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Development of Vocaroom Educational Game to Improve English Vocabulary Comprehension for Elementary School Students

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Abstract

This study aims to develop, evaluate the feasibility of, and analyze the potential effectiveness of the vocaroom educational game as a Canva-based instructional tool to improve English vocabulary comprehension for fourth-grade students. Utilizing the Research and Development method with the ADDIE model, the study involved 28 students at SDN Patemon 01 Semarang through a one-group pre-test-post-test design. The unique contribution of this medium lies in its integration of contextual spatial visualization and bilingual audio, which transforms conventional static digital flashcards into an explorative room-mapping experience. Through the Map Challenge and Room Conditions, students are encouraged to understand vocabulary within a concrete environmental context rather than through isolated rote memorization. Expert validation results indicate that the medium is highly feasible for implementation, with scores of 93 percent from material experts and 95 percent from media experts, confirming its alignment with the Kurikulum Merdeka. Statistical analysis using the Wilcoxon Signed Ranks Test yielded an Asymp Sig 2-tailed value of 0.000, suggesting a significant improvement in student learning achievement from an average of 65.64 to 94.71. An N-Gain score of 0.8286 further suggests high effectiveness within this specific research context. Although these results are promising, the study acknowledges the limitations of a one-group design; therefore, further quasi-experimental research is recommended to strengthen the generalizability of the findings. Overall, the vocaroom educational game serves as a credible instrument to improve English vocabulary comprehension through an interactive spatial-mapping approach.

Keywords: English Vocabulary, Vocaroom Educational Game, Canva, Research and Development, Elementary School

Pengembangan Game Edukasi Vocaroom untuk Meningkatkan Pemahaman Kosakata Bahasa Inggris Siswa Sekolah Dasar

Abstrak

Penelitian ini bertujuan untuk mengembangkan, menguji kelayakan, serta menganalisis potensi efektivitas media pembelajaran game edukasi vocaroom berbasis Canva dalam upaya meningkatkan pemahaman kosakata bahasa Inggris bagi siswa kelas IV sekolah dasar. Menggunakan metode Research and Development dengan model ADDIE, studi ini melibatkan 28 siswa di SDN Patemon 01 Semarang melalui desain penelitian one-group pre-test-post-test. Hal yang membedakan game edukasi vocaroom dari media kosakata berbasis Canva atau game lainnya adalah integrasi mendalam antara visualisasi spasial kontekstual dengan audio bilingual, yang mentransformasi flashcard digital statis menjadi pengalaman pemetaan ruang yang eksploratif. Melalui Map Challenge dan Room Conditions, siswa didorong untuk memahami kosakata bahasa Inggris dalam konteks lingkungan ruangan yang konkret, bukan sekadar hafalan kosakata tunggal. Hasil validasi ahli menunjukkan bahwa media ini sangat layak untuk diimplementasikan, dengan skor 93 persen dari ahli materi dan 95 persen dari ahli media, yang mengonfirmasi keselarasan desain instruksionalnya dengan Kurikulum Merdeka. Analisis statistik menggunakan Uji Wilcoxon Signed Ranks menghasilkan nilai Asymp Sig 2-tailed sebesar 0,000, yang mengindikasikan adanya peningkatan signifikan pada capaian belajar siswa dari rata-rata 65,64 menjadi 94,71. Perolehan skor N-Gain sebesar 0,8286 menempatkan media ini pada kategori efektivitas tinggi dalam konteks penelitian ini. Meskipun hasil yang diperoleh sangat menjanjikan, penelitian ini mengakui adanya keterbatasan pada penggunaan desain one-group; oleh karena itu, penelitian kuasi-eksperimen dengan kelompok kontrol disarankan untuk memperkuat generalisasi temuan. Secara keseluruhan, game edukasi vocaroom merupakan media pembelajaran yang efektif untuk meningkatkan pemahaman kosakata bahasa Inggris melalui pendekatan pemetaan spasial yang interaktif.

