Bringing English to Life: QR Code-Enhanced Textbooks for Early Childhood Education

Sri Slamet[1], Choiriyah Widyasari[2], Sri Katoningsih[3], Heppy Adityarini[4], Rini Fatmawati[5]

[1,2,3] Department of Early Childhood Education, Universitas Muhammadiyah Surakarta, Indonesia
[4,5] English Department of Teacher Training and Education, Universitas Muhammadiyah Surakarta, Indonesia
ss212@ums.ac.id

Abstract

This study explores the development and implementation of QR code-enhanced thematic English textbooks to support pronunciation skills among early childhood education (ECE) teachers in Surakarta, Indonesia. Many ECE teachers face challenges in accurately pronouncing English vocabulary, which hinders the delivery of correct language models to young learners. Conventional textbooks often lack integrated pronunciation support, limiting opportunities for self-directed improvement. To address this gap, a digital-augmented textbook was developed, embedding audio pronunciation links via QR codes. The primary objective was to examine how this innovation impacts teachers' pronunciation ability and confidence in teaching English. Using a descriptive qualitative research design and case study methodology, the study involved 26 kindergarten teachers from Aisyiyah-affiliated schools. A combination of pre-tests, post-tests, observations, interviews, and documentation was used to evaluate the intervention's effectiveness. Thematic training sessions introduced teachers to the textbook's digital features and guided them through pronunciation drills and classroom implementation. Quantitative data showed significant improvements in post-test scores across all teacher groups, while qualitative feedback indicated enhanced self-confidence, increased classroom engagement, and better pronunciation modeling for students. This study supports the integration of simple digital tools such as QR codes to enhance traditional learning resources. It demonstrates that hybrid media combining print and audio components can empower teachers with limited English proficiency to improve their instructional competence. Moreover, it suggests that QR-enhanced textbooks offer an accessible, scalable solution for enriching early language instruction. The findings encourage the adoption of similar innovations in teacher training programs and advocate for further research on long-term effects of mobile-assisted language learning in early childhood contexts.

Keywords: *QR code 1; pronunciation 2; English vocabulary 3; early childhood education 4; instructional innovation 5*

Menghantarkan Bahasa Inggris pada Dunia Nyata: Buku Ajar dengan Code QR untuk Pendidikan Anak Usia Dini

Abstrak

Penelitian ini mengeksplorasi pengembangan dan implementasi buku ajar tematik bahasa Inggris yang diperkaya dengan kode QR untuk mendukung keterampilan pelafalan guru Pendidikan Anak Usia Dini (PAUD) di Surakarta, Indonesia. Banyak guru PAUD menghadapi kesulitan dalam mengucapkan kosakata bahasa Inggris dengan tepat. Hal ini dapat berdampak pada penyampaian model bahasa yang benar kepada anak didik. Buku ajar konvensional umumnya tidak menyediakan dukungan pelafalan yang terintegrasi, sehingga membatasi peluang guru untuk melakukan perbaikan pelafalannya

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

secara mandiri. Untuk menjembatani kesenjangan tersebut, dikembangkanlah buku ajar berbasis digital yang menyematkan tautan audio pelafalan melalui kode QR. Tujuan utama dari inovasi ini adalah untuk mengetahui sejauh mana dampaknya terhadap kemampuan pelafalan dan kepercayaan diri guru dalam mengajar bahasa Inggris. Dengan menggunakan desain penelitian deskriptif kualitatif dan pendekatan studi kasus, penelitian ini melibatkan 26 guru TK dari sekolah-sekolah yang berafiliasi dengan Aisyiyah. Evaluasi efektivitas intervensi dilakukan melalui kombinasi pre-test, post-test, observasi, wawancara, dan dokumentasi. Sesi pelatihan tematik memperkenalkan fitur digital dalam buku ajar serta membimbing guru dalam latihan pelafalan dan penerapan di kelas. Data kuantitatif menunjukkan peningkatan signifikan pada skor post-test di seluruh kelompok guru, sementara data kualitatif mengungkap peningkatan kepercayaan diri, keterlibatan yang lebih tinggi dalam pembelajaran, dan pemodelan pelafalan yang lebih baik bagi anak. Penelitian ini mendukung integrasi alat digital sederhana seperti kode QR untuk memperkaya sumber belajar tradisional. Hasilnya menunjukkan bahwa media hibrida yang menggabungkan komponen cetak dan audio dapat memberdayakan guru dengan keterbatasan kemampuan bahasa Inggris untuk meningkatkan kompetensi pengajarannya. Selain itu, buku ajar berbasis QR menawarkan solusi yang mudah diakses dan dapat ditingkatkan skalanya untuk memperkaya pembelajaran bahasa pada anak usia dini. Temuan ini mendorong penerapan inovasi serupa dalam program pelatihan guru serta merekomendasikan penelitian lanjutan mengenai dampak jangka panjang dari pembelajaran bahasa berbasis perangkat mobile dalam konteks PAUD.

