student-centred learning (SCL) emphasizes active engagement and learner autonomy, enabling students to construct knowledge through exploration, collaboration, and reflection. Martin-Alguacil et al. (2024) explain that SCL transforms learners from passive recipients into active participants. This approach supports vocabulary instruction by encouraging students to practice technical terms in authentic contexts. It also boosts motivation and

ownership of learning (Wang, 2023; Demir, 2024). Through collaborative and inquiry-based tasks, students develop higher-order thinking and problem-solving skills that prepare them for academic and professional demands (Dewsbury et al., 2022). Overall, SCL promotes independence and a deeper understanding while strengthening vocabulary mastery through meaningful language use.

Vocabulary acquisition is a key component of language learning, as insufficient vocabulary limits effective communication (Alqahtani, 2015). Interactive strategies such as games and storytelling help build contextual understanding and retention, while a broad vocabulary enables learners to write clearly and adapt their style to different audiences (Harli et al., 2024). Kiliç (2019) distinguishes between receptive and productive vocabulary, both crucial for technical English proficiency. Thus, mastering vocabulary through engaging, meaningful activities is essential for improving students' overall language competence.

Although student-centred learning offers clear benefits, its implementation in vocational high schools—especially in engineering fields—remains underexplored. Teachers often struggle to apply this approach due to complex subject matter and the need for specialized instructional adjustments. This gap underscores the need for further research on student-centred strategies in technical vocational contexts such as electrical engineering.

The theoretical framework of this study draws on Gagné's Five Events of Instruction (Kruse, 2009), which provides a structured sequence

that supports learners' cognitive processes and aligns well with student-centred vocabulary learning. Research shows that student-centred approaches are effective: Li et al. (2021) found that they significantly improve academic performance, while Fayzullakulovna and Kizi (2022) reported gains in students' lexical competence through autonomous and interactive vocabulary instruction. Guided by these foundations, the present study examines the correlation between student-centred teaching strategies and students' understanding of English vocabulary in electrical engineering classes. The results are expected to offer both theoretical and practical insights for strengthening EFL instruction in vocational education.

This study addresses two main research questions: (1) How significant is the correlation between student-centred learning strategies and students' responses in English vocabulary learning? and (2) What is the students' understanding of the use of student-centred learning strategies in English vocabulary tests?

METHODOLOGY

The research applied a quantitative correlational research design to examine the relationship between student-centered learning strategies and students' comprehension of English vocabulary in vocational engineering education. Quantitative research describes an issue by describing trends or explaining the relationship between variables (Creswell, 2012). An explanatory correlational design was chosen to explore the degree and direction of the relationship between

the independent variable, Student-centered strategies, and the dependent variable, students' vocabulary comprehension, without experimental manipulation (Creswell, 2012).

SMKN 6 Bandung, a vocational school providing an Electrical Engineering Study Program, was used to conduct the study, which provided a suitable background for analyzing technical vocabulary teaching. The population size consisted of 36 tenth-grade students, chosen through total sampling, as the number of students per class is relatively small and meets the minimum number of respondents required in correlational studies (Creswell, 2012).

The data were collected using two main instruments: a Likert-scale questionnaire to capture students' perceptions of student-centered strategies and a comprehension test to measure their understanding of English technical vocabulary. The data analysis process included descriptive statistics, mean, standard deviation, frequency, Pearson's correlation analysis to determine the strength of association between the variables, and simple linear regression to assess the predictive impact of teaching strategies on students' vocabulary learning outcomes. The instrument validity and reliability were also tested to ensure data quality and consistency throughout the study.

The researchers conducted a reliability analysis using Cronbach's Alpha to determine the dependability of the questionnaire. The Cronbach's Alpha value of 0.729 indicates acceptable internal consistency, showing that the questionnaire reliably measures the intended construct. Thus, the instrument is suitable for data

collection without major revisions, as stated in Table 1.

Table 1
Reliability Statistics

Cronbach's Alpha	N of items
.0729	14

The Pearson Correlation validity test shows that most items have significant correlations with the total score (r = 0.346–0.571, Sig. < 0.05), indicating good construct validity. Thus, the instrument effectively measures the intended variables and is suitable for data collection.

RESULTS AND DISCUSSION

This section presents the results of the data analysis conducted to answer the two research questions related to the correlation between student-centered learning strategies and students' understanding of English vocabulary learning.

Based on the results of the descriptive tests presented in Table 2, the results show that 36.1% of students got the highest score (100), while only 2.8% got the lowest score (10–50). In total, 69.5% of students scored 70 or above. This means the learning strategy helped students understand electrical engineering vocabulary well.

