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## THE EFFECTIVENESS OF CROSSWORD PUZZLES WITH VARIED CLUES TYPES ON VOCABULARY MASTERY AMONG SECONDARY SCHOOL STUDENTS IN JEMBER

by

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**Abstract:**

This study examines the effectiveness of crossword puzzles that integrate various types of clues in improving vocabulary mastery among secondary school students in an EFL learning environment. Vocabulary learning in the classroom can be challenging, as students have limited opportunities to interact with English. On the other hand, empirical research focusing on teaching strategies with structured instructional support is also limited. Therefore, this study aims to examine whether the use of crossword puzzles integrating varied clue types can support vocabulary learning. This study employed a pre-experimental one group pretest-posttest design, supported by qualitative data collected through questionnaires. Because the distribution of vocabulary test scores did not show a normal distribution, non-parametric analysis was performed. Qualitative findings indicate that clues integrated into crossword puzzles support students, including definitions, synonyms, antonyms, fill-in-the-blanks, and pictures with the help of letter clues in each grid, which help students recall the target vocabulary they have learned, in turn increases their confidence during the activity. The results of the study indicate that crossword puzzles with varied clue types showed improvements in students vocabulary development and engagement of the learning activity in a rural EFL classroom. Practically, the findings suggest that teachers may adapt crossword puzzles with varied clue types as a low-cost and accessible strategy to support vocabulary learning in contexts where exposure to English and instructional resources are limited.

**Keywords:** crossword puzzle, varied clue types, vocabulary mastery, English as Foreign Language (EFL)

**Abstrak:**

Penelitian ini mengkaji efektivitas teka-teki silang yang mengintegrasikan berbagai jenis petunjuk dalam meningkatkan penguasaan kosakata siswa sekolah menengah pada lingkungan pembelajaran bahasa Inggris sebagai bahasa asing (EFL). Pembelajaran kosakata di kelas dapat menjadi tantangan karena siswa memiliki kesempatan yang terbatas untuk berinteraksi dengan bahasa Inggris. Di sisi lain, penelitian empiris yang berfokus pada strategi pembelajaran dengan dukungan instruksi yang terstruktur masih relatif terbatas. Oleh karena itu, penelitian ini bertujuan untuk menguji apakah

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*Intama et al. (2026)*

*penggunaan teka-teki silang yang mengintegrasikan berbagai jenis petunjuk dapat lebih efektif dalam mendukung pembelajaran kosakata. Penelitian ini menggunakan desain pra-eksperimental one-group pretest-posttest yang didukung oleh data kualitatif yang dikumpulkan melalui kuesioner. Karena distribusi skor tes kosakata tidak menunjukkan distribusi normal, analisis non-parametrik digunakan. Temuan kualitatif menunjukkan bahwa petunjuk yang diintegrasikan dalam teka-teki silang, seperti definisi, sinonim, antonim, isian rumpang (fill-in-the-blank), gambar, serta bantuan petunjuk huruf pada setiap kotak, membantu siswa mengingat kembali kosakata target yang telah dipelajari sehingga meningkatkan kepercayaan diri mereka selama kegiatan berlangsung. Hasil penelitian menunjukkan bahwa teka-teki silang dengan berbagai jenis petunjuk berkaitan dengan peningkatan penguasaan kosakata siswa serta keterlibatan mereka dalam kegiatan pembelajaran pada konteks EFL di daerah pedesaan. Secara praktis, temuan ini menunjukkan bahwa guru dapat mengadaptasi teka-teki silang dengan berbagai jenis petunjuk sebagai strategi pembelajaran yang terjangkau, mudah diterapkan, dan dapat diakses untuk mendukung pembelajaran kosakata pada konteks yang memiliki keterbatasan paparan bahasa Inggris maupun sumber daya pembelajaran.*

**Kata kunci:** *teka-teki silang, petunjuk, pembelajaran kosakata, EFL*

## INTRODUCTION

In many secondary school EFL classrooms, students encounter English structures that differ from their first language. Because of this, vocabulary learning does not rely only on repeated exposure to English input. Students also need opportunities to recognize new words, understand their meanings, and recall them through meaningful use in learning activities (Rasuki & Ahmad, 2023). Rural students may struggle with this process due to limited exposure to English outside school. Although the school is not geographically isolated, English is rarely used in students' daily environments, making classroom activities the primary source of English input. In these circumstances, vocabulary knowledge provides the essential foundation that shapes how well students comprehend the reading materials and their participate in classroom activities. Over time, this builds language proficiency development and can build their reading, speaking, listening, and writing skills (Al Qunayeer, 2021; Ashar et al., 2025)