Kata kunci: kode QR1; pelafalan 2; kosakata bahasa Inggris 3; pendidikan anak usia dini 4; inovasi pembelajaran 5

1. Introduction

English has become an essential language in early childhood education. In many kindergartens across Indonesia, especially in urban areas like Surakarta, English is introduced as a basic language skill. However, many early childhood teachers still face challenges in pronouncing English vocabulary correctly. This becomes a problem because incorrect pronunciation by teachers can lead to poor language models for children, who rely heavily on imitation in learning to speak. Accurate pronunciation is a foundational component of early language development, as mispronunciation can fossilize errors in young learners' speech patterns [1].

Over the years, efforts have been made to support English teaching in early education through training, workshops, and printed teaching materials. Some programs have provided teachers with audio-visual aids, while others have focused on curriculum development. Educational publishers have also produced thematic textbooks to support vocabulary learning for young children. Despite these efforts, most available books still lack direct tools for helping teachers with correct pronunciation. As a result, pronunciation errors remain common and unaddressed in classroom settings. Recent studies emphasize the limitations of static instructional materials that fail to accommodate oral language skill development among educators [2].

Previous researchers have paid much attention to teaching methods, learning media, and vocabulary development strategies. However, there has been limited focus on integrating pronunciation support directly into textbooks used by early childhood teachers. At the same time, mobile technology and QR codes have become widely accessible and are rarely used in this context. This represents an untapped opportunity for enhancing textbook design with interactive digital support. Emerging evidence suggests that mobile-augmented learning

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

environments significantly enhance teacher training outcomes, particularly in pronunciation and phonemic awareness [3].

This study proposes the use of QR code-embedded English textbooks as a solution. By linking vocabulary words to audio pronunciation through scannable codes, teachers can instantly access correct models and improve their own skills. This concept combines print and digital media in a simple, user-friendly way, without requiring advanced technological training. Integrating QR codes allows for seamless scaffolding of pronunciation modeling, supporting both structured learning and spontaneous practice [4].

The main goal of this research is to examine how QR code-assisted textbooks can improve teachers' English pronunciation and support more effective language learning for young children.

2. Literatur Review

2.1. Textbooks in Early English Education

Textbooks play a central role in early childhood education as they serve as both a learning resource and a teaching guide. In the context of language learning, they offer structure, thematic content, and repetitive practice that are essential for vocabulary development. As stated in the report "Textbooks are considered important because they provide rules and syllabus that guide teaching, and ensure that children in different classes receive the same material".

According to Richards, textbooks are indispensable in classrooms because they organize instructional content and promote consistency across learning environments [5]. Hutchinson and Torres also argue that well-designed textbooks provide valuable input for classroom activities [6]. However, traditional textbooks often lack support for oral language skills, especially pronunciation [7], [8].

This lack of support becomes problematic when teachers are not trained in English pronunciation, as they may pass on incorrect models to students. Therefore, the development of textbooks with additional pronunciation tools becomes a critical need in early English education [9].

2.2. Integrating QR Codes into English Textbooks

The integration of QR codes in textbooks has introduced a new way to provide immediate access to pronunciation support and multimedia content. QR codes allow teachers and students to scan printed materials and retrieve linked audio or video resources, bridging the gap between print and digital learning [10].

A study by Celik found that QR code-embedded textbooks significantly improved learners' pronunciation and vocabulary acquisition [11]. Likewise, HEOS emphasized that QR codes enhance pronunciation learning by offering accessible and real-time feedback [12]. In early childhood contexts, the "Pop-Up QR Book" model demonstrated how audio-visual QR tools can effectively engage young learners in pronunciation and vocabulary development [13].

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

From the field report:

"English textbooks currently used in PAUD do not provide pronunciation guidance, even though correct pronunciation is crucial for meaningful communication".

This indicates that QR code integration is a promising solution, particularly for teachers who are not native speakers and lack formal training in English phonology [9], [12].