Table 2
Descriptive Test of Students' Vocabulary Score

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10	1	2.8	2.8	2.8
	40	1	2.8	2.8	5.6
	50	1	2.8	2.8	8.3
	60	6	16.7	16.7	25.0
	70	6	16.7	16.7	41.7
	80	6	16.7	16.7	58.3
	90	2	5.6	5.6	63.9
	100	13	36.1	36.1	100.0
	Total	36	100.0	100.0	

The normality test in Table 3 shows Asymp. Sig. (0.200) and Monte Carlo Sig. (0.622) values greater than 0.05, indicating that the data are normally distributed. Thus, the normality assumption is met,

supporting the validity of further statistical analyses.

Table 3
Kolmogorov-Smirnov Normality Test

			Unstandardized Residual
N			36
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		1.77960645
Most Extreme Differences	Absolute		.091
	Positive		.069
	Negative		-.091
Test Statistic			.091
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		.622
	99% Confidence Interval	Lower Bound	.609
		Upper Bound	.634

The ANOVA results in Table 4 show a significance value of <0.001, indicating that the regression model is statistically significant. With an F value of 90.219, the model strongly explains the relationship between student-centered learning strategies and students' understanding of technical vocabulary in electrical engineering classes.

Table 4
Linear Regression Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	294.127	1	294.127	90.219	<,001[b]
	Residual	110.845	34	3.260		
	Total	404.972	35			

a. Dependent Variable: StudentsResponse
b. Predictors: (Constant), StudentCenteredStrategy

The Pearson correlation results, as stated in Table 5, show a strong positive relationship between student-centered learning strategies and students' understanding of electrical engineering vocabulary ($r = 0.852$, $p < 0.001$). This means that greater use of student-centered strategies leads to better understanding, supporting the research hypothesis.

Table 5
Pearson's Correlation Test

		StudentCenteredStrategy	StudentsResponse
StudentCenteredStrategy	Pearson Correlation	1	.852**
	Sig. (2-tailed)		<,001
	N	36	36
StudentsResponse	Pearson Correlation	.852**	1
	Sig. (2-tailed)	<,001	
	N	36	36

**. Correlation is significant at the 0.01 level (2-tailed).

Research Question 1: *How significant is the correlation between student-centred learning strategies and students' responses in English vocabulary learning?*

The results show a strong and positive correlation between student-centred learning strategies and students' understanding of English vocabulary ($r = 0.852$, $p < 0.001$). This finding indicates that when student-centred strategies are applied effectively, students demonstrate

better comprehension and retention of technical vocabulary. These results confirm the view of Petrovic et al. (2022), who describe student-centred pedagogy as a collaborative process that transforms learners from passive recipients into active participants. Similarly, Keiler (2018) emphasizes that when students are encouraged to question and interact with content, their cognitive engagement and learning outcomes increase.

Furthermore, the ANOVA test result (Sig. < 0.001, F = 90.219) reinforces the significance of this relationship, showing that student-centred learning strategies have a meaningful impact on vocabulary comprehension. This supports Gagné's model (Kruse, 2009), which explains that structured instructional steps—such as engaging learners, providing guidance, and eliciting performance—enhance cognitive processing and memory retention. The present findings also align with Li et al. (2021), who found that student-centred approaches significantly improve academic performance, and with Fayzullakulovna and Kizi (2022), who confirmed that interactive and autonomous instruction enhances students' lexical competence. Therefore, it can be concluded that student-centred strategies not only encourage active participation but also lead to measurable improvements in students' understanding of English vocabulary in vocational contexts.

Research Question 2: *What is the students' understanding of the use of student-centred learning strategies in English vocabulary tests?*

The descriptive results show that most students achieved high scores, with 69.5% scoring 70 or above and

36.1% achieving the maximum score of 100. This suggests that students responded positively to the implementation of student-centred strategies and were able to apply vocabulary knowledge effectively in tests. These outcomes support the perspectives of Martin-Alguacil et al. (2024), who stated that student-centred learning promotes autonomy and collaboration, helping learners construct understanding through exploration and practice. Wang (2023) and Demir (2024) also emphasized that such strategies enhance students' motivation and engagement, allowing them to take ownership of their learning. The high achievement levels in this study reflect this increased motivation and responsibility for learning outcomes.

Moreover, the findings align with the principles of Communicative Language Teaching (CLT), which emphasize authentic input and meaningful interaction in language learning (Kaygisiz, 2020; Eroz & Akbarov, 2016). Using real-life materials and encouraging students to apply technical vocabulary in context makes learning more relevant and supports the needs of vocational students in fields such as electrical and automotive engineering. Scholars highlight that authentic materials strengthen learners' practical language skills by reflecting real workplace communication (Zheng & Borg, 2013; Liu & Ren, 2021). Additionally, Kausar (2025) shows that ESP curricula tailored to engineering contexts enhance both language proficiency and professional communication. Nazarov (2025) further reports that collaborative learning and educational technologies

support the development of communicative competence, and Evdokimova and Davidenko (2025) emphasize the role of profession-oriented instruction in fostering both language skills and professional responsibility. Overall, these studies affirm the importance of authentic and context-based instruction for preparing students to use English effectively in technical settings.