Previous studies have reported that students in rural areas often fall behind their urban peers in English vocabulary development. Research indicates gaps between rural and urban learning contexts. According to Restinawati et al. (2024), urban students in Buton, Indonesia, tended to score higher than rural students, particularly in pronunciation, grammar, and English term comprehension. In rural settings, these gaps can create extra challenges for vocabulary learning. Lack of instructional resources, insufficient exposure to English, and a teacher shortages are among of the contributing factors to the students' performance (Astriyani et al., 2025; Fadilah et al., 2023). However, vocabulary problems cannot be entirely explained by

*Intama et al. (2026)*

the exposure problem. Vocabulary learning is also influenced by students effort and their active engagement in using English (Dörnyei & Ryan, 2015; Laufer & Hulstijn, 2001). In a rural context where exposure is limited, this cognitive effort becomes even more demanding, especially for beginner and low-proficiency EFL learners who often engage in cognitive translation from their first language (L1) to the target language (L2) for English, which requires more cognitive demands. According to cognitive load theory, learners may experience unsatisfactory learning outcomes when tasks are too difficult or poorly structured, as this can overload their working memory (Sweller et al., 2019). Therefore, there is an increasing need for structured instructional tasks that can support vocabulary learning while maintaining manageable cognitive demands, particularly in rural EFL contexts where independent exposure is limited (Eskandari et al., 2024; Rejeki & Wahyuni, 2025)

One instructional approach that offers structured yet engaging learning experiences is game-based learning. In recent years, studies have shown that game-based learning work well in foreign language learning settings because they boost student motivation, engagement, and language retention (Luo, 2023; Roseni & Muho, 2024). This game-based strategy also have been found to support vocabulary learning (Panjaitan & Amaniarsih, 2021). In rural contexts, activities incorporating game elements can foster a learning environment in where students feel more engaged and supported. Research in a rural school in Thailand found that students who use gamified learning performed better than those in conventional classrooms (Panyajamorn et al., 2022). However, these studies generally emphasize the effectiveness of game-based activities at a broad level, without examining how specific instructional elements within the activity are designed, implemented, and function to support vocabulary learning.

Among various game-based approaches, puzzle-based learning, particularly crossword puzzles, has been shown to support vocabulary learning. Previous studies have explored the use of puzzles as tools for vocabulary learning has a positive outcome. For example, Hafizhah and Pratolo (2022), examined puzzle-based activities in a junior high school students using classroom-based intervention design and reported improved vocabulary outcomes. However, the study focused on general puzzle engagement without specifying the types of clues used. Similarly, Sari et al. (2023) applied Scrabble and crossword puzzles in rural learning environment using collaborative learning activities. While the finding indicated improved vocabulary acquisition, the study did not examine how different forms of clues functioned as

*Intama et al. (2026)*

instructional support. While, Alda and Wati (2021) examined pronunciation during crossword activities, focusing on oral production rather than structured cognitive support through clue design. In another study, Ramadhani and Shofiyuddin (2025) developed crossword puzzles with clue cards as instructional media to enhance vocabulary mastery. Although the results showed vocabulary improvement, the clues functioned mainly as direct prompts rather than varied scaffolding mechanisms. Nevertheless, these studies differ from the present study in several aspects, including research focus, instructional design, and methodological approach. Most prior studies focus on the use of puzzles as general learning tools, often employing single-type clues or template formats, without systematically examining how different types of clues function as instructional variables. In addition, previous research tends to emphasize outcomes rather than analysing the role of clue variation in supporting vocabulary processing, and many studies do not explicitly address how task design interacts with cognitive processes in rural EFL contexts.

Based on these limitations, a clear research gap emerges regarding the role of varied clues types within crossword puzzles as structured instructional support for vocabulary learning. Therefore, this study aims to investigate (1) the effectiveness of crossword puzzles incorporating varied clue types in improving students' vocabulary mastery and (2) students' perceptions of the use of such activities in a rural EFL classroom.