2.3. Early Childhood Teachers and Language Instruction

Early childhood teachers, especially those in PAUD (Pendidikan Anak Usia Dini), are not always equipped with strong English language skills. As observed in the field:

"Many teachers struggle with correct pronunciation, and most of them do not have a background in English language education".

This aligns with global challenges, where ECE teachers often face difficulties in teaching foreign languages due to limited training. Moreover, language exposure in early childhood relies heavily on the teacher's oral modeling. Incorrect pronunciation from the teacher may lead to fossilization of errors in students' speech [14], [15].

Using QR code-enabled textbooks allows teachers to independently access pronunciation models, practice listening and speaking, and develop confidence. The post-test data in the report showed significant improvement in teachers' pronunciation after using QR-based materials.

"The QR codes helped teachers imitate the correct pronunciation, and teachers reported increased confidence in teaching English".

Thus, empowering early childhood teachers with QR-supported textbooks does not only improve instructional quality but also ensures that young children receive accurate and engaging language input [5], [9], [15].

3. Research Methodology

Research Design

This study employed a descriptive qualitative approach with a case study method. It focused on exploring how QR code-embedded English textbooks improve pronunciation skills among early childhood teachers in Surakarta. This approach is suitable for investigating educational innovations in real-life settings [16].

Participants

Enhanced Textbooks for Early Childhood Education", the study involved a population of early childhood teachers actively teaching English in Aisyiyah-affiliated kindergartens in Surakarta. The sample consisted of 26 kindergarten teachers who were purposefully selected due to their active involvement in English thematic instruction despite lacking formal English education backgrounds. This purposive sampling technique was used to ensure the

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

participants represented typical PAUD teachers facing pronunciation challenges. The participants were involved in a series of structured interventions, including thematic workshops and classroom implementations. They were assessed using pre-tests and post-tests to measure changes in pronunciation abilities. Observations during classroom sessions and interviews with both teachers and principals were conducted to enrich the data. The sample size was considered adequate for a qualitative case study design that prioritizes depth of understanding over generalization. The selection process ensured the data gathered would reflect practical classroom realities and instructional needs. This approach was aligned with the study's aim to evaluate the effectiveness of QR code-supported textbooks in a realistic early childhood education context.

Instruments and Data Collection

To collect comprehensive data, the study used a combination of tests, observations, interviews, and documentation. The pre-test and post-test instruments were designed to measure teachers' ability to pronounce selected English vocabulary before and after the intervention. Observations were carried out during training and classroom practice to monitor how teachers used the QR code-embedded textbooks and responded to pronunciation guidance. Semi-structured interviews were conducted with teachers and school principals to explore their experiences, needs, and perceptions regarding English teaching [17]. In addition, field notes and photographic documentation supported the data triangulation process.

Intervention Procedure

The intervention consisted of a series of structured workshops and classroom activities spread over several weeks. Teachers were first introduced to the thematic textbook, including how to access and use the QR code features. Subsequent sessions focused on guided pronunciation drills, familiarization with daily classroom expressions, and singing English songs—an approach known to enhance early language learning through rhythm and repetition [5], [18]. Participants practiced in groups and individually, with feedback provided by facilitators. After the workshops, teachers implemented the textbook in their own classrooms.

Data Analysis

Data were analyzed qualitatively using a descriptive and comparative approach. Test results from the pre- and post-intervention phases were compared to identify changes in pronunciation performance. Observational and interview data were coded thematically to uncover patterns related to the effectiveness of the QR code-supported materials. Thematic coding helped to reveal teachers' attitudes, challenges, and progress during the implementation [16], [17].

Ethical Considerations

Participation was voluntary and involved informed consent. Confidentiality of participants' identities was ensured. All procedures were conducted in accordance with research ethics guidelines [19].

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

4. Result and Discussion

Prior to the intervention, many teachers experienced difficulties in pronouncing basic English vocabulary correctly. These difficulties were primarily due to the lack of exposure to native-like pronunciation and the absence of pronunciation support in the textbooks commonly used in their classrooms [8], [9]. Mispronunciation by teachers can hinder children's language acquisition, as young learners tend to imitate the way words are spoken by their teachers [14], [15].

To address this issue, a thematic English textbook equipped with QR codes was developed. The QR codes linked to audio files of correct vocabulary pronunciation, allowing teachers to access and model accurate speech directly from their mobile devices [10], [12]. The textbooks were designed to be age-appropriate for early learners, incorporating large fonts, colorful visuals, simple sentence structures, and everyday vocabulary.