Kata kunci: Kosakata Bahasa Inggris, Game Edukasi Vocaroom, Canva, Research and Development, Sekolah Dasar

INTRODUCTION

English plays a strategic role as an international language. In Indonesia, English language teaching in schools has been officially implemented since 1967, following regulations issued by the Minister of Education and Culture (Ardaya et al., 2022). In this era of increasing globalization, the demand for English proficiency continues to grow, making it one of the primary focuses of education in Indonesia (Kusumaningsih et al., 2024). This is in line with the view that the basic education level is a crucial foundation that determines academic success and students' learning development in the future (Rustamova, 2022). Current global dynamics also emphasize the urgency of English language education at the elementary school level to optimize the development of students' linguistic competence, especially for those learning English as a Foreign Language (Yang et al., 2025). Therefore, introducing English from an early age at this level provides students with the opportunity to access information from around the world and expand their horizons of knowledge, including vocabulary mastery.

Vocabulary mastery is considered a fundamental element in learning English (Ritonga & Khadijah, 2025). Mastery of a wide range of vocabulary allows students to understand learning content more easily and develop effective reading, writing, and interaction skills (Xodabande et al., 2022). Success in learning English is determined by the extent to which students master vocabulary (Ebbels et al., 2022). The more vocabulary students master, the easier it is for them to use English efficiently. Therefore, the integration of modern and adaptive support tools is crucial to facilitate vocabulary acquisition in this digital age.

Technology serves as a means to produce efficient outcomes across all human activities (Bahri et al., 2022). The current transformation of education in Indonesia is facilitated by the Kurikulum Merdeka policy, which emphasizes the utilization and flexibility of technology. This drives educational reform aligned with modern dynamics through enhanced digital literacy and various online learning platforms (Rahmafutri et al., 2024). This curriculum introduces a learning method that emphasizes diversity within defined frameworks, allowing for precise content adjustment to provide students with greater opportunities to grasp concepts and improve their skills (Khoirurrijal et al., 2022). The introduction of this policy marks a significant step in Indonesia's educational transformation, grounded in the recognition of the need for reform that aligns with contemporary dynamics, social needs, and technological advancements (Rahmafutri et al., 2024). By focusing on technology-based learning, the curriculum encourages students to utilize various online platforms, where the integration of technology is evident through digital assessments, the Merdeka Mengajar platform, and the implementation of interactive learning media, such as educational games, which enrich the learning experience and support vocabulary mastery.

Educational games aim not only for entertainment but also to enhance student knowledge (Gunawan et al., 2022). This is because playing is a natural and essential part of a child's development, where game-based learning allows students to acquire knowledge through play to achieve educational goals (Jhang et al., 2025). Compared to traditional lecture-based teaching, game-based learning improves learning efficiency by involving students in hands-on experiences, enhancing eye-hand coordination, and increasing overall learning engagement and motivation (Lin et al., 2021). In this context, these games serve as appropriate learning media in the teaching and learning process to improve instructional quality, particularly in English (Kusumarini et al., 2025). The use of educational game media also represents a more modern learning method for students (Wildan et al., 2023). By leveraging technology and creative design, educational games offer an innovative approach that not only presents English material in an attractive and interactive format but also provides an enjoyable learning experience for students while enhancing their emotional and cognitive engagement.

Field data reveals a gap in current teaching practices. Based on interviews and observations, teachers have not yet utilized diverse learning media and remain limited to concrete aids or one-way PowerPoint presentations. This causes students to long for new innovations in the learning process. The urgency of this research is based on the disconnection between the digital nature of today's elementary school students and the conventional pedagogical methods still used in the classroom.

Although the Kurikulum Merdeka has mandated technology integration, reality on the ground shows that media utilization is still limited to static visual displays that fail to trigger active interaction. The failure to bridge students' needs for interactive, game-based media can result in low English vocabulary comprehension, which in turn hampers their basic communication skills in the future. In fact, when games are meaningfully integrated with instructional content, learners tend to achieve deeper understanding and more comprehensive knowledge acquisition because they are required to apply learned concepts to complete specific tasks (Lai & Hu, 2025). Therefore, providing media that is not only digital but also game-

oriented becomes crucial to ensuring the language acquisition process occurs naturally and meaningfully (Yanti & Janattaka, 2025).

