

## The Influence of QR Code–Puzzle Towards Students' Speaking Ability at Eight Grade of SMP Negeri 2 Kwandang

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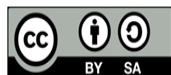
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### ABSTRAK

Penelitian ini menyelidiki efektivitas penggunaan QR Code - Puzzle, sebuah puzzle yang dikombinasikan dengan kode QR yang dikembangkan sebagai media pembelajaran, dalam meningkatkan kemampuan berbicara bahasa Inggris siswa di SMP Negeri 2 Kwandang. Penelitian ini menggunakan pendekatan kuantitatif dengan desain pra-eksperimental, khususnya desain kelompok tunggal dengan tes awal dan tes akhir. Sebanyak 29 siswa dari kelas VIII-4 berpartisipasi dalam penelitian ini. Instrumen yang digunakan adalah tes esai lisan yang terdiri dari 9 pertanyaan, yang berfokus pada materi teks naratif. Setelah enam pertemuan mengintegrasikan teka-teki Kode QR dengan materi Teks Recount, data dianalisis menggunakan Uji Peringkat Bertanda Wilcoxon dengan nilai  $Z = -4,733$  dan Asymp.  $Mr. (2-tailed) < .001$ . Karena nilai- $p < 0,05$ , hipotesis nol ( $H_0$ ) ditolak, dan dapat disimpulkan bahwa terdapat perbedaan yang signifikan antara hasil tes awal dan tes akhir. Hal ini menunjukkan bahwa teka-teki Kode QR secara signifikan meningkatkan kemampuan berbicara siswa. Temuan ini menunjukkan bahwa integrasi QR Code - Puzzle dalam pembelajaran bahasa Inggris dapat memberikan dukungan yang menarik, interaktif, personal, dan efektif untuk

meningkatkan kemampuan berbicara. Di antara lima komponen berbicara yang dinilai—pelafalan, tata bahasa, kosakata, kelancaran, dan pemahaman—pemahaman menunjukkan peningkatan tertinggi, diikuti oleh pelafalan. Hasil ini menunjukkan bahwa integrasi QR Code - Puzzle menciptakan lingkungan belajar yang menarik, interaktif, dan efektif yang meningkatkan kemampuan berbicara siswa secara keseluruhan dan kompetensi linguistik tertentu, terutama pemahaman dan pelafalan.

### ABSTRACT

*This study investigates the effectiveness of using QR Code - Puzzle, a puzzle combined with a QR code developed as a learning medium, in improving the English speaking ability of students at SMP Negeri 2 Kwandang. This study uses a quantitative approach with a pre-experimental design, specifically a single group design with pre-and post-tests. A total of 29 students from class VIII-4 participated in this study. The instrument used was an oral essay test consisting of 9 questions, which focused on narrative text material. After six meetings integrating QR Code puzzles with Recount Text material, the data were analyzed using the Wilcoxon Signed Rank Test with a  $Z$  value of  $-4.733$  and Asymp. Sig. (2-tailed)  $< .001$ . Since the  $p$ -value was  $< 0.05$ , the null hypothesis ( $H_0$ ) was rejected, and it can be concluded that there was a significant difference between the pre-test and post-test results. This shows that QR Code puzzles significantly improve students' speaking ability. These findings suggest that the integration of QR Code - Puzzle in English language learning can provide interesting, interactive, personalized, and effective support to improve speaking ability. Among the five assessed speaking components—pronunciation, grammar, vocabulary, fluency, and comprehension—comprehension showed the highest improvement, followed by pronunciation. These results suggest that the integration of QR Code–Puzzle fosters an engaging, interactive, and effective learning environment that enhances students' overall speaking proficiency and specific linguistic competencies, particularly comprehension and pronunciation.*

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### INTRODUCTION

In the era of globalization, English proficiency is an essential skill that enables individuals to communicate effectively across cultures. Among the four language skills—listening, speaking, reading, and writing—speaking is often regarded as the most important for real-life communication (Brown, 2004). However, for students learning English as a Foreign Language (EFL), developing speaking proficiency remains a major challenge. In Indonesian secondary schools, students often struggle to express their ideas fluently and confidently due to limited vocabulary, grammatical difficulties, and a lack of exposure to

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communicative situations. This limitation is often compounded by traditional teaching practices that emphasize rote learning and grammar drills rather than communicative activities (Harmer, 2007).