Practically, it provides a low-cost, accessible, and adaptable instructional strategy for teachers working in resource limited rural classrooms, where exposure to English is minimal and instructional support is often constrained. So that, this study empirically contributes to the literature by shifting the focus from the general effectiveness of game-based learning to the analysis of instructional design within the activity, particularly how varied clue types function as task-embedded scaffolding. This novelty lies in examining not only whether crossword puzzles are showed improvement, but how their structure through different types of clues can facilitates vocabulary processing. Besides, this study highlights how a commonly used instructional tool can be optimized through structured clue variation. This makes the study particularly relevant in contexts where teachers need practical, adaptable, and resource efficient strategies to support vocabulary learning.

Based on the theoretical framework and previous studies discussed above, this study assumes that crossword puzzle activities with varied clue types may support vocabulary

learning by providing structured instructional support and encouraging active engagement during the learning process. In addition, students are expected to show positive perceptions toward the activity, particularly in terms of vocabulary understanding, participation, and collaborative learning experience.

This study draws on scaffolding theory and cognitive load theory. Scaffolding theory suggests that learners can perform beyond their independent ability when supported appropriately (Wood et al., 1976), while cognitive load theory emphasizes the importance of managing cognitive demands during learning (Sweller et al., 2019). In this study, scaffolding is embedded within the task design, where each crossword item provides a fixed type of support (e.g., definition, synonym, antonym, image, fill-in-the-blank, and letter cue). Rather than allowing learners through different pathways of vocabulary processing. This structured variation allows learners to engage with vocabulary through multiple forms of processing without overwhelming working memory. Therefore, this study addresses the following research questions:

- 1) Is there any significant improvement in students' vocabulary mastery after using crossword puzzles with varied clue types?
- 2) How do students perceive the use of crossword puzzles with varied clue types in vocabulary learning?

### METHOD

#### *Design*

This study employed a pre-experimental one-group pretest-posttest design supported by qualitative descriptive data. Quantitative data were collected through pretest and posttest scores to examine students' vocabulary achievement after the treatment, while qualitative supporting data from questionnaires and open-ended responses were used to provide additional insights into students' perceptions of the learning activity. In a chart, the one group pretest-posttest design (Ary et al., 2014) was described in Figure 1.

<b>Pretest</b>	<b>Independent</b>	<b>Posttest</b>
$Y_1$	$X$	$Y_2$

*Figure 1. One group pretest-post-test design*

Notes:

$Y_1$  = Students' vocabulary mastery before treatment

X = Crossword puzzle activities with varied clue types

$Y_2$  = Students' vocabulary mastery after treatment

The independent variable (X) in this study was the use of crossword puzzles incorporating varied clue types (definitions, synonyms, antonyms, fill-in-the-blank, images, and letter cues), while the dependent variable (Y) was students' vocabulary mastery. Vocabulary mastery was operationally defined as students' ability to correctly select and use target words in context, as measured through fill-in-the-blank test items.

In addition to the vocabulary test scores, questionnaire data and open-ended responses were collected to support the interpretation of students' perceptions, engagement, and learning experiences during the implementation of crossword puzzle activities. This design enabled the study to examine not only students' vocabulary improvement after the treatment, but also their responses toward the learning process.

### ***Participant***

The participants consisted of 20 eleventh-grade students (9 females and 11 male) from Class XI IPS 1 at SMA BIMA Ambulu during the 2024/2025 academic year. The school is located in Jember, East Java, Indonesia, and represents a rural EFL context in which students have limited exposure to English outside the classroom.

The participants were determined by way of convenience sampling due to accessibility considerations. Given that the current study employed a pre-experimental design, it was therefore conducted with one class only that was accessible for research purposes. Ethical considerations were addressed by obtaining permission from the school and ensuring that students participated voluntarily. Students' identities were kept confidential and the data were used solely for research purposes.

### ***Instrument***

The instruments used in this study consisted of a vocabulary test and a perception questionnaire. The vocabulary test was administered as both a pretest and posttest to measure students' vocabulary achievement. The outcome of the test was a numerical score ranging from 0 to 100. The test consisted of eight fill-in-the-blank items, and each correct answer was

*Intama et al. (2026)*

scored 12.5 points, resulting in a maximum score of 100. The test was conducted during regular English class sessions in the students' classroom environment.

