

Implementing QR Code Media to Improve Students' Vocabulary Mastery at TK IT Al Irsyad Koto Baru

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ABSTRACT

Vocabulary mastery is one of the fundamental components of early English language development, yet young learners at the kindergarten level often struggle to retain new words when instruction relies solely on verbal explanation or static printed materials. This article discusses the implementation of QR code media as an instructional tool to improve vocabulary mastery among students at TK IT AL Irsyad Koto Baru. The medium combines printed picture cards representing concrete vocabulary items (such as animals, fruits, colors, and daily objects) with embedded QR codes that, when scanned using a tablet or smartphone camera, direct students and teachers to short audio pronunciations, animations, or videos related to the pictured word. Grounded in Dual Coding Theory (Paivio, 1990), Mayer's Cognitive Theory of Multimedia Learning, and the broader framework of Mobile-Assisted Language Learning (MALL), this approach is expected to strengthen children's verbal and visual memory pathways simultaneously, increase engagement, and provide immediate audio-visual reinforcement of new vocabulary. This article outlines the background of the problem, the theoretical foundation, the four-stage design and implementation procedure of the media, its anticipated pedagogical benefits, the practical challenges likely to arise in a kindergarten setting, and closes with limitations and recommendations for teachers and future researchers who wish to adopt or evaluate similar technology-assisted media in early childhood classrooms.

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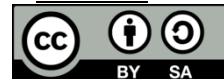
media berbasis gambar; kode QR; penguasaan kosakata; pendidikan anak usia dini; taman kanak-kanak; pembelajaran bahasa berbantuan perangkat bergerak

ABSTRAK

Penguasaan kosakata merupakan salah satu komponen fundamental dalam perkembangan awal kemampuan berbahasa Inggris, namun anak-anak pada jenjang taman kanak-kanak sering kali kesulitan mengingat kata-kata baru ketika pembelajaran hanya bergantung pada penjelasan verbal atau materi cetak yang statis. Artikel ini membahas penerapan media berbasis kode Quick Response (QR) bergambar sebagai alat pembelajaran untuk meningkatkan penguasaan kosakata pada siswa TK IT AL Irsyad Koto Baru. Media ini memadukan kartu bergambar cetak yang merepresentasikan kosakata konkret (seperti hewan, buah-buahan, warna, dan benda sehari-hari) dengan kode QR tertanam yang, ketika dipindai menggunakan kamera tablet atau ponsel pintar, mengarahkan siswa dan guru ke rekaman pengucapan audio singkat, animasi, atau video yang berkaitan dengan kata yang digambarkan. Berlandaskan Teori Pengodean Ganda (Dual Coding Theory) (Paivio, 1990), Teori Kognitif Pembelajaran Multimedia (Cognitive Theory of Multimedia Learning) dari Mayer, serta kerangka yang lebih luas tentang Pembelajaran Bahasa Berbantuan Perangkat Bergerak (Mobile-Assisted Language Learning/MALL), pendekatan ini diharapkan dapat memperkuat jalur memori verbal dan visual anak secara bersamaan, meningkatkan keterlibatan, serta memberikan penguatan audio-visual secara langsung terhadap kosakata baru. Artikel ini menguraikan latar belakang masalah, landasan teoretis, prosedur perancangan dan penerapan media dalam empat tahap, manfaat pedagogis yang diharapkan,

tantangan praktis yang mungkin muncul dalam konteks taman kanak-kanak, dan diakhiri dengan keterbatasan serta rekomendasi bagi guru dan peneliti

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INTRODUCTION

a. Background of the Study

English vocabulary acquisition at the early childhood level lays the groundwork for later language competence, since a child's ability to communicate, comprehend stories, and follow simple instructions depends heavily on the range of words they recognize and can recall. At the kindergarten stage, vocabulary mastery plays a crucial role in children's ability to communicate effectively and understand language, yet many early childhood classrooms still rely on textbook-based activities such as coloring, tracing, and copying letters, which provide limited repetition and reinforcement for new words. Because vocabulary functions as the basic building block for listening comprehension, early reading readiness, and oral expression, weaknesses in vocabulary instruction at this stage tend to accumulate into larger language gaps as children progress into primary school.