In response to these needs, this research develops an innovative learning medium called the vocaroom educational game. Unlike other platforms, the vocaroom educational game was developed using Canva, a digital creativity platform that allows users to create interactive visualizations using a comprehensive collection of elements (Rahmawati & Nurafni, 2024). The vocaroom educational game is specifically designed to facilitate English vocabulary comprehension related to rooms in a house. Through Canva's interactive features, students can explore vivid visual representations to help them connect vocabulary with real objects (Utami & Calam, 2025). In the vocaroom educational game, students do not only view animations and visual objects but are also invited to interact through challenges that require them to name and use vocabulary within simple sentence structures.

Although much research on educational game development has been conducted previously, the vocaroom educational game offers substantial differentiation through the simultaneous integration of spatial and multisensory synchronization. This unique contribution lies in the transformation of the Canva platform from a mere static design tool into a dynamic and structured learning medium. Unlike typical Canva media development, which tends to be linear and limited to digital flashcards, the vocaroom educational game presents realistic house layout visualizations to build students' spatial awareness. This understanding is crucial so that students do not just memorize room vocabulary but also understand the systemic positional relationships between rooms.

Furthermore, the integration of bilingual audio synchronized with interactive visual elements provides a multisensory learning experience rarely found in similar media. This innovative design ensures that the vocaroom educational game does not only require students to memorize words in isolation but also trains their ability to understand cohesive vocabulary usage within complete and contextual sentence structures. Thus, this research does not merely replicate existing digital media but fills a methodological gap in teaching English vocabulary comprehension at the elementary school level through a more holistic approach.

This study focuses on the innovation of the vocaroom educational game developed through the Canva platform to enhance fourth-grade elementary school students understanding of vocabulary related to the topic "My Living Room is Beside Kitchen", while also measuring the validity and efficiency of this medium in addressing the challenges of modern, dynamic learning.

METHODS

This study applies a Research and Development (R&D) approach as the primary foundation for developing instructional products. Referring to the framework proposed by Nana Syaodih Sukmadinata, R&D is a structured process designed to create or optimize educational products so that their effectiveness can be professionally accounted for (Astuti et al., 2022). In line with this, the development aims to produce a specific product while simultaneously testing its success in field practice (Okpatrioka, 2023). The entire research workflow consistently follows the ADDIE development model, which consists of five integrative stages: Analysis, Design, Development, Implementation, and Evaluation.

The first stage, analysis, focused on identifying direct field needs through a preliminary study at SDN Patemon 01, Semarang City. This process involved participatory observation and structured interviews with the fourth-grade English teacher to map curriculum gaps, the limited availability of learning media, and specific obstacles faced in teaching English vocabulary. The researcher also conducted an in-depth analysis of the cognitive characteristics and learning styles of the 28 students serving as research subjects for the 2025/2026 academic year. The data from this analysis became a crucial foundation for determining the feature specifications and material depth required to improve English vocabulary comprehension.

In the design stage, the researcher drafted a systematic architecture for the vocaroom educational game. This step included creating interactive storyboards that outline the game flow, selecting materials aligned with the Kurikulum Merdeka Learning Outcomes (CP), and determining visual and audio assets that support a multisensory approach. In addition to designing the media, the researcher developed comprehensive assessment instruments, including validation sheets for material and media experts, as well as multiple-choice test items tailored to the indicators of English vocabulary comprehension for fourth-grade elementary school students.

The development stage realized the design into a complete digital product using the Canva platform. This production integrated multimedia elements such as concrete room imagery, bilingual pronunciation audio (Indonesian and English), and interactive navigation. Once the prototype was completed, the media

underwent a validation process by a team of experts from the PGSD program at Universitas Negeri Semarang to receive critical reviews from pedagogical and technical perspectives. Critiques, suggestions, and constructive feedback from the validators were used as a basis for iterative product revisions. This process ensured that the vocaroom educational game was declared feasible and ready for use as an instructional instrument before being tested on the research subjects.