The test items were developed by the researcher based on the Indonesian senior high school English syllabus for Grade XI Semester 2 (Curriculum 2013 revised edition), particularly focusing on cause-and-effect texts. The vocabulary items were aligned with the instructional materials taught during the intervention and with vocabulary previously introduced in class. The items were reviewed by a university lecturer to ensure their clarity, relevance, and alignment with the learning objectives. Each item had a predetermined correct answer, and scoring was based on affixed answer key to ensure consistency in scoring.

The perceptions questionnaire consisted of nine closed-ended items measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), as well as open-ended questions to capture students' qualitative responses. The closed-ended items produced ordinal data, while the open-ended questions generated qualitative responses regarding students' learning experiences. The questionnaire items were designed based on the objectives of the study and focused on three aspects: (1) students' perceived understanding of vocabulary through the clues provided, (2) students' enjoyment of the crossword puzzle activity, and (3) students' willingness to participate in similar activities in future learning. The questionnaire was administered immediately after the intervention during classroom instruction to capture students' perceptions of the learning experience.

### ***Data collecting technique***

The study was conducted in three meetings. The first meeting served as the pretest session. Throughout this session, students independently completed eight item fill-in-the-blank assessment items. Students were expected to decide the correct target word to finish each sentence. The assessment was designed to measure students' base vocabulary knowledge related to the cause-and-effect topics.

In the second meeting, the treatment was implemented through a crossword puzzle activity designed to build vocabulary using varied types of clues. The treatment was conducted in a single session because the study aimed to investigate the immediate effects of the crossword puzzle activity on students' vocabulary learning. Rather than investigating long-term vocabulary retention, the study focused on the short-term instructional effects of the

*Intama et al. (2026)*

activity after one exposure. This approach allowed the researcher to evaluate students' immediate vocabulary achievement and perceptions following the intervention. During the treatment, students worked in pairs to solve crossword puzzles containing six types of clues: definitions, synonyms, antonyms, fill-in-the-blank, images, and letter cues. These hints were categorized into textual, contextual, and visual hints.

Textual hints cover definitions, synonyms, antonyms, and letter cues, such as a definition explaining a word meaning (e.g., to stay away from something bad or harmful) or a synonym and antonym prompt made students to think of words that semantically connected (e.g., hand in as a synonym of submit, or the opposite of fail) or letter cues (e.g., "V" in the second row) which integrated into the crossword grid to help students verify spelling and narrow possible answers. Then, contextual hints were provided through fill-in-the-blank sentences that were supposed to be filled with the target vocabulary within cause-effect structures (e.g., she worked very hard to win the race, and her \_\_\_ paid off), and allowed students to infer meaning from context. Images were used as visual hints to support vocabulary recognition. Each crossword item was designed with a predetermined type of clue, meaning that students did not choose the type of hint, but instead engaged with systematically varied clue types across items. This design ensured consistent exposure to different forms of cognitive support. These clues encouraged students to infer meaning, recall vocabulary, and verify answers independently rather than receiving direct answers.

During the treatment phase, a supplementary puzzle-based activity related to cause-and-effect relationships was briefly introduced as part of regular classroom practice. This activity aimed to help students recognize cause-and-effect structures in sentences. This activity did not use structured clues for the target vocabulary, so it was not included in the main intervention. As a result, it was excluded from the data analysis, and the study focused only on crossword puzzles that included various types of clues to support vocabulary learning.

The study employed a pretest-posttest procedure aligned with the research hypotheses, allowing the researcher to examine whether a statistically significant difference existed before and after the treatment. In the final meeting, students are supposed to complete a posttest using the same format as the pretest, to measure vocabulary achievement after treatment followed by a questionnaire. The posttest measured students' vocabulary achievement right after implementing the crossword puzzle activities.

