

Exploring the use of QR codes to address vocabulary learning in classrooms

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Abstract. This study aimed to examine students' vocabulary mastery through the implementation of QR code-based learning activities in English classrooms at SMK Negeri 1 Jombang. A quantitative approach was employed involving students from DKV 1, DKV 2, DKV 3, and DKV 4 classes. The instrument used in this study was a vocabulary test consisting of 50 sentence-based items covering verbs, nouns, and adjectives. Students were required to complete the test after participating in QR code-based learning activities, and the data were analyzed using percentage calculation. The results showed that students answered 41 out of 50 items correctly and 9 items incorrectly, resulting in a score of 82%, which falls into the (Good) category based on the assessment criteria of SMK Negeri 1 Jombang. These findings indicate that students demonstrated a high level of vocabulary mastery after participating in QR code-based learning activities. Therefore, QR code-based learning can be considered an effective strategy for supporting vocabulary mastery in English classrooms by providing interactive and accessible learning experiences, although further attention should be given to helping students apply vocabulary accurately in grammatical sentence structures.

Keywords: QR Code; Vocabulary Learning; English Language Teaching; Student Engagement; Vocational High School

1 Introduction

Vocabulary is one of the fundamental components in learning a foreign language, especially in English language education. Without sufficient vocabulary knowledge, students may struggle to develop their speaking, reading, listening, and writing skills effectively. In vocational high schools, English is not only taught as an academic subject but also as a practical skill that supports students' future professional needs. English learners must learn a number of language components, namely pronunciation, grammar, and vocabulary. However, depending on learners' needs, one language component may be given a priority

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than another, (Cahyono, Bambang Yudi and Indah, 2021). Therefore, effective vocabulary instruction is essential to help students communicate meaningfully in both academic and vocational contexts.

However, since vocabulary acquisition is paramount in English language education, it becomes challenging (Yunus et al., 2020). Vocabulary learning in English classrooms often presents significant challenges. Many students perceive vocabulary learning as repetitive and uninteresting, particularly when it is delivered through traditional methods such as memorization and textbook-based exercises. Most previous studies focused on general English learning contexts and did not specifically examine vocational high school students. In addition, limited research has investigated the use of QR code-based learning to support vocabulary mastery related to Visual Communication Design (DKV) terminology. Furthermore, few studies have reported quantitative results based on students' performance in vocabulary tests within vocational school settings. Therefore, this study seeks to address these gaps by examining students' vocabulary mastery through QR code-based learning activities among DKV students at SMK Negeri 1 Jombang using a quantitative approach. During the PPL experience at SMK Negeri 1 Jombang, especially in DKV classes (DKV 1, 2, 3, and 4), The orientation of learning in vocational schools is to prepare students to have skills in the business and work world. The vocational education system is an education that prioritizes the development of skills and abilities of students or students to have specific abilities and skills. Therefore, English learning in vocational schools is grouped as English for Specific Purposes (ESP) with specific English learning objectives and linked to the majors or skills they are pursuing (Fuadul Matin, 2022), it was observed that students had limited vocabulary mastery and showed low engagement when vocabulary was taught using conventional approaches. This condition indicates the need for more innovative and engaging teaching strategies.

In recent years, the integration of technology in education has gained increasing attention as a means to improve teaching and learning processes. One simple yet powerful technological tool that can be utilized in the classroom is the QR (Quick Response) code. QR Code-based digital learning media includes videos, PDFs, and other materials, (Tukhtabayeva et al., 2024) QR codes allow users to quickly access digital content by scanning a code using a smartphone. In the context of English language learning, QR codes can be used to provide vocabulary explanations, pronunciation models, visual illustrations, and interactive tasks that enrich students' learning experiences.

The use of QR codes is particularly relevant for vocational students, such as those majoring in Visual Communication Design (DKV), who are already familiar with visual elements and digital tools. By integrating QR codes into vocabulary instruction, teachers can create a learning environment that aligns with students' interests and learning styles. This approach not only makes vocabulary learning more engaging but also encourages students to become active and independent learners. Students fundamentally need to have an adequate amount of vocabulary (Leshchenko et al., 2022)

Based on these considerations, this article aims to explore the use of QR codes as an alternative instructional medium to address vocabulary learning in English classrooms. Specifically, this study reflects on the implementation of QR code-based vocabulary activities during the PPL program at SMK Negeri 1 Jombang and examines their potential benefits in improving students' engagement and vocabulary understanding. The major techniques used to assess vocabulary are (a) defining and (b) using a word in a sentence. This method is more authentic, but even that task is constrained by a contrived situation (Brown, 2022). Through this exploration, the article seeks to contribute insights into innovative teaching practices that can support effective English vocabulary instruction in vocational school contexts.