To address these challenges, educators have increasingly turned to the integration of educational technology in language teaching. Digital media such as mobile-assisted language learning (MALL), interactive applications, and game-based tools have shown promising results in improving students' motivation and learning outcomes (Godwin-Jones, 2018). One of the innovative tools that combines both digital and interactive elements is the QR Code–Puzzle, a learning medium designed to engage students actively in the learning process through problem-solving and discovery-based tasks. By scanning QR codes embedded within puzzles, students can access multimedia materials, tasks, and clues that guide them to reconstruct meaningful information, encouraging both collaboration and communication.

The use of QR Code–Puzzle aligns with constructivist learning theory, which emphasizes learners' active involvement in constructing knowledge through experience and interaction (Vygotsky, 1978; Piaget, 1985). In the context of EFL learning, constructivism supports activities that allow learners to negotiate meaning, reflect on their understanding, and use language in authentic communication. Through the integration of QR codes, learners are encouraged to engage in exploratory learning, while the puzzle component promotes cognitive challenge, curiosity, and teamwork—key factors in building speaking confidence and competence.

Despite the growing interest in technology-enhanced learning, empirical studies focusing on the integration of QR Code–Puzzle in improving speaking ability remain limited, particularly in the Indonesian EFL context. Previous research has demonstrated the effectiveness of QR codes in vocabulary acquisition (Hsu & Lee, 2020), reading comprehension (Chen et al., 2021), and motivation enhancement (Kukulska-Hulme, 2022), but few have explored their impact on oral communication skills. This study therefore aims to fill this gap by examining the effectiveness of QR Code–Puzzle in improving students' speaking ability in recount text learning at SMP Negeri 2 Kwandang. Specifically, it seeks to determine whether the use of this interactive medium leads to a statistically significant improvement in speaking performance as measured by pre- and post-tests, and to identify which components of speaking show the greatest enhancement.

## LITERATURE REVIEW

### Speaking Skill in English Language Learning

Speaking is one of the essential productive language skills that reflects a learner's communicative competence. According to Brown (2004), speaking is the process of constructing and sharing meaning through verbal and non-verbal symbols in a variety of contexts. It involves the coordination of multiple language components, including pronunciation, grammar, vocabulary, fluency, and comprehension. Richards and Renandya (2002) state that speaking is not merely the production of sounds but the ability to use language for communication effectively in real-life situations. In the context of EFL, speaking is often considered the most challenging skill because it requires immediate processing and spontaneous production of language (Nunan, 2003).

Effective speaking instruction should thus encourage learners to practice in authentic communicative situations, promote interaction, and foster fluency rather than mere accuracy. However, traditional classroom practices in Indonesian junior high schools often emphasize written grammar and translation, leaving minimal opportunities for oral communication (Setiawan, 2019). Consequently, students' speaking ability remains underdeveloped, and many lack confidence in expressing ideas orally. This problem calls for pedagogical innovation that integrates technology and active learning strategies to increase engagement and performance in speaking.

### Components of Speaking

In assessing speaking ability, Brown (2004) identifies five major components: pronunciation, grammar, vocabulary, fluency, and comprehension.

1. Pronunciation refers to the correct articulation of words and sounds so that communication remains intelligible.
2. Grammar encompasses the accurate use of syntactic structures and forms.
3. Vocabulary involves the range and appropriateness of words used to express ideas.
4. Fluency relates to the smoothness and speed of speech without excessive hesitation.
5. Comprehension is the listener's ability to understand and interpret spoken language effectively.

Each of these components contributes differently to communicative success. Improving them requires an integrated and interactive learning environment where students can practice language

meaningfully. QR Code–Puzzle media supports this integration by combining digital input, interaction, and problem-solving in one engaging platform.

### **Recount Text in Speaking Instruction**

Recount text is one of the text types taught in the Indonesian junior high school curriculum. Its primary purpose is to retell past events or experiences in chronological order, typically to inform or entertain the listener. According to Emilia (2011), recount texts follow a three-part structure: orientation (introducing who, where, and when), events (describing what happened in sequence), and reorientation (providing a personal comment or conclusion). This genre provides an ideal platform for speaking practice because it encourages students to narrate personal experiences and use past tense structures.