Entering the implementation stage, the media was tested directly on 28 fourth-grade students using a one-group pre-test-post-test research design. The procedure began with a pre-test to measure students' initial competencies, followed by a treatment involving intensive learning sessions using the vocaroom educational game, and concluded with a post-test to measure the improvement in learning outcomes. In this stage, the researcher honestly acknowledges that the use of a single-group design without a control group has limitations in interpreting pure statistical causal relationships. Therefore, as a step for future development, subsequent studies are strongly recommended to apply true experimental or quasi-experimental designs involving a control group as a comparison to strengthen the internal validity of the research findings.

In the evaluation stage, a comprehensive data analysis was conducted to measure the significance of the media's effectiveness. Quantitative analysis was performed using IBM SPSS Statistics 21 software through normality tests (Shapiro-Wilk) and difference tests (Wilcoxon) to compare students' score achievements before and after the intervention. Additionally, the N-Gain test was used to measure the effectiveness level of the improvement in student understanding. The results of this evaluation not only determined the final quality of the product but also provided an overview of the media's practical utility in supporting the enhancement of English vocabulary comprehension for fourth-grade elementary school students.

RESULTS AND DISCUSSION

Result

This research has produced an educational game called "vocaroom", developed using the Canva platform. The media is designed to present English vocabulary related to rooms in a house, specifically focusing on the topic "My Living Room is Beside Kitchen." The structure of the vocaroom educational game consists of several key features designed to facilitate students in exploring and to improve English vocabulary comprehension independently.



Figure 1. Start Screen

Figure 1 shows the Start Screen design, which serves as the initial gateway for student interaction with the media. This section highlights visual aspects through the use of a contrasting color palette and typography tailored to the characteristics of elementary school students. This design aims to create a positive first impression and improve English vocabulary comprehension before students enter the main learning content of the vocaroom educational game.



Figure 2. Main Menu

Figure 2 displays the Main Menu, which serves as the navigation control center within the vocaroom educational game. This feature is designed to provide students with flexibility in choosing their activity flow, whether to access learning materials, start quizzes, or view the developer's identity. The use of representative icons aims to facilitate the independent operation of the vocaroom educational game and to improve english vocabulary comprehension among students.



Figure 3. Material Menu

The primary instructional content within the vocaroom educational game is presented through the Materials Menu, as illustrated in Figure 3. The material is divided into three units: Learn the Rooms, Map Challenge, and Room Conditions. Each unit integrates concrete visual elements with bilingual audio features to help students understand vocabulary and its spelling simultaneously, which serves to improve english vocabulary comprehension.



Figure 4. Quiz

To review the extent of student understanding of the materials studied, a Quiz feature was developed, as shown in Figure 4. This Quiz section presents multiple-choice questions equipped with an instant feedback function. This feature allows students to immediately confirm the accuracy of their answers after

the input process within the vocaroom educational game, which serves to improve english vocabulary comprehension.



Figure 5. Developer

As a form of transparency and development accountability, the vocaroom educational game is equipped with a Developer Profile page, as shown in Figure 5. This section contains the developer's identity and institutional affiliation. The existence of this feature is intended to facilitate academic coordination and open opportunities for future media refinement based on user feedback to improve english vocabulary comprehension.

Once all technical features and instructional content within the vocaroom educational game were fully developed, the next stage was to measure the media's feasibility level through a series of validation tests involving material and media experts. Material validation was conducted to evaluate content relevance, linguistic accuracy, and the alignment of materials with fourth-grade elementary school English learning outcomes. Based on these assessment results, a percentage score of 93% was obtained, placing the material aspect in the "highly feasible" category. The validation instrument indicates that the content within the vocaroom educational game possesses precision regarding compliance with Phase B Learning Outcomes (CP) in the Kurikulum Merdeka, specifically on the topic "My Living Room is Beside Kitchen."

Media validation testing was carried out to ensure that the designed learning instrument meets the technical standards of high-quality instructional media. The assessment results from media experts yielded a score of 95%, classified in the "highly feasible" category. Data from the validation instrument indicate that the vocaroom educational game features an ergonomic design suitable for the cognitive characteristics of elementary school-aged children. This media is considered capable of simultaneously integrating text, image, and audio elements, thereby making it easier for students to associate foreign vocabulary with concrete real-world objects to improve english vocabulary comprehension. Through the high accumulation of validation scores from both experts, the vocaroom educational game is declared to meet the validity threshold to be implemented as a supporting instrument in English language learning.