The pre-test measured how many vocabulary words teachers could pronounce correctly before the intervention. After several weeks of using the QR-enhanced textbooks, the post-test evaluated the same criteria. The results showed a marked improvement across all groups. The result can be shon in Table 1.

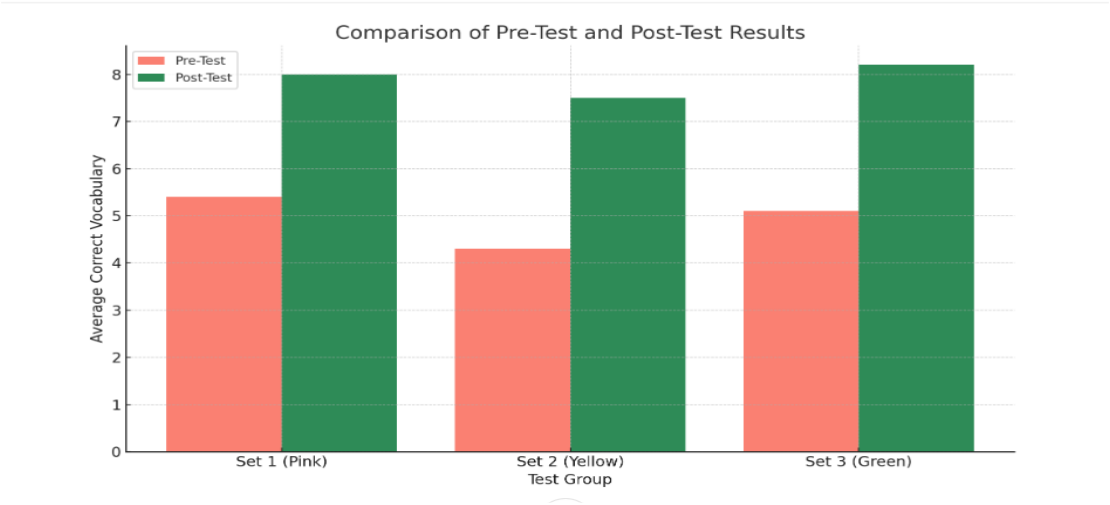
Table 1. Summary of Pre-Test and Post-Test Results

Test Group	Pre-Test (Avg.)	Post-Test (Avg.)	Improvement
Set 1 (Pink)	5.4	8.0	+2.6
Set 2 (Yellow)	4.3	7.5	+3.2
Set 3 (Green)	5.1	8.2	+3.1

Source: Field Report, 2024 (Processed Data)

Based on the data, Figure 1. illustrates the comparison between pre-test and post-test scores. All three sets showed clear improvement in vocabulary pronunciation. The average increase in performance suggests that the audio support provided by the QR codes was effective in enhancing pronunciation skills. Teachers also reported that the feature allowed them to practice pronunciation independently, boosting their self-confidence.

Figure 1. Pre-Test and Post-Test Score Comparison



Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

The data depicted in Figure 1 clearly illustrates a positive shift in teachers' pronunciation abilities after the implementation of QR code-embedded textbooks. Each group—Pink, Yellow, and Green—experienced measurable gains in post-test scores, with improvements ranging from +2.6 to +3.2 points. This upward trend reflects not only the efficacy of the QR-linked audio support but also the participants' increased engagement in active pronunciation practice. The accessibility of pronunciation models via QR codes allowed teachers to receive instant feedback and correction, which is essential in building accurate speech habits. Unlike conventional materials that require external facilitators or costly training, this innovation democratized access to language modeling. Furthermore, the teachers' improved performance signifies a shift from passive reliance on printed texts to a more multimodal, technology-supported learning experience. These results reinforce the idea that small digital enhancements, when embedded meaningfully, can yield significant pedagogical benefits.