A similar condition is commonly observed at TK IT AL Irsyad Koto Baru, where English is introduced as an additional language alongside the regular Islamic early-childhood curriculum. Teaching is largely delivered through flashcards, worksheets, and oral repetition led by the classroom teacher. While these methods are simple to prepare and require no special equipment, they tend to engage only the verbal or visual channel separately, offer little interactivity, and depend entirely on the teacher being physically present to model correct pronunciation. Consequently, students may recognize a picture but forget how the corresponding word is pronounced once the lesson ends, or vice versa. Repetition at home is also difficult because parents themselves may be unsure of correct English pronunciation, leaving children with few opportunities to reinforce new vocabulary outside the classroom.

b. Problem Identification

Several interrelated problems can be identified from this situation. First, existing media at the school provide limited audio modeling, so pronunciation instruction depends almost entirely on the teacher's own voice and availability. Second, learning activities tend to be one-directional, with students positioned as passive recipients of vocabulary rather than active participants who can independently explore and repeat the material. Third, there is no simple mechanism for children to review vocabulary at home in a way that reproduces the same audio-visual experience they receive in class. Taken together, these problems point to the need for a medium that is inexpensive, easy for teachers to prepare, and capable of delivering consistent

audio-visual reinforcement that children can access both in the classroom and, with parental support, at home.

c. QR Codes as a Potential Solution

Advances in mobile technology offer a practical solution to this gap. QR (Quick Response) codes are two-dimensional barcodes that can instantly link a printed page to digital content such as audio recordings, short videos, or animations once scanned with a smartphone or tablet camera. When combined with picture cards, QR codes turn a static image into an interactive multimedia experience: a child sees the picture of an object, scans the code, and immediately hears its correct pronunciation and usage in a simple sentence. This model integrates print and digital media in a simple, user-friendly way that does not require advanced technical training for either teachers or young learners, and it allows children to repeat the audio as often as they need, supporting independent as well as guided practice. Because QR codes can be generated free of charge and printed on ordinary cardstock, the medium is also financially accessible for a small early-childhood institution such as TK IT AL Irsyad Koto Baru, which may not have a large budget for commercial digital-learning applications.

d. Objectives of the Article

This article aims (1) to describe the design and classroom implementation procedure of picture-based QR code media for improving vocabulary mastery among kindergarten students at TK IT AL Irsyad Koto Baru; (2) to explain the theoretical basis that supports the use of picture-based and QR-code-integrated media in early childhood language instruction; and (3) to discuss the anticipated pedagogical benefits, practical challenges, and recommendations relevant to integrating this media into everyday early childhood English instruction.

LITERATURE REVIEW

a. Vocabulary Mastery in Early Childhood Education

Vocabulary mastery refers to a learner's ability to recognize, recall, pronounce, and appropriately use words in communication. For young learners, vocabulary develops mainly through repeated exposure, imitation, and meaningful context rather than through formal memorization, since children at this age tend to imitate the way words are spoken by the people and media around them. Early childhood learners typically acquire a foreign language through a combination of immersion, play, and repetition, and short, playful, and frequent exposure to target words tends to produce stronger retention than long, formal drills. Because kindergarten-age children have not yet developed the metalinguistic awareness needed for explicit grammar instruction, vocabulary is generally regarded as the most appropriate and productive language focus at this stage, and its mastery is a strong predictor of later reading comprehension and oral fluency.