### ***Data analysis technique***

The quantitative vocabulary test data were analysed using descriptive and inferential statistics. Students' vocabulary scores from the pretest and posttest were calculated using mean scores and standard deviation to identify general score distribution and improvement after the treatment. Since the pretest scores did not meet the normality assumption based on the Shapiro–Wilk test was conducted to examine the normality of the data distribution. A non-parametric Wilcoxon Signed-Rank Test was used to analyse the difference between the pretest and posttest scores. This test was selected because it is appropriate for paired data and does not require normal distribution in small samples. To examine whether the treatment produced a significant difference in vocabulary achievement, the following hypotheses were tested:

*H<sub>0</sub>: There is no significant difference in students' vocabulary mastery before and after the implementation of crossword puzzles with varied clue types.*

*H<sub>a</sub>: There is a significant different in students' vocabulary mastery before and after the implementation of crossword puzzles with varied clue types.*

The closed-ended questionnaire data, which used a five-point Likert scale, were analysed descriptively using frequencies, percentages, and mean scores to identify students' perceptions toward the crossword puzzle activity. Responses to the open-ended questionnaire items were analysed using Content Category Analysis (CCA). Similar responses were coded and grouped into recurring categories related to crossword puzzle experience, vocabulary learning were then calculated to describe the distribution of students' responses. The qualitative findings were used to support and enrich the interpretation of the quantitative results.

## **RESULT AND DISCUSSION**

### ***Result***

#### ***Vocabulary improvement after the treatment***

To address the first research question, students took a pretest and a posttest to examined the vocabulary achievement. Descriptive statistics showed an increase in

vocabulary scores following the intervention. The mean pretest score was 34.37 (SD = 27.76), while the mean posttest score was increased to 50.00 (SD = 26.28), as indicated in Table 1.

Table 1. Descriptive statistics of vocabulary scores

<i>Variable</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>
<i>Pretest</i>	20	34.37	27.76
<i>Posttest</i>	20	50.00	26.28

Before conducting inferential analysis, a Shapiro-Wilk test was used to examine the normality of the data distribution. The results showed that the pretest scores were not normally distributed ( $p = 0.012$ ), whereas the posttest scores were normally distributed ( $p = 0.799$ ), as shown in Table 2.

Table 2. Normality Test Results

<i>Variables</i>	<i>N</i>	<i>S-W</i>	<i>P-value</i>	<i>Interpretation</i>
<i>Pretest</i>	20	0.871	0.012	<i>Not normally distributed</i>
<i>Posttest</i>	20	0.972	0.799	<i>Normally distributed</i>

Since the assumption of normality was not fully met, a non-parametric Wilcoxon Signed-Rank Test was employed to compare the pretest and posttest scores. The rank analysis showed that 15 students obtained higher posttest scores than pretest scores, 4 students obtained lower posttest scores, and 1 student showed no change, as shown in Table 4.

Table 3. Wilcoxon Signed Ranks Test - Ranks

		<i>N</i>	<i>Mean Rank</i>	<i>Sum of Ranks</i>
<i>Posttest- Pretest</i>	<i>Negative Ranks</i>	4	6.38	25.50
	<i>Positive Ranks</i>	15	10.97	164.50
	<i>Ties</i>	1	-	-
	<i>Total</i>	20		

The Wilcoxon Signed-Rank Test revealed a statistically significant difference between the pretest and posttest scores ( $Z = -2.839$ ,  $p = 0.005$ ), as shown in Table 4.

Table 4. Wilcoxon Signed-Rank Test – Test Statistics

<b>Variable</b>	<b>N</b>	<b>Z</b>	<b>Sig. (2-tailed)</b>
Pretest-posttest	20	-2.839	0.005

The findings indicate that students achieved significantly higher vocabulary scores after the implementation of the crossword puzzle activity with varied clues types.

***Students’ perceptions of crossword puzzles activities based on close-ended responses***

To address the second research question, students’ perceptions of the crossword puzzle activity were collected through a close-ended questionnaire. The questionnaire focused on three aspects: vocabulary understanding and retention, perceived difficulty, and enjoyment of the activity.

*Table 5. Students’ perception of the effectiveness of crossword puzzles in supporting vocabulary understanding and retention*

<b><i>Agreement Level</i></b>	<b><i>Frequency (N = 20)</i></b>	<b><i>Percentage</i></b>
<i>Strongly Disagree</i>	0	0%
<i>Disagree</i>	1	5%
<i>Neutral</i>	3	15%
<i>Agree</i>	12	60%
<i>Strongly Agree</i>	4	20%

Table 5 presents students’ responses to the statement, “*Crossword puzzles help me in understanding and remembering new vocabulary.*” The majority of 20 respondents, 60% agreed, and 20% strongly agreed with the statement that the crossword puzzle helped them to understand and remember new vocabulary. Meanwhile, 15% of students chose the neutral option, and a mere 5% students disagreed.