Incorporating recount text in speaking tasks helps students develop narrative skills, use appropriate time connectors, and construct coherent discourse. Moreover, recount activities can be made more engaging through digital and game-based learning tools, allowing learners to connect language use with meaningful personal expression (Sudrajat & Rahmawati, 2021).

### **Technology Integration in Language Learning**

The integration of technology in language teaching has transformed the EFL classroom from a teacher-centered to a learner-centered environment. Modern educational technologies, such as mobile applications, digital storytelling, and augmented reality, have been widely adopted to enhance motivation and language proficiency (Godwin-Jones, 2018). Mobile-assisted language learning (MALL) has particularly gained popularity, enabling learners to access resources flexibly and interact with multimedia content anytime and anywhere (Stockwell, 2020).

QR codes, or Quick Response codes, are one such technology that bridges physical and digital learning environments. When scanned with mobile devices, QR codes instantly provide access to web links, audio recordings, videos, or quizzes, allowing learners to engage with multimodal input (Rashid & Yusuf, 2021). Research indicates that QR code-based learning can improve vocabulary retention (Hsu & Lee, 2020), reading comprehension (Chen et al., 2021), and learner engagement (Al-Khalifa, 2022). By embedding QR codes in classroom tasks, teachers can create interactive and autonomous learning experiences.

### **QR Code–Puzzle as an Interactive Learning Medium**

QR Code–Puzzle is a hybrid educational medium that combines the logical and motivational aspects of puzzles with the accessibility of QR code technology. Puzzles stimulate cognitive engagement by requiring problem-solving, logical reasoning, and pattern recognition (Prensky, 2019). When integrated with QR codes, these puzzles provide digital interactivity—students can scan codes to access clues, tasks, or questions related to the lesson content. This dual mode of learning fosters both cognitive and linguistic development by engaging students in active exploration (Putri & Hamzah, 2023).

In English speaking instruction, QR Code–Puzzle enables learners to participate in communicative activities that encourage discussion, collaboration, and spontaneous speech production. For example, students may solve a language puzzle in groups, scan QR codes to obtain questions or prompts, and then discuss the answers orally. This process promotes the use of target language in meaningful contexts, supporting fluency, accuracy, and comprehension.

### **Theoretical Foundation: Constructivism**

The present study is grounded in constructivist learning theory, which views knowledge as actively constructed by learners through experience rather than passively received (Vygotsky, 1978). Constructivism posits that meaningful learning occurs when learners engage with tasks that challenge them to connect prior knowledge with new information. Through collaborative problem-solving and reflection, students internalize concepts more deeply (Piaget, 1985; Bruner, 1996).

QR Code–Puzzle embodies constructivist principles by promoting active participation, learner autonomy, and social interaction. Students construct their understanding of language through exploration, peer discussion, and self-discovery. This approach aligns with 21st-century learning paradigms that emphasize critical thinking, creativity, communication, and collaboration (OECD, 2022).

Therefore, integrating QR Code–Puzzle into speaking instruction not only enhances linguistic proficiency but also nurtures cognitive engagement and learner-centered interaction. It bridges theory and practice by applying constructivist pedagogy in technology-supported EFL classrooms.

## **METHOD**

### **Research Design**

This study employed a quantitative approach using a pre-experimental design, specifically the one-group pre-test and post-test model. This design was chosen because it allows the researcher to measure the difference in participants' performance before and after treatment (Creswell, 2014). The research aimed to determine whether the use of QR Code–Puzzle significantly improved students' English-speaking ability.

Although this design lacks a control group, it provides sufficient data to evaluate treatment effectiveness within a specific classroom context (Sugiyono, 2018).

The study was conducted over six instructional sessions in which QR Code–Puzzle was integrated into speaking activities focusing on recount text. The independent variable in this study was the use of the QR Code–Puzzle medium, while the dependent variable was students' speaking ability. The research followed a systematic procedure involving three phases: pre-test, treatment, and post-test.

### **Research Site and Participants**

The research was carried out at SMP Negeri 2 Kwandang, a junior high school located in Gorontalo, Indonesia. The participants consisted of 29 students from class VIII-4 during the academic year 2024/2025. The participants were selected using purposive sampling, as they represented a class with moderate English proficiency and had not previously used QR Code–based media. The students were aged between 13 and 15 years and had studied English for approximately two years as part of the national curriculum.