Based on the feasibility test results from experts, which stated that this media is highly feasible for implementation, the research phase proceeded to the effectiveness test to measure student learning outcomes. This test employed a one-group pretest-posttest design involving 28 fourth-grade students at SDN Patemon 01 Semarang on the topic "My Living Room is Beside Kitchen." The effectiveness of the media was measured by comparing student competencies through pre-test scores obtained before using the vocaroom educational game and post-test scores obtained after the use of the vocaroom educational game. This score distribution comparison is comprehensively visualized in Figure 6 as an effort to improve english vocabulary comprehension.

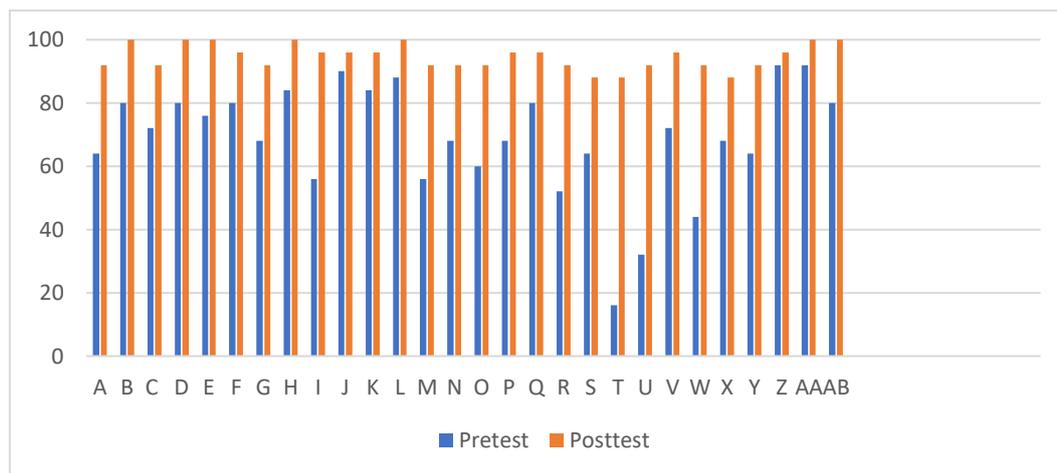


Figure 6. Student Learning Outcomes Graph

Data in Figure 6 shows that the students' initial average score in the pre-test session was 65.64. This achievement indicates that, classically, the students' abilities had not yet reached the established Learning Objective Achievement Criteria (KKTP) threshold of 70. However, after interacting with the vocaroom educational game, the students' average score in the post-test session experienced a significant escalation to 94.71. This surge in figures provides initial evidence regarding the cognitive progress achieved by students through the use of the vocaroom educational game to improve english vocabulary comprehension.

To ensure statistical validity, a prerequisite normality test was conducted on the pre-test and post-test data using the Shapiro-Wilk method. This step is crucial in determining the type of statistics to be used in hypothesis testing to measure the media's effectiveness in efforts to improve english vocabulary comprehension. The results of the data normality test are presented in Table 1.

Table 1. Normality Test of Pre-test and Post-test Data

| | Tests of Normality | | | | | |
|----------|---------------------------------|----|------|--------------|----|------|
| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
| | Statistic | Df | Sig. | Statistic | Df | Sig. |
| Pretest | .141 | 28 | .163 | .912 | 28 | .022 |
| Posttest | .219 | 28 | .001 | .873 | 28 | .003 |

The analysis results in Table 1 show that the significance values for the pre-test (0.022) and post-test (0.003) are below the 0.05 threshold. This condition indicates that the data distribution is not normal. Therefore, the hypothesis testing shifted to a non-parametric statistical approach using the Wilcoxon Signed Ranks Test. A summary of the rank data calculation results is presented in Table 2.