In order to address the identified challenges in vocabulary learning, a structured instructional plan was designed for the English classes in DKV 1, 2, 3, and 4. The learning activities were planned to integrate QR codes as a central medium for vocabulary instruction rather than as a supplementary tool. This integration was intended to create a learning environment where technology supports active exploration and contextual understanding of vocabulary.

The planned classroom activities involved the use of QR codes linked to vocabulary-related content, such as word definitions, pronunciation models, visual representations, and short contextual explanations. These QR codes were embedded in learning materials, including worksheets and task instructions, allowing students to access information independently by scanning the codes using their smartphones. The vocabulary items were carefully selected based on the learning objectives and the vocational context of DKV students, particularly terms related to design, media, and visual communication.

In the classroom implementation plan, students were expected to work individually and in small groups to explore vocabulary through QR code-based tasks. These activities were designed to encourage collaboration, discussion, and peer learning. Rather than memorizing vocabulary lists, students were guided to analyse the meaning, usage, and relevance of vocabulary items within specific contexts. The teacher's role in this process was planned to focus on facilitating learning, providing guidance when necessary, and ensuring that students remained engaged and on task.

Furthermore, the instructional plan aimed to observe students' responses to QR code-based vocabulary learning. Particular attention was given to students' levels of engagement, participation, and interaction during the learning activities. The plan also considered how students accessed and used the information provided through QR codes, as well as the extent to which the activities supported vocabulary comprehension and retention.

Through this planned implementation, the study seeks to examine how QR code-based instruction can be effectively applied in vocational English classrooms and how it addresses common challenges in vocabulary learning. These aspects form the basis for the findings discussed later in this article, which focus on students' engagement, learning experiences, and the practicality of using QR codes as a vocabulary learning tool in DKV classrooms.

2 Method

This study employed a descriptive quantitative design to examine students' vocabulary mastery through QR code-based learning activities in English classrooms at SMK Negeri 1 Jombang. The research was conducted during the PPL program at SMK Negeri 1 Jombang, focusing on students from the Visual Communication Design (DKV) program.

The population of this study consisted of all students in the DKV program at SMK Negeri 1 Jombang. The sample included students from four classes, namely DKV 1, DKV 2, DKV 3, and DKV 4. The sample was selected using purposive sampling, as these classes were directly involved in the teaching practice and participated in the QR code-based vocabulary learning activities.

The instrument used in this study was a vocabulary test designed to measure students' understanding of English vocabulary in context. The test consisted of 50 sentence-based items, which included different types of words such as verbs, nouns, and adjectives. Each item required students to identify, understand, or correctly interpret vocabulary within a sentence. The test was distributed to students in a group-based format, where students were divided into 10 groups, each consisting of 5 students, and each group worked on 5 vocabulary items. Group work was used to encourage collaboration and discussion among students during the learning process. Through group discussions, students were able to share their

understanding of vocabulary items, exchange ideas, and assist one another in interpreting the meanings of unfamiliar words before completing the test.

The research procedure consisted of several stages. First, the researcher prepared QR code-based learning materials containing vocabulary explanations and examples. Second, students were divided into ten groups consisting of five students in each group. Third, students accessed the learning materials by scanning the QR codes using their smartphones. Fourth, students discussed the vocabulary items within their groups and completed the vocabulary test consisting of 50 sentence-based items. Finally, students' answers were collected, scored, and analyzed using percentage calculations to determine their level of vocabulary mastery. The scoring system was based on the accuracy of students' answers. Each correct answer was given a score of 1, while each incorrect answer was given a score of 0. The total score was calculated by summing the number of correct answers out of 50 items. In addition to percentage calculation, the mean score was used to describe students' overall performance. The mean score was obtained by dividing the total number of correct answers by the total number of test items.