The classroom was equipped with basic technological facilities, including Wi-Fi access and students' personal smartphones, which allowed the use of QR Code–Puzzle during lessons. Participation was voluntary, and all students agreed to take part in the research under the supervision of the English teacher.

### **Research Instruments**

The primary instrument used for data collection was an oral speaking test developed by the researcher. The test took the form of an oral essay task consisting of nine open-ended questions based on recount text material. The questions required students to describe past experiences, such as holidays, memorable events, or daily routines, using past tense verbs and appropriate time connectors. Both the pre-test and post-test used the same set of questions to ensure comparability.

Students' speaking performance was assessed using a speaking rubric adapted from Brown (2004), which includes five key components:

1. Pronunciation – accuracy and clarity of speech sounds.
2. Grammar – correct use of tenses and sentence structures.
3. Vocabulary – range and appropriateness of lexical items.
4. Fluency – natural flow and continuity of speech.
5. Comprehension – ability to understand and respond appropriately.

Each component was rated on a scale from 1 to 5, with total scores ranging from 5 to 25. Two English teachers served as raters, and inter-rater reliability was calculated using the Spearman correlation coefficient, yielding a reliability index of 0.87, indicating a high level of consistency between raters.

### **Research Procedures**

The implementation of the research consisted of three stages:

#### **a. Pre-test:**

Before the treatment, a speaking pre-test was administered to measure students' initial ability in recount text speaking. Each student responded individually to the oral questions, and their performances were recorded for scoring.

#### **b. Treatment:**

Over the course of six meetings, the researcher integrated the QR Code–Puzzle into classroom instruction. Each session lasted 80 minutes and involved both group and individual tasks. During these sessions, students worked in small groups to solve puzzles related to recount text topics. Each puzzle contained embedded QR codes that, when scanned, revealed clues, questions, or audio recordings prompting discussion. The learning objectives of each session were to:

- encourage active participation and collaboration,
- practice speaking in context,
- improve comprehension and vocabulary through interactive tasks, and
- foster confidence in oral communication.

Students were required to discuss clues verbally, reconstruct stories, and report their results in front of the class. The teacher acted as a facilitator, guiding pronunciation and providing feedback during speaking activities.

#### **c. Post-test:**

After completing the six sessions, a post-test identical in structure to the pre-test was administered. The post-test assessed the extent to which the QR Code–Puzzle intervention improved students' speaking performance.

### **Data Collection and Analysis**

The data collected from the pre-test and post-test were analyzed quantitatively using SPSS Version 30. The Wilcoxon Signed Rank Test was employed because the data did not meet the assumption of

normality, as confirmed by the Shapiro–Wilk test ( $p < .05$ ). The Wilcoxon test is a non-parametric alternative to the paired-sample t-test and is suitable for comparing two related samples (Field, 2018).

The statistical hypothesis was formulated as follows:

- $H_0$  (Null Hypothesis): There is no significant difference in students' speaking ability before and after using the QR Code–Puzzle.
- $H_1$  (Alternative Hypothesis): There is a significant difference in students' speaking ability before and after using the QR Code–Puzzle.

The decision rule stated that  $H_0$  would be rejected if  $p < 0.05$ .

The results of the Wilcoxon Signed Rank Test yielded a Z value of -4.733 and an Asymp. Sig. (2-tailed)  $< .001$ , leading to the rejection of the null hypothesis. These results indicated a statistically significant improvement in students' speaking scores following the intervention.

Additionally, descriptive statistics were calculated to determine the mean score difference between the pre-test and post-test. The results are presented in Table 1.

**Table 1. Wilcoxon Signed Ranks Test**

| Test Type | Mean Score | N  | Z-value | Asymp. Sig. (2-tailed) |
|-----------|------------|----|---------|------------------------|
| Pre-test  | 61.21      | 29 |         |                        |
| Post-test | 82.14      | 29 | -4.733  | $< .001$               |

As shown in Table 1, the mean score increased from 61.21 in the pre-test to 82.14 in the post-test, confirming that the QR Code–Puzzle contributed significantly to improving students' speaking ability.