Table 2. Wilcoxon Signed Ranks Test Results

| | | Ranks | | |
|--------------------|----------------|-----------------|-----------|--------------|
| | | N | Mean Rank | Sum of Ranks |
| Posttest – Pretest | Negative Ranks | 0 ^a | .00 | .00 |
| | Positive Ranks | 28 ^b | 14.50 | 406.00 |
| | Ties | 0 ^c | | |
| | Total | 28 | | |

Based on Table 2, it is observed that 28 students achieved positive ranks, meaning that all subjects experienced an increase in scores from the pre-test to the post-test. To examine whether this increase is statistically significant, the results of the Wilcoxon test are further presented in Table 3.

Table 3. Wilcoxon Signed Ranks Test Results

| Test Statistics ^a | |
|------------------------------|---------------------|
| | Posttest – Pretest |
| Z | -4.630 ^b |
| Asymp. Sig. (2-tailed) | .000 |

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

The analysis in Table 3 shows an Asymp. Sig. (2-tailed) value of 0.000. Since the significance value is less than 0.05, the working hypothesis (H_a) is accepted, which means there is a significant difference in learning outcomes between before and after the use of the vocaroom educational game. As a final stage to determine the effectiveness of the increase, an N-Gain test was conducted as shown in Table 4.

Table 4. N-Gain Improvement Test Results

| Descriptive Statistics | | | | | |
|------------------------|----|---------|---------|---------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| N-gainScore | 28 | .50 | 1.00 | .8286 | .13428 |
| N-gainScorePersen | 28 | 50.00 | 100.00 | 82.8603 | 13.42847 |
| Valid N (listwise) | 28 | | | | |

The calculation results in Table 4 show an average N-Gain score of 0.8286 or 82.86%. Referring to the effectiveness criteria, this achievement places the vocaroom educational game in the "high effectiveness" category. These results confirm that the use of the vocaroom educational game empirically contributes positively to improve english vocabulary comprehension among 4th-grade elementary school students.

Discussion

Development of the Vocaroom Educational Game

The development of the vocaroom educational game media through the Canva platform is an instructional effort to present a more dynamic learning experience compared to static material presentation methods. The development process, which follows the ADDIE procedure, allows for the systematic integration of multimedia elements through a multisensory approach that stimulates students' visual and auditory senses simultaneously. In the aesthetic aspect, the selection of a contrasting color palette and child-friendly typography in the vocaroom educational game design is not merely a decorative element, but a design strategy aimed at maintaining the attention of 4th-grade elementary school students. The use of visual stimulation through a variety of colors and dominant illustrations in this media can support brain development while enhancing cognitive abilities and the effectiveness of students' understanding in processing information during the learning process, which is in line with research conducted by (Lim, 2025).

The content structure in the vocaroom educational game is divided into three main material units designed systematically to facilitate the transition of students from mechanical memorization toward a more contextual understanding. These three units consist of Learn the Rooms, which contains the introduction of basic vocabulary regarding room names; Map Challenge, which presents material regarding the positions or layout between rooms in a house; and Room Conditions, which explains or describes various physical conditions of a room. The material layout, which proportionally combines text and illustrations, is intended to help achieve learning objectives in a more structured way, this is in line with research conducted by (Hindriyani et al., 2025). Bilingual audio support in this media also serves as a bridge for students in recognizing correct pronunciation. This synchronous integration of audio and visual elements is in line with research conducted by (Xodabande et al., 2022) which shows that the involvement of various senses can facilitate students to improve english vocabulary comprehension. This is reinforced by research conducted by (Nathan, 2021), which states that physically involved students learn better because bodily engagement, as well as the exploration and physical manipulation of objects, can provide rich sensory and motor experiences that are essential for learning. Furthermore, the use of this media offers various sensory modalities that require learners to utilize visual, auditory, kinesthetic, and other sensory experiences to foster imagination and creativity, as shown in the research conducted by

(Jusslin et al., 2022). The use of the vocaroom educational game format also aims to encourage students to be actively involved in learning activities, which is in line with research conducted by (Ummah et al., 2023). In addition, the intuitive navigation features on the Main Menu provide space for autonomy for students to explore independently, which is in line with research conducted by (Utami & Calam, 2025).