***Table 6. Students perceived level of difficulty in completing the crossword puzzle activity***

<b><i>Agreement Level</i></b>	<b><i>Frequency (N = 20)</i></b>	<b><i>Percentage</i></b>
<i>Strongly Disagree</i>	3	15%
<i>Disagree</i>	7	35%
<i>Neutral</i>	7	35%
<i>Agree</i>	2	10%
<i>Strongly Agree</i>	1	5%

Table 6 shows students’ response to the statement, “*I have difficulty understanding or completing crossword puzzles.*” The results show that 35% of students disagreed and 15% strongly disagreed with the statement that they experienced difficulty in completing the

crossword puzzle activity. In the hand, 15% of students agreed or strongly agreed that they experienced some level of difficulty, whereas 35% of students chose the neutral response.

Table 7. Students Perceptions of the Attractiveness of Crossword Puzzles for Vocabulary Learning

Agreement Level	Frequency (N = 20)	Percentage
Strongly Disagree	0	0%
Disagree	1	5%
Neutral	2	10%
Agree	12	60%
Strongly Agree	5	25%

Table 7 presents students’ responses to the statement, “Crossword puzzles are fun to use in vocabulary learning.” A total of 60% students and 25% strongly agreed that crossword puzzles were interesting to use in learning vocabulary. Only a small proportion of students that is 10% of students responded neutrally, while a small percentage expressed disagreement.

**Students’ perceptions based on open-ended responses**

To complement the closed-ended questionnaire results, students were asked to provide written comments regarding their experiences during learning activities. The responses were grouped into three categories: vocabulary learning benefits, enjoyment and interest, and learning in peers.

Table 8. Content Categories from Students’ Open-Ended Responses

Category	Frequency	Percentage
Enjoyment of Learning Activities	7	50.0%
Vocabulary Learning Benefits	3	21.4%
Peer Collaboration	4	28.6%
Total	14	100%

As shown in Table 8, students commonly described the activities as enjoyable and engaging, while others reported leaning new vocabulary and understanding word meanings. Some students also reported difficulties related to understanding English vocabulary and completing some of the puzzle tasks.

Table 9. Representative responses from students’ open-ended responses

Category	Example Responses
Crossword Puzzles Enjoyment	“I enjoyed the guessing activity because it was very fun” “I liked the crossword because it was easy and I enjoyed it” “The guessing activity made the learning process enjoyable”

<i>Advantages of Learning Vocabulary</i>	<i>"I learned and translated eight vocabulary items"</i> <i>"I gained new vocabulary"</i> <i>"I learned how to find out the meanings of vocabulary"</i>
<i>Peer Collaboration</i>	<i>"I arranged the puzzle together with my friends"</i> <i>"We worked together to complete the task"</i>

**Discussion**

***Vocabulary achievement after the crossword puzzle treatment***

The findings of this study revealed a statistically significant improvement in students' vocabulary mastery after the implementation of the crossword puzzle activity with varied clue types. This finding directly addresses the first research question, the increase in posttest scores indicates that the instructional treatment contributed to measurable vocabulary development in a rural EFL classroom context. This interpretation is supported by the increase in posttest scores and students' improved performance as reflected in the descriptive and inferential statistical results.

This finding aligns with previous studies that identify the role of vocabulary knowledge plays central role in language skills development (Al Qunayeer, 2021; Ashar et al., 2025). Those suggesting that the observed improvement reflects not only increased word recognition but also enhanced ability to use vocabulary within meaningful contexts. Similarly, Panyajamorn et al. (2022) demonstrated that gamified learning environments improve vocabulary retention. However, unlike these studies, which were conducted in more resource-supported or technology-enhanced context, the present study demonstrates that vocabulary gains can also be achieved through low-resource, paper-based crossword activities in rural classrooms.

Previous studies have reported that puzzle-based learning activities contributed positively to vocabulary learning, particularly in supporting students' vocabulary mastery and classroom engagement (Alda & Wati, 2021; Hafizhah & Pratolo, 2022; Ramadhani & Shofiyuddin, 2025; Sari et al., 2023). However, these studies did not explicitly examine how internal task features, such as clue variation, contribute to learning processes, which this study addresses. Nevertheless, previous studies primarily treated puzzles as general learning media, whereas the present study specifically highlights the role of varied clue types as structured instructional support, representing a key distinction. Unlike previous studies that focused

*Intama et al. (2026)*

mainly on the effectiveness of puzzles in general, this study suggests how varied clue types may function as structured instructional scaffolding, thereby addressing the gap identified in the introduction.