## RESULT AND DISCUSSION

### Overview of Findings

The statistical analysis using the Wilcoxon Signed Rank Test revealed a Z value of -4.733 and an Asymp. Sig. (2-tailed)  $< .001$ , indicating that the improvement in students' speaking ability after the implementation of QR Code–Puzzle was statistically significant. This finding confirms that the use of interactive, technology-based media had a positive effect on students' English-speaking performance.

Descriptive statistics further showed that the mean score increased from 61.21 (pre-test) to 82.14 (post-test). The gain of more than 20 points demonstrates that students achieved substantial progress in their speaking proficiency after six sessions of QR Code–Puzzle-based instruction. This improvement aligns with previous research suggesting that interactive and game-based learning environments enhance motivation, focus, and retention in language learning (Prensky, 2019; Hsu & Lee, 2020).

### Improvement Across Speaking Components

To obtain a clearer understanding of how QR Code–Puzzle influenced speaking ability, the performance of students across five key components—pronunciation, grammar, vocabulary, fluency, and comprehension—was analyzed. The comparison of pre-test and post-test scores for each component is summarized in Table 2.

**Table 2. Improvement Across Speaking Components**

| Component     | Pre-test Mean | Post-test Mean | Mean Difference | Improvement (%) |
|---------------|---------------|----------------|-----------------|-----------------|
| Pronunciation | 12.4          | 17.8           | 5.4             | 43.5%           |
| Grammar       | 11.6          | 16.3           | 4.7             | 40.5%           |
| Vocabulary    | 12.8          | 17.2           | 4.4             | 34.4%           |
| Fluency       | 12.5          | 17.0           | 4.5             | 36.0%           |
| Comprehension | 12.0          | 17.9           | 5.9             | 49.2%           |

As shown in Table 2, **comprehension** exhibited the greatest improvement (49.2%), followed by **pronunciation** (43.5%). These results indicate that QR Code–Puzzle activities not only enhanced students' understanding of the tasks and materials but also improved their ability to express ideas clearly and confidently. The interactive nature of the puzzle and the use of QR codes that linked to multimodal content—such as audio prompts and short video clues—helped students process language meaningfully, promoting deeper comprehension and more accurate pronunciation.

This pattern of improvement corresponds with findings by **Kukulska-Hulme (2022)** and **Al-Khalifa (2022)**, who reported that mobile-based learning activities encourage learners to engage cognitively and linguistically with materials, resulting in better oral performance and pronunciation accuracy.

### Analysis of Learners' Engagement and Motivation

Observation during the implementation phase showed a significant increase in students' engagement and participation. At the beginning of the study, students were hesitant to speak and relied

heavily on the teacher for guidance. However, during QR Code–Puzzle sessions, they became more active, collaborative, and enthusiastic. The use of puzzles appealed to their sense of curiosity and competition, while QR codes provided instant access to tasks, hints, and challenges, which kept them motivated throughout the learning process.

This shift in classroom dynamics reflects **constructivist learning principles** (Vygotsky, 1978; Bruner, 1996), where learners build knowledge through active participation and social interaction. The activity structure—solving puzzles in groups, scanning QR codes for clues, and presenting results orally—created opportunities for meaningful language use. Students practiced speaking to achieve a purpose, not merely to complete a test.

These findings are consistent with **Sari and Widyastuti (2021)**, who found that students' speaking confidence improved significantly in technology-integrated classrooms because digital tasks reduced anxiety and increased autonomy. Similarly, **Putri and Hamzah (2023)** observed that students involved in puzzle-based English learning became more motivated to speak in English due to the game-like atmosphere and collaborative problem-solving nature of the tasks.

### Comparison with Previous Studies

The results of this study align with several prior studies that emphasize the benefits of technology-supported language instruction.

- **Hsu and Lee (2020)** reported that QR code-based tasks enhance vocabulary acquisition and student motivation.
- **Chen et al. (2021)** found that integrating QR codes with reading materials improved comprehension and critical thinking.
- **Al-Khalifa (2022)** and **Stockwell (2020)** demonstrated that mobile-assisted activities significantly increase learner engagement and retention.