In sum, this study shows that student-centred learning strategies significantly enhance students' understanding of English vocabulary. Learner-centred approaches that foster collaboration, reflection, and authentic communication lead to more meaningful learning. Therefore, vocational teachers are encouraged to adopt flexible and interactive practices that support deeper vocabulary mastery relevant to students' professional fields.

Research Question 1: *How significant is the correlation between student-centred learning strategies and students' responses in English vocabulary learning?*

The results show a strong and positive correlation between student-centred learning strategies and students' understanding of English vocabulary ($r = 0.852$, $p < 0.001$). This indicates that the more effectively student-centred approaches are implemented, the better students comprehend and retain vocabulary. These findings align with Petrovic et al. (2022), who describe student-centred pedagogy as a collaborative process where learners take active roles in constructing their knowledge. Similarly, Keiler (2018) emphasizes that active engagement allows

students to express ideas and question information, thereby deepening understanding.

Furthermore, the ANOVA test (Sig. < 0.001, F = 90.219) confirms that student-centred learning strategies significantly influence students' vocabulary comprehension. This finding supports Gagné's instructional model (Kruse, 2009), which suggests that structured yet interactive instructional steps enhance cognitive processing and memory retention. Likewise, Li et al. (2021) found that student-centred education consistently improves academic performance, while Fayzullakulovna and Kizi (2022) demonstrated that interactive and autonomous instruction strengthens students' vocabulary mastery. Thus, the results of this study affirm that student-centred strategies promote active learning and measurable improvements in vocabulary understanding within vocational English contexts.

Research Question 2: *What is the students' understanding of the use of student-centred learning strategies in English vocabulary tests?*

Descriptive results indicate that most students achieved high scores, with 69.5% scoring 70 or above and 36.1% reaching the maximum score of 100. This shows that students responded positively to the student-centred approach and were able to apply their vocabulary knowledge effectively. These results are consistent with Martin-Alguacil et al. (2024), who highlight that student-centred learning enhances learner autonomy and collaboration, helping students build knowledge through exploration and meaningful interaction. Similarly, Wang (2023)

and Demir (2024) note that student-centred approaches increase motivation and engagement, allowing learners to take ownership of their progress. The strong performance in this study reflects these motivational and cognitive benefits.

The findings also correspond with the principles of Communicative Language Teaching (CLT), which emphasizes authentic, real-world language use. As stated by Kaygisiz (2020) and Eroz and Akbarov (2016), authentic materials and communicative tasks make learning more relevant and effective. In vocational settings, such as electrical engineering, this relevance is crucial for developing technical English competence. Furthermore, Ningsih et al. (2025) introduced an innovative Automotive Engineering e-module that integrates technical content with task-based language learning, representing a significant advancement in vocational education aimed at aligning teaching practices with global industry standards in a digitalized era. Similarly, Kausar (2025) demonstrated that an English for Specific Purposes (ESP) curriculum tailored to engineering needs can enhance both language proficiency and professional communication skills. By addressing the specific challenges faced by non-native speakers, Kausar highlights the importance of contextually grounded language instruction that equips students with the communicative competence required in real-world professional environments.

Overall, the results demonstrate that student-centred learning strategies not only correlate significantly with but also positively influence students'

understanding of English vocabulary. These findings validate the theoretical perspectives presented in the introduction, particularly those emphasizing active participation, collaboration, and contextual learning as key factors in vocabulary development. From a pedagogical standpoint, the study highlights the importance of adopting flexible and reflective teaching practices that encourage learner autonomy and engagement. For vocational education, integrating student-centred strategies can make English instruction more meaningful, contextual, and aligned with students' professional goals—thereby improving both their language proficiency and readiness for real-world communication.

CONCLUSION

This study examined the relationship between student-centred learning strategies and students' understanding of English vocabulary in electrical engineering classes at SMKN 6 Bandung. The results showed a strong positive correlation ($r = 0.852$, $p < 0.001$), indicating that the greater the use of student-centred approaches, the better the students' comprehension and retention of technical vocabulary. The findings demonstrate that active involvement, collaboration, and learner autonomy contribute significantly to improving students' vocabulary mastery and learning outcomes. Overall, student-centred learning encourages motivation, critical thinking, and meaningful engagement, making it an effective approach for teaching English in vocational settings.

Therefore, teachers are encouraged to apply interactive and contextual strategies that connect classroom learning with real-world applications to enhance students' language proficiency and professional readiness.

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