From a theoretical perspective, this improvement can be explained through meaningful context exposure and cognitive processing. According to Nation (2001), vocabulary is more effectively acquired when presented in meaningful contexts rather than through isolated memorization. In this study, vocabulary items embedded in cause-and-effect contexts allowed students to connect meaning and usage. Additionally, Laufer and Hulstijn (2001) argue that deeper cognitive involvement enhances retention, which aligns with the problem-solving nature of crossword tasks. This finding supports the initial assumption that rural EFL learners require structured instructional support due to limited exposure to English.

Therefore, the findings suggest that the observed improvement may be associated with the interaction between contextual learning, cognitive engagement, and guided task design. This result suggested the argument proposed in the introduction that structured tasks help manage cognitive load in low-exposure contexts. However, this finding should be interpreted cautiously. The small sample size, limited number of the test items, and short intervention period may restrict the generalizability of the results.

### ***The function of varied clues as scaffolding***

The second essential finding shows that varied clue types functioned as structured instructional scaffolding that supported vocabulary learning processes. Unlike traditional crossword puzzles that typically rely on a single clue type (e.g., definitions), this study incorporated multiple forms of hints (definitions, synonyms, antonyms, fill-in-the-blanks, images and letter cues).

Previous studies have reported positive outcomes from game-based and puzzle based learning activities. Luo (2023) emphasized the effectiveness of gamified learning tools in increasing students' engagement, motivation, and language learning participation. Similarly, Panjaitan and Amaniarsih (2021) focused on improving students' vocabulary mastery through puzzle games. While Roseni and Muho (2024) highlighted the positive impact of gamification on students' engagement and language proficiency outcomes rather than instructional structure. However, these studies mainly discussed the general effectiveness of game-based

*Intama et al. (2026)*

learning without specifically examining how clue variation supports students' cognitive processing, such as inferring meaning, recalling vocabulary, and verifying answers. In contrast, the present study suggests that varied clue types may have functioned as structured instructional scaffolding that guided students through different pathways of vocabulary retrieval and meaning construction.

This result is grounded in scaffolding theory (Wood et al., 1976), where scaffolding provides temporary support that enables learners to accomplish tasks beyond their independent ability. In this study, each type of clues acted as a different form of support, guiding students toward meaning without directly giving answers. At the same time, this finding can be interpreted through cognitive load theory. According to Sweller et al. (2019), learning is more effective when cognitive load is managed appropriately. Although multiple clue types could potentially increase task complexity, the structured distribution of clues across items may have helped regulate cognitive demand rather than overload it. This aligns with Mayer and Fiorella (2022), who argue that well-designed instructional support enhances cognitive processing.

Although students did not choose the type of clues, the variation across items ensured that learners were exposed to multiple forms of support, allowing them to engage with vocabulary through different cognitive pathways. Thus, the varied clues may be interpreted as systematically embedded scaffolding that provided different forms of support during vocabulary learning.

### ***Students' perceptions of the crossword puzzle activity***

The findings related to research question 2 indicate that students generally perceived the crossword puzzle activity as engaging, helpful, and supportive for vocabulary learning. Questionnaire results and qualitative responses consistently showed positive attitudes toward the activity. These perceptions are supported by the questionnaire results, which showed high levels of agreement in terms of engagement, enjoyment, and perceived usefulness of the activity.

While previous studies reported that game-based learning enhances motivation and engagement (Luo, 2023; Panjaitan & Amaniarsih, 2021). The present findings indicate that students' positive perceptions may also influenced by the structured support embedded within

*Intama et al. (2026)*

the task, suggesting that engagement is closely linked to perceived cognitive accessibility rather than enjoyment alone. This interpretation is supported by engagement theory and active learning perspectives. According to Dörnyei and Ryan (2023), active involvement enhances language learning outcomes. In this study, students actively interpret clues, discussed answers, and negotiated meaning, which contributed to both engagement and understanding.

Importantly, variation in student responses, including reports of difficulty may reflect differences in prior knowledge and learning experience rather than failure of the instructional design. Instead, the presence of multiple clue types allowed students to approach tasks using difference strategies. Therefore, it can be inferred that students' positive perceptions were influenced not only by enjoyment, but by the perceived usefulness and accessibility of the learning support provided.