The data analysis was conducted using quantitative analysis by calculating the percentage of correct answers. The percentage was calculated using Eq. (1), as presented below.

$$\text{Percentage} = (\text{Number of Correct Answers} / \text{Total Number of Items}) \times 100 \quad (1)$$

The results were then interpreted based on the assessment criteria used at SMK Negeri 1 Jombang, which are categorized as follows:

- Baik Sekali (Very Good): 90–100
- Baik (Good) :80–89
- Cukup Baik (Fair): 70–79
- Kurang Baik: 69-0

This quantitative analysis allowed the researcher to determine the level of students' vocabulary mastery after the implementation of QR code-based learning activities and to evaluate the effectiveness of the instructional approach based on measurable results.

2.1 Theoretical Framework

2.1.1 Vocabulary in English Language Learning

Vocabulary is one of the most fundamental components in learning a foreign language. According to Wilkins, "without grammar very little can be conveyed, without vocabulary nothing can be conveyed." This statement emphasizes that vocabulary plays a central role in communication. Students need sufficient vocabulary knowledge to understand texts, express ideas, and participate in classroom interactions.

Furthermore, David Wilkins explains that vocabulary mastery influences students' ability to develop other language skills such as speaking, reading, listening, and writing. In vocational education contexts, vocabulary learning becomes even more important because students require specific terms related to their field of study. Therefore, effective vocabulary instruction should not only focus on memorization but also on meaningful usage in context.

2.1.2 Technology Integration in Language Learning

The integration of technology in education has significantly influenced modern teaching practices. Marc Prensky introduced the concept of "digital natives," referring to students who

grow up in a digital environment and are familiar with technology. This suggests that integrating digital tools into classroom instruction can increase students' engagement and relevance of learning.

In English language teaching, technology can function as a medium to create interactive, student-centered learning experiences. Digital tools allow students to access multimedia content, such as audio pronunciation, images, and videos, which can enhance vocabulary comprehension. Therefore, the use of QR codes aligns with the need to integrate simple and accessible technology into classroom practice.

2.1.3 QR Codes as Learning Media

QR (Quick Response) codes are two-dimensional barcodes that can store information and provide quick access to digital content through smartphone scanning. In educational contexts, QR codes can be used to connect printed materials with online resources. This feature makes QR codes practical and flexible learning tools.

The use of QR codes in vocabulary instruction allows teachers to embed definitions, pronunciation guides, visual representations, and contextual examples into learning activities. This supports multimodal learning, where students receive information through text, audio, and visual forms. For vocational students, especially those in design-related majors, visual and interactive elements are particularly beneficial in maintaining interest and attention.

3 Results and Discussion

The findings of this study revealed that students achieved a score of 82%, which falls into the "Good" category based on the assessment criteria of SMK Negeri 1 Jombang. This result indicates that students demonstrated a satisfactory level of vocabulary mastery after participating in QR code-based learning activities. The high percentage of correct answers suggests that the integration of QR codes provided students with effective support in understanding vocabulary items presented in sentence contexts. The accessibility of learning materials through QR codes may have contributed to students' ability to recognize and interpret vocabulary more accurately.

The findings can be explained through vocabulary learning theory, which emphasizes the importance of meaningful exposure and contextualized learning. Vocabulary acquisition is more effective when students encounter words within authentic contexts rather than learning isolated word lists. In this study, students accessed vocabulary explanations and examples through QR codes before completing the test. This learning process allowed students to connect vocabulary items with their meanings and usage, which may explain the relatively high level of achievement observed in the results.

The positive results also support the concept of technology integration in education. The use of QR codes enabled students to access learning resources quickly and independently through their smartphones. Unlike traditional vocabulary learning, which often relies on textbooks or teacher explanations, QR code-based learning encouraged students to explore vocabulary through digital resources. This finding suggests that technology can play an important role in creating a more interactive learning environment and increasing students' participation during classroom activities.

The findings of this study are consistent with previous research. (Yunus et al., 2020) reported that QR code-based learning improved students' vocabulary acquisition and increased their motivation to learn English. Similarly, the students in this study achieved a high level of vocabulary mastery after engaging with QR code-supported learning activities.

The similarity between these findings suggests that QR codes can serve as an effective instructional tool for vocabulary learning across different educational contexts.

Although the overall results were positive, the error analysis revealed that students still experienced difficulties in several vocabulary items, particularly those involving verbs and sentence structures. Errors related to verbs may occur because students are required not only to understand word meanings but also to apply correct grammatical forms, tenses, and subject-verb agreement. Likewise, some adjective-related items were answered incorrectly because students needed to understand how descriptive words function within complete sentences. These findings indicate that vocabulary knowledge alone is not sufficient; students must also develop grammatical awareness to use vocabulary accurately.