In addition, the implementation of QR-assisted learning materials had a noticeable ripple effect on classroom dynamics. Teachers reported that children showed heightened interest when audio materials were used, especially those embedded within interactive QR codes. Young learners were curious and eager to scan codes, listen to native-like pronunciation, and mimic the sounds they heard. This enthusiastic response supports the notion that audio-visual stimuli enhance learning retention and engagement among early learners, a principle grounded in multimodal learning theory [20]. As a result, pronunciation activities evolved from isolated teacher drills into collaborative, student-centered practices. The QR-enhanced books acted as a bridge between teacher-led instruction and interactive media-based learning, fostering both guided instruction and exploratory play. This shift is significant because it underscores how digital features in textbooks can foster both teacher competence and student involvement simultaneously. Consequently, QR codes served not only as tools for teacher training but also as catalysts for more dynamic language instruction in early childhood settings. This improvement aligns with the theory of multimodal learning, which asserts that combining visual, auditory, and kinesthetic inputs reinforces understanding and retention [20]. In this case, printed words (visual), QR-linked audio (auditory), and verbal practice (kinesthetic) worked in synergy. The use of QR codes also supported self-directed and independent learning among teachers. This aligns with previous findings that self-access learning systems enhance confidence and long-term skill development [21]. Moreover, the comparative analysis between pre- and post-tests suggests that improvements were consistent across teacher groups regardless of their initial proficiency levels. This outcome suggests that the intervention was equitable and adaptable to different teacher capabilities. Group 2 (Yellow), which had the lowest average pre-test score, showed the highest improvement, indicating that QR codes are particularly beneficial for those with the most room for growth. Such results echo the findings of Celik [11], who emphasized the inclusive potential of QR technology in bridging gaps among learners with varying abilities. Additionally, teachers in this group became notably more active in discussions and peer mentoring during the training sessions. Their development showcases the potential of integrating simple, scalable tools in supporting professional development in underserved educational sectors. The QR textbook thus functioned not only as a learning aid but also as a professional equalizer among teachers with differing competencies.

Furthermore, teacher feedback indicated that students became more engaged when QR-supported materials were used. Increased student participation and enthusiasm are indicators of successful early language exposure [13], [15]. These findings emphasize the

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

sustainability and scalability of mobile-assisted learning tools in early childhood education. Since QR codes can be printed at virtually no cost and accessed with common smartphones, the barrier to adoption is minimal. The study proves that even low-resource schools and educators can benefit from technology-enhanced teaching without needing complex infrastructure. The combination of printed material and embedded audio links allowed for learning continuity both within and outside the classroom. Teachers reported practicing pronunciation at home and sharing materials with colleagues, indicating a multiplier effect beyond the immediate intervention. This grassroots-level dissemination suggests that future teacher training programs should consider QR-integrated resources as a cost-effective model for large-scale educational improvement. Hence, the broader implication of this study lies not only in improved pronunciation outcomes but also in a reimagined approach to equitable teacher capacity building.

5. Conclusion and Recommendation

Conclusion

This study demonstrated that QR code-embedded English textbooks can effectively improve early childhood teachers' pronunciation skills. The integration of audio-linked QR codes provided teachers with immediate access to accurate pronunciation models, which significantly enhanced their confidence and performance. The findings revealed clear improvements across all test groups, confirming the positive impact of this digital feature on traditional learning materials [11], [12].

The approach also encouraged independent learning and created a more interactive and engaging teaching environment. Overall, this innovation bridges the gap between conventional teaching practices and modern technological support in early childhood education [10], [13].

Recommendations

Based on the results, it is recommended that early childhood education programs consider adopting QR code-integrated textbooks, particularly for language instruction. Training should be provided to help teachers use these tools effectively and independently [16]. Future textbook development should continue to combine print and digital elements to accommodate teachers' needs and enrich classroom learning. Further research is encouraged to explore the long-term effects of QR-assisted instruction on teacher performance and student language acquisition [22].

Acknowledgement

The authors wish to thank to the Leader of Lembaga Pengabdian Masyarakat dan Pengembangan Persyarikatan (LPMPP) Universitas Muhammadiyah Surakarta, who has approved this social service. The research for this article is supported by funding from Pengembangan Persyarikatan Dakwah, Al-Islam dan Kemuhammadiyahan (P2DAI) with Project entitled "Penerapan Teknologi Buku Ajar Berfasilitas Barcode untuk Mengenalkan Kosakata Bahasa Inggris bagi Guru TK Aisyiyah Surakarta" (Grant Ref. 104.9/A.3-III/LPMPP/VI/2024).