### ***Peer collaboration***

Another important finding is the role of peer collaboration in facilitating vocabulary learning during the activity. Students worked in pairs, allowing them to exchange ideas, verify answers, and solve problems collaboratively. This collaborative interaction supported vocabulary development by enabling students to check their understanding and refine their responses through shared reasoning. This finding extends previous research on collaborative learning, Malik et al. (2024) and Sari et al. (2023) showing that peer interaction not only increases engagement but also functions as an additional layer of scaffolding, enabling students to negotiate meaning and verify vocabulary through shared reasoning. In this study, collaboration enabled students to clarify misunderstandings and confirm vocabulary choices, particularly when encountering unfamiliar words.

From a theoretical perspective, this interaction reflects contingent scaffolding. That support can emerge dynamically through peer interaction (Pol et al., 2010). In this study, scaffolding was not only embedded in the task design such clues, but also emerged socially peer discussion. Thus, vocabulary learning in this study was supported by structured instructional scaffolding and peer collaboration.

## **CONCLUSION AND IMPLICATION**

### ***Conclusion***

This study concludes that employing crossword puzzles incorporating varied and

*Intama et al. (2026)*

purposeful clues may support vocabulary development among secondary school EFL learners in rural settings with limited English exposure. The findings indicate that the observed improvement was not merely the result of puzzle engagement, but may be influenced by structured task design in which contextual, textual, and visual clues functioned as cognitive scaffolding to support recall, verification, and vocabulary use. By specifically examining differentiated clue types such as definitions, synonyms, antonyms, fill-in-the-blank prompts, images, and letter cues, this study contributes a more focused understanding of how structured clue design may facilitate vocabulary mastery in resource constrained classrooms. The results suggest that low-cost instructional strategies can promote cognitive engagement and collaborative participation in vocabulary learning.

For pedagogical practice, English teachers in rural secondary schools may consider integrating crossword puzzles with varied hints as an alternative strategy to enhance vocabulary learning. Rather than using puzzles solely as supplementary games, teachers are encouraged to design differentiated clues that function as scaffolding supports. Future studies may extend this investigation by implementing longer treatment periods, involving larger samples, or examining long-term vocabulary retention to further validate the sustainability of this instructional approach.

### ***Limitation***

This study has several limitations that should be acknowledged. First, the final analysis involved only 20 students from a single rural classroom due to incomplete pretest and posttest data. As a result, the findings should be interpreted cautiously and may not be generalizable the vocabulary learning outcomes in broader EFL contexts. Second, the non-normal distribution of pretest scores reflects heterogeneous baseline ability, which may influence the magnitude of improvement. Third, the instrument consisted of only eight items, limiting measurement depth. Future studies may incorporate additional validation procedures to strengthen instrument quality. Fourth, the instructional treatment was conducted in a single session, limiting conclusions regarding long-term vocabulary retention. As a result, the posttest scores reflect short-term learning outcomes, and variations in classroom conditions during testing may have affected students focus and time management. This limitation suggest that the findings should be interpreted as preliminary evidence rather than definitive conclusions.

*Intama et al. (2026)*

The findings indicate that vocabulary improvement was not solely the result of engaging activities, but rather the interaction between structured scaffolding, cognitive processing, and collaborative learning. The varied clue types functioned as systematically embedded support that guided learners through different pathways of lexical retrieval while maintaining manageable cognitive load. Therefore, this study extends previous research by demonstrating that the effectiveness of game-based learning lies not only in engagement, but in how learning tasks are structured to support cognitive processes.

### ***Implication***

This study offers several pedagogical implications for English language teaching in rural contexts. Crossword puzzles with varied clue types may serve an alternative instructional strategy for vocabulary development, particularly in rural classrooms with limited instructional resources. The use of textual, contextual, and visual clues design may help accommodate learners with diverse proficiency levels which may help reduce difficulty when encountering unfamiliar vocabulary. Rather than using puzzles solely as supplementary activities, teachers may consider designing clues so that they function as structured support within the learning process. Given the minimal resources required, this approach may be practical and adaptable for vocabulary instruction in under-resourced EFL classrooms.

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*Intama et al. (2026)*

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*Intama et al. (2026)*

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