b. Characteristics of Young Learners in Foreign Language Acquisition

Kindergarten-age children learn differently from older learners in several important respects. Their attention span for a single activity is short, typically ranging from five to fifteen minutes, so instructional segments need to be brief, varied, and embedded in play rather than

delivered as long, uninterrupted verbal explanations. Young children also rely heavily on concrete, sensory experience rather than abstract reasoning, meaning that a word is more easily learned when it is anchored to something the child can see, touch, hear, or act out. In addition, children at this age are highly responsive to novelty and immediate feedback; an activity that produces an instant, engaging response, such as a sound or animation, tends to sustain attention far longer than a static worksheet. These characteristics collectively suggest that any medium intended for kindergarten vocabulary instruction should be short in duration, multisensory in design, and capable of providing quick, self-directed feedback, all of which are properties that a picture-based QR code medium is specifically designed to offer.

c. Picture-Based Media and Dual Coding Theory

The use of pictures in vocabulary instruction is supported by Dual Coding Theory, which proposes that verbal and nonverbal (visual) information are processed through two distinct but interconnected cognitive channels; when a word is learned together with a related image, memory traces are formed in both channels, creating more retrieval pathways than verbal instruction alone. Building on this theory, research has confirmed that preschool-age children who are taught new words with pictorial support demonstrate stronger word learning than those taught with verbal explanation only, and several studies conducted in Indonesian kindergarten contexts have found that picture-based media substantially improves young learners' vocabulary acquisition through concrete visual representation. Complementary evidence from cognitive psychology further indicates that images are generally easier to remember than words presented in isolation, a phenomenon often referred to as the picture superiority effect, and that this advantage is strongest when learners actively engage with the image rather than merely viewing it passively.

Related to Dual Coding Theory is Mayer's Cognitive Theory of Multimedia Learning, which holds that people learn more effectively when verbal and pictorial materials are presented together rather than separately, because the combination allows learners to build connections between the two representations in working memory. Applied to early childhood vocabulary instruction, this theory suggests that pairing a picture with a short, well-synchronized audio explanation, as is done in the picture-based QR code medium proposed in this article, should produce stronger comprehension and retention than either a picture-only flashcard or an audio-only recording used in isolation.

d. QR Code Technology and Mobile-Assisted Language Learning

A QR code is a machine-readable matrix barcode that can store links to audio, video, or web-based content and can be decoded almost instantly by an ordinary smartphone camera. In language education, QR codes have been used to support listening, speaking, reading, and vocabulary-building activities by giving learners quick access to authentic audio models and supplementary content embedded directly within printed materials. Studies on QR-code-assisted learning report that the technology increases learners' active vocabulary knowledge and provides accessible, real-time audio feedback that supports both pronunciation modeling and independent review outside class hours. QR-code integration also fits within the wider field of Mobile-Assisted Language Learning (MALL), which examines how portable devices such

as smartphones and tablets can extend language practice beyond the physical classroom; MALL research broadly indicates that mobile technologies enable ubiquitous, anywhere-anytime access to learning content and can strengthen learner autonomy when the supporting materials are pedagogically well aligned with classroom objectives.

In early childhood contexts specifically, a classroom action research using a "Pop-Up QR Book" combining print illustrations with scannable audio content found the medium highly effective for teaching English vocabulary to children aged three to four, as it stimulated their interest and strengthened their ability to remember and understand new words. Related work on QR-code-based letter cards for early literacy instruction likewise reported favorable validation results from subject-matter and media experts, indicating that QR-integrated print media can be developed into a feasible and classroom-ready instructional tool even for very young learners. At the same time, research on MALL adoption cautions that device access and teacher confidence are not automatic; successful implementation depends on teachers receiving adequate orientation and on the learning content being tightly aligned with the curriculum rather than treated as a novelty add-on, a consideration that is directly relevant to planning QR code integration at TK IT AL Irsyad Koto Baru.

e. Related Studies on Media-Assisted Vocabulary Instruction in Kindergarten

Community-based vocabulary interventions in Indonesian kindergartens further support the value of concrete, visually anchored media. For example, a "From Pictures to Words" program implemented at a kindergarten in Padangsidempuan, which paired flashcards with audio songs to teach vocabulary on colors and fruits, produced a statistically significant increase in students' mean vocabulary scores from the pre-test to the post-test. Similarly, studies on image-based media in Indonesian early childhood classrooms have reported that image media effectively enhances children's vocabulary mastery through concrete visual representation, while other classroom action research combining multimedia elements such as text, pictures, and animation has found superior vocabulary gains compared with traditional, verbally dominated methods across successive teaching cycles. These findings, together with the dual coding, multimedia learning, and QR-code literature reviewed above, indicate that a medium combining pictorial cues with an accessible audio channel is well suited to the needs of kindergarten-age learners and provides the theoretical and empirical basis for the picture-based QR code media proposed in this article.