Published by:
KONSORSIUM
LPPM PTMA
KOORDINATOR WILAYAH JATENG & DIY

References

[1] A. Rahman and D. Setiawan, "The role of pronunciation in early language learning: A study of preschool language modeling," Children and Youth Services Review, vol. 127, p. 106123, 2021. [Online]. Available: https://doi.org/10.1016/j.childyouth.2021.106123

[2] H. Kim, J. Lee, and M. Choi, "Limitations of traditional materials in developing teachers' pronunciation instruction skills," Early Education and Development, vol. 33, no. 1, pp. 45–62, 2022. [Online]. Available: https://doi.org/10.1080/10409289.2021.1928663

[3] S. Ahmed and M. K. Kabilan, "Exploring mobile-augmented tools to enhance English language teacher competence: A focus on phonemic instruction," Computers & Education, vol. 198, p. 104700, 2023. [Online]. Available: https://doi.org/10.1016/j.compedu.2022.104700

[4] C. J. Liu, Y. H. Wang, and M. Y. Chen, "A scaffolding framework for pronunciation training using QR code-linked multimedia," Teaching and Teacher Education, vol. 92, p. 100531, 2020. [Online]. Available: https://doi.org/10.1016/j.tsc.2020.100531

[5] J. C. Richards, Curriculum Development in Language Teaching. Cambridge: Cambridge University Press, 2001. DOI: https://doi.org/10.1017/CBO9780511667220

[6] T. Hutchinson and E. Torres, "The textbook as agent of change," ELT Journal, vol. 48, no. 4, pp. 315–328, 1994.

[7] G. P. S. Dewayani, Ngadiso, and T. Sarosa, "Insufficient higher order thinking skill in reading comprehension exercises of an English language textbook," ELT Worldwide, vol. 7, no. 2, pp. 124–135, 2020.

[8] S. M. Basra and P. Purnawarman, "An evaluation of English e-book 'Think Globally Act Locally' for the ninth graders," Journal on English as a Foreign Language, vol. 8, no. 1, pp. 57–74, 2018.

[9] L. S. Armstrong, A. N. Stahl, and P. J. Lampi, "All the best-laid plans: A content analysis of textbooks driving integrated reading and writing courses," Community College Journal of Research and Practice, vol. 44, no. 7, pp. 508–527, 2020.

[10] G. Firmansyah dan D. Hariyanto, "The use of QR code on educational domain: A research and development on teaching material," Jurnal SPORTIF: Jurnal Penelitian Pembelajaran, vol. 5, no. 2, hlm. 265–278, Nov. 2019. DOI: https://doi.org/10.29407/js_unpgri.v5i2.13467

[11] B. Celik, "Using QR codes to develop EFL learners' pronunciation skills and expand vocabulary knowledge," Amazonia Investiga, vol. 12, no. 66, pp. 21–30, 2023.

[12] HEOS, "QR Codes as a Potential Tool in Teaching and Learning Pronunciation," Higher Education and Oriental Studies, vol. 1, no. 1, pp. 31–44, 2020.

[13] European Journal of Education and Pedagogy, "Learning Fun English through Pop-Up QR Book: An Audio-Visual Aid for Early Childhood Foreign Language Development," EJ-EDU, vol. 3, no. 2, pp. 45–52, 2023.

[14] K. D. Dickinson, F. M. Collins, K. Nesbitt et al., "Effects of teacher-delivered book reading and play on vocabulary learning," Journal of Cognition and Development, vol. 20, no. 2, pp. 136–164, 2019.

[15] E. B. Hadley, D. K. Dickinson, K. Hirsh-Pasek, and R. M. Golinkoff, "Building semantic networks: The impact of a vocabulary intervention on preschoolers' depth of word knowledge," Reading Research Quarterly, vol. 54, no. 1, pp. 41–61, 2019.

[16] Sugiyono, Metode Penelitian Kualitatif: Untuk penelitian yang bersifat eksploratif, interpretatif, interaktif, dan konstruktif. Jogjakarta: Alfabeta, 2021.

[17] I. Florensa, M. Bosch, and J. Gascón, "Question–answer maps as an epistemological tool in teacher education," Journal of Mathematics Teacher Education, vol. 24, pp. 203–225, 2021.

[18] A. S. Anggaira, N. Aryanti, Suryadi, and Tusriyanto, "Songs for teaching vocabulary: English learning media for preschoolers," Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini, vol. 6, no. 6, pp. 6057–6068, 2022.

[19] E. B. Hurlock, Developmental Psychology: A Life-Span Approach. New Delhi: Tata McGraw-Hill, 1996.

[20] N. D. Fleming, Teaching and Learning Styles: VARK Strategies. Christchurch, New Zealand: Neil Fleming, 2001.

[21] D. N. Aprilani and M. Suryaman, "Students' perception in learning English vocabulary through Quizlet," Journal of English Teaching (JET), vol. 7, no. 3, pp. 343–353, 2021.

[22] F. Li and L. Wang, "A study on textbook use and its effects on students' academic performance," Disciplinary and Interdisciplinary Science Education Research.