Another possible explanation for the effectiveness of QR code-based learning is the increased level of student engagement during the learning process. Students showed greater interest in learning activities because QR codes provided a technology-supported experience that was different from conventional classroom instruction. The opportunity to access information directly through smartphones may have increased students' curiosity and encouraged them to participate more actively in learning tasks.

From a pedagogical perspective, the findings suggest that QR code-based learning can be integrated into English vocabulary instruction, particularly in vocational high school settings. Teachers may use QR codes to provide vocabulary explanations, examples, videos, or additional learning resources that students can access independently. However, vocabulary instruction should also be combined with grammar-focused activities to help students apply newly learned vocabulary correctly in sentence construction. By combining vocabulary learning with technology integration and grammar support, teachers can create a more effective and engaging learning environment for students.

The analysis focuses on the number of correct and incorrect answers, the percentage of achievement, and the classification of students' performance based on the assessment criteria of SMK Negeri 1 Jombang.

3.1 Overall Vocabulary Test Results

Table 1. Overall vocabulary test results

Total Items	Correct Answers	Incorrect Answers	Percentage	Category
50	41	9	82%	Good

According to Table 1, the results show that out of 50 items, students answered 41 items correctly and 9 items incorrectly. The percentage of correct answers is calculated as:

$$(41 / 50) \times 100 = 82\%$$

Based on the assessment criteria of SMK Negeri 1 Jombang, a score of 82% falls into the (Good) category. This indicates that students have achieved a high level of vocabulary mastery after participating in QR code-based learning activities. The findings can be explained through vocabulary learning theory, which emphasizes the importance of contextualized learning, the results also support the concept of technology integration.

3.2 Distribution of Vocabulary Types

To provide a more detailed analysis, the vocabulary test items were categorized into three types: verbs, nouns, and adjectives.

Table 2 shows that students performed relatively well across all vocabulary types. However, errors were still found in verbs and adjectives, indicating that students may have difficulties in understanding verb forms and descriptive language in sentence contexts.

Table 2. Distribution of Vocabulary Types

Vocabulary Type	Number of Items	Correct	Incorrect
Verb	20	16	4
Noun	10	9	1
Adjective	20	16	4
Total	50	41	9

3.3 Sentence-Based Error Analysis

To identify specific difficulties, the incorrect sentences were analyzed based on error types.

Table 3. Error Analysis of Incorrect Sentences

No	Sentence	Error Type
1	The designer create a logo with good alignment.	Subject-verb agreement
2	This poster have strong visual impact.	Subject-verb agreement
3	The typography very important in design.	Missing verb
4	They using vector tools for illustration.	Verb form
5	The color hue are very bright.	Grammar (to be)
6	He make a storyboard for animation project.	Verb form
7	The layout not balance and lack unity.	Missing verb
8	She design a website with good composition.	Verb tense
9	The presentation was very good but not have	Sentence structure

Table 3 indicates that most errors were related to verb usage and grammatical structure, particularly in tense, subject-verb agreement, and sentence completeness. This suggests that although students understood vocabulary meaning, they still faced challenges in applying vocabulary accurately in sentence structures. Although the overall results were positive, several errors were identified in items involving verbs and sentence structures. Verbs may be more difficult because students must understand grammatical rules such as tense usage and subject-verb agreement in addition to vocabulary meaning. Similarly, adjective-related items require students to understand how descriptive words function within sentence contexts.

4 Conclusion

This study demonstrates that QR code-based learning can be an effective strategy for supporting vocabulary mastery among vocational high school students. The integration of QR codes into classroom activities provided students with accessible and interactive learning resources, which contributed to a more engaging learning experience. The findings suggest that technology-supported learning can play an important role in helping students develop vocabulary knowledge within meaningful learning contexts.

From a pedagogical perspective, the study highlights the potential of QR code-based activities as an alternative instructional tool for English teachers. By integrating digital resources into vocabulary instruction, teachers can encourage greater student participation

and create a more student-centered learning environment. However, vocabulary learning should also be accompanied by grammar-focused activities to help students use newly acquired vocabulary accurately in sentence construction.

For future research, it is recommended that researchers investigate the effectiveness of QR code-based learning using larger samples, different educational contexts, or experimental designs involving pre-tests and post-tests. Such studies may provide deeper insights into the long-term impact of QR code integration on students' vocabulary development and overall language learning outcomes.

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