RESEARCH METHOD

The implementation of picture-based QR code media at TK IT AL Irsyad Koto Baru is designed as a classroom-based instructional innovation carried out in four stages: needs analysis, media development, classroom trial, and evaluation. Table 1 summarizes the purpose and main activities of each stage before a more detailed explanation is given below.

Stage	Purpose	Main Activities
1. Needs Analysis	Identify vocabulary gaps and appropriate themes	Curriculum review, teacher interview, observation of current media use

2. Media Development	Produce picture cards with embedded QR codes	Illustration selection, audio recording, QR code generation, expert validation
3. Classroom Trial	Introduce and practice the media with students	Scan-and-say games, pair matching, scavenger hunts, guided repetition
4. Evaluation	Measure vocabulary gains and gather feedback	Pre-test/post-test picture naming, observation, teacher reflection notes

a. Needs Analysis.

The teacher identifies core vocabulary themes appropriate for the students' age group and the school's thematic curriculum, such as animals, fruits, colors, family members, and daily activities, and reviews existing media to identify gaps in repetition and audio modeling. This stage also involves brief interviews or informal discussions with teachers about the vocabulary items students find most difficult to remember, so that the media development stage can prioritize the words that will benefit most from additional audio-visual reinforcement.

b. Media Development.

Picture cards are designed for each vocabulary item with a clear, colorful illustration and a printed QR code placed beside the picture. Each QR code links to a short (10-15 second) audio clip containing the word's pronunciation, a simple example sentence, and, where appropriate, a short animation or the Indonesian translation for scaffolding. The audio and visual content are prepared in advance and hosted on a simple, freely accessible link so that the QR code can be generated and printed on durable cardstock or laminated for classroom durability. Before being used in class, the prototype cards should ideally be reviewed by a media expert and, if possible, a subject-matter or early-childhood-education expert, so that visual clarity, audio pacing, and vocabulary appropriateness are validated prior to classroom use, following the same expert-validation procedure used in earlier QR-code media development studies.

c. Classroom Trial.

During the trial phase, the teacher introduces the picture cards in small thematic sets, models scanning the QR code with a tablet or smartphone, and guides students to listen, repeat, and match the picture with the spoken word. Activities are designed as short, playful routines, such as scan-and-say games, pair matching, and picture scavenger hunts, in line with the play-based learning approach recommended for early childhood classrooms. To accommodate limited device availability, students may work in small rotating groups of three to four children per tablet, with the teacher or a classroom assistant supervising the scanning process while other groups engage in complementary offline activities such as coloring or matching worksheets based on the same vocabulary set.

d. Evaluation.

Vocabulary mastery is assessed through simple pre-test and post-test picture-naming tasks, along with informal observation of student engagement, attention, and willingness to use the media independently. Teacher reflection notes are also used to record practical challenges, such as device availability, internet access, and classroom management during scanning activities. Where feasible, results from successive trial sessions can be compared descriptively across weeks to see whether repeated exposure to the picture-based QR code media produces a steady improvement in students' ability to name and pronounce the target vocabulary, providing preliminary evidence to guide any wider adoption across other classes at the school.