However, unlike these studies, which primarily focused on reading or vocabulary, the present research provides empirical evidence on how QR Code–Puzzle directly improves **speaking performance**, particularly comprehension and pronunciation. This suggests that interactive mobile-based tools can be extended beyond receptive skills to develop **productive skills** such as speaking.

Moreover, the results strengthen the argument made by **Prensky (2019)** that game-based learning supports deeper cognitive engagement, where students learn effectively through active problem-solving and immediate feedback. The combination of gamification (through puzzles) and technology integration (through QR codes) created a learning environment that supported both enjoyment and linguistic growth.

### Pedagogical Implications

The findings of this study hold several important implications for EFL teachers and curriculum designers:

1. **Interactive Technology Enhances Speaking Outcomes.** The integration of QR Code–Puzzle demonstrates that digital interactivity can effectively improve students' oral proficiency. Teachers are encouraged to design tasks that incorporate scanning activities, multimedia prompts, and collaborative discussion.
2. **Gamification Promotes Motivation and Confidence.** The puzzle aspect increases engagement by making learning playful and competitive, reducing students' speaking anxiety. This aligns with **constructivist pedagogy**, which values intrinsic motivation and experiential learning.
3. **Focus on Comprehension and Pronunciation.** Since comprehension and pronunciation showed the highest gains, teachers can prioritize QR code-linked audio materials, pronunciation drills, and context-based discussions to reinforce these skills.
4. **Collaborative Learning Environment.** Group-based QR Code–Puzzle activities foster peer learning, encourage negotiation of meaning, and develop communication strategies—key components of communicative competence.

These pedagogical insights highlight the potential of integrating QR Code–Puzzle not only as a supplementary activity but as a core method for communicative language teaching in secondary schools.

### DISCUSSION

In summary, the findings from both quantitative and qualitative observations indicate that the QR Code–Puzzle effectively enhances EFL learners' speaking skills. The combination of game mechanics, technology-assisted input, and collaborative communication contributes to measurable improvement across all components of speaking. The significant gain in comprehension suggests that students benefited from exposure to meaningful tasks that required active interpretation and verbalization. Pronunciation improvement reflects increased awareness and practice supported by QR code-linked audio materials.

These results confirm that integrating QR Code–Puzzle aligns well with 21st-century education principles that emphasize creativity, communication, collaboration, and critical thinking (OECD, 2022).

Hence, this instructional approach can be adopted more broadly in EFL classrooms to bridge traditional methods and modern technological learning experiences.

## CONCLUSION

The findings of this study demonstrate that the integration of QR Code–Puzzle as a learning medium significantly enhances students' English-speaking ability, particularly in the components of comprehension and pronunciation. The results of the Wilcoxon Signed Rank Test ( $Z = -4.733, p < .001$ ) confirm a statistically significant difference between the pre-test and post-test scores, with students' mean speaking performance increasing from 61.21 to 82.14. This substantial improvement provides empirical support for the effectiveness of QR Code–Puzzle as an instructional tool in EFL classrooms.

The success of this approach can be attributed to several interrelated factors. First, the interactive and multimodal features of QR Code–Puzzle provided students with authentic language exposure and opportunities for meaningful communication. Second, the puzzle-based learning environment encouraged engagement, collaboration, and critical thinking—core principles of constructivist pedagogy. Third, by combining problem-solving tasks with immediate feedback from digital media, learners developed confidence in using English for oral communication.

From a pedagogical perspective, QR Code–Puzzle offers an innovative framework for designing learner-centered and technology-enhanced speaking activities. Teachers can adapt this approach to various topics and skill levels by embedding QR codes in worksheets, classroom walls, or digital slides, linking them to audio prompts, dialogue videos, or vocabulary games. This integration can motivate students to participate actively and promote a dynamic classroom atmosphere.

However, this study is limited by its one-group pre-experimental design, which lacks a control group for comparison. Future research could employ a quasi-experimental or experimental design with larger samples to validate the findings. Additionally, qualitative data such as student interviews or classroom observations could be included to explore learners' perceptions and engagement more deeply.

In conclusion, the integration of QR Code–Puzzle represents a powerful pedagogical innovation that aligns with modern educational paradigms emphasizing active learning, technological integration, and communicative competence. By bridging the gap between traditional instruction and digital learning, QR Code–Puzzle not only improves students' speaking ability but also prepares them to thrive in technology-driven learning environments.

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