The presence of a quiz feature in a multiple-choice format with an instant feedback mechanism also contributes to the interactive evaluation dimension. The multiple-choice format was chosen to help students perform word identification quickly in a fun game atmosphere. The direct feedback that appears every time a student chooses an answer allows them to confirm their understanding independently. If the answer is wrong, students can realize their mistake after finishing all the quizzes. Students can repeat the quiz independently so that students can understand the English vocabulary comprehension presented in the quiz. This mechanism is in line with research conducted by (Wildan et al., 2023) which states that instant feedback in educational games can increase intrinsic motivation and help students improve conceptual understanding independently (self-correction).

The inclusion of the developer profile at the end of the game is not just an administrative supplement, but functions as a crucial instrument to ensure academic transparency and accountability of the work as a whole. The presence of this profile page also becomes a communication access point that allows for academic coordination between educational practitioners in the field and the developer if technical needs or further development are identified. This is in line with research conducted by (Tania et al., 2025) which emphasizes that transparency of developer identity is very important to guarantee the originality of the work and ensure the sustainability of media utilization in the long term. Practically, this feature also aims to build trust between the developer, educators, and educational institutions as a collective effort to improve english vocabulary comprehension.

Feasibility Test of the Vocaroom Educational Game

The feasibility level obtained through a series of expert validation tests indicates that the vocaroom educational game based on Canva has met adequate instructional standards for implementation at the 4th-grade elementary school level. From the material aspect, the 93% score given by the material validator shows a very high level of substance precision, thus placing the material aspect in the "very feasible" category. The determination of this category refers to the classification criteria for validation questionnaire percentages according to (Arikunto in Kusumawati & Prastiwi, 2025), which divides the feasibility level into four categories: very feasible (85%–100%), feasible (70%–84%), sufficiently feasible (55%–69%), and not feasible (<55%).

The high validity of this material is rooted in the alignment of content with the Phase B Learning Objectives (CP) of the Merdeka Curriculum as well as alignment with English vocabulary competency achievement indicators. Substantively, this media is considered capable of supporting the achievement of learning objectives through the precision and accuracy of vocabulary that is highly relevant to the needs of elementary school students. In addition, the aspect of completeness in material presentation and the use of language that is easy for students to understand and comprehend are key factors that strengthen the content quality in this media.

Meanwhile, the 95% score from the media validator also confirms the position of the vocaroom educational game in the "very feasible" category because it exceeds the minimum threshold for that category (85%). The high score in this media validation is based on excellent technical and aesthetic quality, including proportional element layout, the use of harmonious color combinations, as well as clear and non-blurry image quality. The validator also assessed that this media does not present excessive visuals so that student focus remains maintained. From the functionality side, the media can be operated smoothly without technical constraints (errors), all navigation buttons function well, supported by clear bilingual audio and font sizes appropriate for the readability of elementary school-age students.

Overall, the very significant percentage obtained from both validators is in line with research conducted by (Kusumawati & Prastiwi, 2025) which emphasizes that high-quality learning media must meet high feasibility standards in order to minimize students' cognitive load and be relevant to pedagogical needs in the field. These findings provide a credible foundation for the utilization of the vocaroom educational game as an effective instructional instrument in supporting English language learning for 4th-grade elementary school students in improve english vocabulary comprehension.

Effectiveness of the Vocaroom Educational Game

The significance of the media's effectiveness in supporting student learning achievements is empirically proven through a contrasting surge in average scores, from 65.64 in the pre-test session to 94.71 in the post-test session. This study uses a one-group pre-test post-test design, in which measurements are taken before and after the intervention on a single group of subjects to observe the direct impact of media use. This significant increase in scores automatically pushes student achievement beyond the threshold of the Learning Objective Achievement Criteria (KKTP). This is triggered by the presence of a multiple-choice quiz feature equipped with an instant feedback mechanism, which allows for a rapid self-correction process so that students can immediately correct their misunderstandings without having to wait for an evaluation from the teacher.