DISCUSSION

The picture-based QR code media is expected to offer several pedagogical advantages for TK IT AL Irsyad Koto Baru. First, it provides consistent and accurate pronunciation modeling regardless of teacher availability, since the audio is standardized and can be replayed on demand, which is particularly valuable given that young learners tend to imitate the way words are spoken around them. Second, the combination of a concrete image and an audio cue activates both the visual and verbal channels described in Dual Coding Theory, which is theorized to strengthen memory retention more effectively than single-channel instruction. Third, the interactive scanning process introduces an element of novelty and autonomy, allowing children to actively trigger the multimedia content themselves rather than passively receiving it, which supports engagement and motivation in a manner consistent with findings from earlier QR-code and picture-media studies in early childhood settings. Fourth, because the same picture cards can be sent home or displayed on a classroom board, the medium bridges classroom instruction and home-based repetition, extending the anywhere-anytime access to learning content that is characteristic of Mobile-Assisted Language Learning more broadly.

From a curricular perspective, the medium also complements rather than replaces existing teaching practices at the school. Flashcards, songs, and oral repetition remain valuable for building initial familiarity and classroom rapport, while the QR code layer adds a standardized audio reference point those students can return to independently, reinforcing what has already been introduced by the teacher. This layered approach aligns with the recommendation, found in prior MALL research, that technology should be positioned as a pedagogically aligned supplement to teacher-led instruction rather than a stand-alone novelty, since device access alone does not guarantee meaningful learning gains without careful curricular integration.

Nonetheless, several practical considerations need to be addressed for successful implementation. Not all classrooms have consistent access to a tablet, smartphone, or stable internet connection, so the school may need to schedule shared-device rotations or prepare an offline-accessible audio option, such as saving audio files directly onto a device rather than relying solely on streaming links. Teachers also require brief technical orientation to comfortably manage scanning routines within a group of young children, and classroom

management strategies are needed to prevent overexcitement around the technology from overshadowing the vocabulary-learning objective itself. Careful curation of audio content length and clarity is also essential, since overly long or complex audio clips may exceed the attention span typical of kindergarten-age learners. Finally, screen-time exposure for young children should be monitored carefully; because the scanning interaction itself is brief, most of the learning time can still be spent away from the screen, with the device used only as a short trigger for the audio-visual content rather than for extended viewing.

LIMITATIONS AND RECOMMENDATIONS

This article is conceptual and descriptive in nature; it outlines a proposed design and implementation procedure rather than reporting empirical pre-test and post-test results from an actual classroom trial. As such, the anticipated benefits discussed above are grounded in relevant theory and in findings from comparable studies rather than in data collected specifically at TK IT AL Irsyad Koto Baru. Future work should therefore involve a systematic classroom action research or quasi-experimental design, comparing a control group taught with conventional flashcards to an experimental group using the picture-based QR code media, so that actual vocabulary gains, engagement levels, and retention over time can be measured and statistically verified.

It is also recommended that the school provide a brief technical training session for teachers before full implementation, prepare a simple offline backup for the audio content in case of internet disruption, and involve parents by sharing a digital copy of the picture cards for optional home practice. Further research could additionally examine the medium's effectiveness across different vocabulary themes, compare picture-based QR code media with other forms of educational technology such as gamified applications, and explore its impact on related outcomes such as listening comprehension and speaking confidence, so that a more comprehensive picture of its pedagogical value can be established for early childhood English instruction in similar school contexts.

CONCLUSION

Picture-based QR code media offers a low-cost, low-technical-barrier way to enrich vocabulary instruction for young learners by pairing a concrete picture with an instantly accessible audio-visual explanation of the target word. Anchored in Dual Coding Theory, Mayer's Cognitive Theory of Multimedia Learning, and the broader framework of Mobile-Assisted Language Learning, and supported by prior studies on QR-code-assisted and picture-based vocabulary instruction in early childhood settings, this media is expected to help students at TK IT AL Irsyad Koto Baru build stronger, more independent vocabulary recall than traditional flashcard or worksheet-based methods alone. Successful implementation nonetheless depends on adequate device access, brief teacher orientation, and careful attention to the short attention span and playful learning style characteristic of kindergarten-age children. Future implementation should include a systematic pre-test/post-test evaluation to measure actual learning gains, and further classroom action research is recommended to refine the media

design, scanning routines, and assessment instruments so that the approach can be adopted more broadly across similar early childhood institutions.

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