Before processing the data further, a normality prerequisite test was conducted to determine the type of statistics to be used. Based on the results of the Shapiro-Wilk test in Table 1, the significance values (Sig.) obtained were 0.022 for the pre-test data and 0.003 for the post-test data. Since both values are smaller than 0.05, it can be concluded that the data are not normally distributed. Based on these conditions, this study applies the Wilcoxon Signed Ranks Test as the primary inferential analysis procedure. Academically, the use of non-parametric statistics through the Wilcoxon test is considered more credible and accurate compared to the Paired Sample T-Test when normality assumptions are not met, in order to minimize the risk of biased conclusions. This is in line with research conducted by (Maryadi in Tanjung et al., 2023), which emphasizes that the precision of statistical instrument selection is the foundation for generating valid data interpretations in developmental research.

The results of the Wilcoxon test analysis showing an Asymp. Sig. (2-tailed) value of 0.000 (< 0.05) provide a strong statistical basis that the intervention using the vocaroom educational game provides a difference in student competence. This success is reinforced by the acquisition of an N-Gain score of 0.8286 (82.86%), which places this media in the "high effectiveness" category, consistent with Hake's classification which stipulates that values of $g > 0.7$ fall into the high category (Febrinita, 2022). This achievement indicates that the use of the vocaroom educational game is technically capable of providing a positive contribution to improve english vocabulary comprehension for students compared to conventional methods. This effectiveness stems from the synergy of interactive elements that transform abstract material into concrete experiences. Before using the media, students had difficulty distinguishing prepositions of place and identifying room names; however, the integration of spatial visualization in the Map Challenge feature and accurate audio proved to help students to improve english vocabulary comprehension. This phenomenon is in line with research by (Harianja et al., 2024) regarding the ability of digital media to facilitate vocabulary assimilation through interactive visual simulations.

Furthermore, the integration of challenge features and real-time feedback within this game significantly strengthens students' cognitive mastery, which is in line with research conducted by (Gultom & Fathurrahman, 2025). It is important to note that independent learning strategies provide elementary school students with the autonomy to take control of their own learning process, as shown in research conducted by (Shen et al., 2023). This becomes a crucial factor for students in developing and expanding their vocabulary mastery independently. Thus, this accumulation of empirical data provides a strong argument that the vocaroom educational game is not merely a supplementary tool, but an effective instructional solution in helping to improve english vocabulary comprehension for fourth-grade elementary school students in the era of educational digitalization.

CONCLUSION

This research aimed to develop the vocaroom educational game through the Canva platform, following systematic ADDIE model procedures to improve English vocabulary comprehension for fourth-grade students. The product integrates visual elements, bilingual audio, and interactive navigation specifically designed based on a multisensory approach to transform static materials into a dynamic digital learning experience. Through the features within the vocaroom educational game, this medium offers novelty in spatial visualization aspects that allow students to understand object positions within a house more concretely. The integration of these various multimedia components is indicated to be capable of creating an independent and explorative learning ecosystem for elementary school students.

In terms of validity, the vocaroom educational game was declared highly feasible for implementation based on assessments from material experts (93%) and media experts (95%). These high feasibility scores indicate that the instructional content aligns with the Learning Outcomes (CP) of the Kurikulum Merdeka and possesses an ergonomic design. Theoretically, this media design is perceived to succeed in minimizing

cognitive load through the presentation of simple and intuitive instructions. This demonstrates that the vocaroom educational game has technically and pedagogically met the criteria as a credible English learning support instrument relevant to the cognitive characteristics of elementary school students.

The effectiveness test results show a significant increase in student learning achievement, with mean scores rising from 65.64 to 94.71 and an N-Gain score of 0.8286, which falls into the "high" category. This improvement is strongly suggested to stem from the synergy of visualization features and instant feedback mechanisms that serve as cognitive reinforcement instruments during the interaction process. Although it shows great potential effectiveness for improving English vocabulary comprehension for fourth-grade students, it must be acknowledged that the use of a one-group pre-test-post-test design in this study has limitations in pure causal interpretation. Therefore, future research is recommended to apply a quasi-experimental design with a control group to strengthen internal validity and provide a more comprehensive overview of the media's contribution to student learning outcomes.

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