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The hybrid game-based approach for enhancing English vocabulary in Indonesian kindergartens

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Abstract

Children in the digital ages are digital native and they accustom to play with digital games, while the games have drawbacks to child's development. This study aims to develop and evaluate a hybrid game-based learning medium that integrates traditional Indonesian games with digital elements to enhance English vocabulary acquisition among kindergarten children. Employing a research and development (R&D) design and a modified ADDIE framework, the hybrid media was piloted and tested in three kindergartens in West Sumatra. The instruments used included experts' validation (Aiken's V), practicality surveys, and pretest-post-test for measuring the effectiveness which are analyzed through N-Gain and Wilcoxon tests. The results demonstrated a high practicality (mean scores > 91), and significant effectiveness across all test sites (average N-Gain scores ranging from 0.67 to 1.00). Findings show that while digital components introduced vocabulary effectively, the hybrid games provided meaningful physical and social contexts that enhanced retention and engagement. The study contributes a culturally grounded model of hybrid learning that balances digital innovation with local pedagogical values. Its implications highlight the potential of combining technology for early language education in resource-constrained settings.

Keywords: Digital media, Early childhood education, Hybrid learning, Traditional games, Vocabulary acquisition.

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1. Introduction

The increasing attention to early childhood education in Indonesia has raised the demand for pedagogical innovations that align with the national Early Childhood Education curriculum, which promotes learning through play. Introducing English vocabulary to young learners, especially in kindergarten settings, has become increasingly important in the light of

globalization and early bilingual education imperatives [1, 2]. However, many kindergartens in Indonesia, particularly in the province of West Sumatra has limited instructional media that do not effectively integrate language learning into playful, engaging activities. This can be the constraints to stimulate active participation, and cognitive and language development in young children.

At the same time, the rise of digital technology has changed the landscape of children's play. Children are increasingly familiar with digital devices, and digital games are often more appealing than conventional learning methods [3, 4]. However, excessive screen time also poses risks to children's physical, emotional, and cognitive development, including reduced physical motor activity; eye health issues [5, 6] and attention [7]. Moreover, research of Yarahı [6] pointed out that child who play excessively with digital games had social behavior problems and lack of self-confidence. While digital educational games have shown potential for supporting language development [8]. However, digital games cannot fully replace the social, physical, and cultural benefits offered by traditional games [9, 10].

In response to these pedagogical and developmental challenges, this study focuses on the development and evaluation of a hybrid learning medium that combines the richness of traditional Indonesian games with the interactivity of digital applications. This hybrid model is designed to support the acquisition of English vocabulary in early childhood settings, while also promoting physical movement, social interaction, and cultural preservation [11-13].

Unlike studies that apply the full ADDIE instructional design model, this research concentrates on specific stages: the development, implementation, and evaluation of the media. The validation and effectiveness testing of the hybrid media, including instructional materials, teacher manuals, and digital-traditional game components, are the main focus of the investigation. The media incorporates selected traditional games such as *congklak* or *mancala*, and *dore* (*hopscotch*) redesigned with English vocabulary elements and guided by digital prompts.

The main research question driving this study is: *To what extent is the hybrid games which are developed based on traditional games, valid, practical, and effective for introducing English vocabulary to kindergartners in West Sumatra?* In line with this research question, the study proposes the following hypotheses:

H₁: There is a significant difference between students' English vocabulary test scores before and after using the hybrid games media.

H₀: There is no significant difference between students' English vocabulary test scores before and after using the hybrid games media.

This study employs both quantitative and qualitative data to analyze the validity, practicality, and effectiveness of the developed media and seeks to contribute to the body of knowledge on hybrid learning approaches in early childhood English language instruction.

2. Methodology

2.1. Research Design

This study employed a research and development (R&D) methodology aimed at producing a valid, practical, and effective hybrid game-based learning media to support English vocabulary acquisition in kindergartens. The study was situated within selected early childhood education institutions in three locations in West Sumatra, Indonesia. This research adopted the ADDIE development model. However, not all stages of ADDIE were implemented or reported in full; this research concentrated specifically on three critical phases: development, implementation, **and** evaluation.

2.2. Development Model

The ADDIE model (Analyze, Design, Develop, Implement, Evaluate) served as the conceptual guideline for organizing the research phases [14]. In practice, the research did not exhaustively carry out all stages. Instead, the focus was narrowed to product development, pilot implementation, and empirical validation through field testing, reflecting practical constraints and the core purpose of the study.

The hybrid media was developed through several sub-stages: identifying appropriate traditional games; designing physical and digital game components; creating learning materials and a teacher's guidebook; and finally, testing these in classroom settings to gather data on their validity, practicality, and effectiveness.

2.3. Research Sites and Participants

The field research was conducted ethically in three kindergartens in West Sumatra. The research setting are named anonymously to ensure the confidentiality. The setting of the research are as follow:

- A Kindergarten in the North District of Padang City (15 children)
- A Kindergarten in the East District of Padang (9 children) – large-scale trial
- A Kindergarten in Bukittingi City (8 children) – large-scale trial.

The total number of participants involved was 32 children across the three kindergartens. The kindergartens' teachers were also involved in qualitative feedback and practical implementation of the media.

2.4. Data Types and Instruments

Both quantitative and qualitative data were collected. The quantitative data were used to evaluate the validity, practicality, and effectiveness of the hybrid media. The qualitative data helped contextualize the implementation and reflect on user experiences.

2.5. Instruments for Validity Evaluation

- Content validity of the developed products was evaluated by a panel of expert validators. The content validity of the hybrid games product was validated in terms of:
- Language appropriateness (validated by TESOL and language experts)
- Content Relevance to Early Childhood Education (ECE) standards (validated by early childhood education experts)
- Design quality and usability (validated by instructional media design experts)

The validity index was calculated using Aiken's V coefficient [15] with scores interpreted using the guidelines from Retnawati [16]. For example, scores above 0.8 were considered "very valid".

2.6. Instruments for Practicality Evaluation

To assess practicality, teachers were asked to complete Likert-scale questionnaires after using the media. Statements focused on:

- Ease of use
- Alignment with classroom routines
- Student engagement and participation
- Clarity of instruction in the teacher's guide

The practical value was then categorized based on Gitnita, et al. [17] scale:

- 81–100 = Very Practical
- 60–80 = Practical
- 40–60 = Quite Practical
- Below 40 = Not Practical

2.7. Instruments for Effectiveness Evaluation

Effectiveness was evaluated using a pretest–post-test design, using vocabulary acquisition scores as indicators. Children's understanding of selected English words was measured before and after using the hybrid media. The N-Gain formula by Hake [18] was used to calculate learning gains. N-Gain scores were categorized as follows:

- High (≥ 0.7)
- Medium ($0.3 < G < 0.7$)
- Low (≤ 0.3)

In addition to N-Gain scores, the data were analyzed using a paired-sample t-test in SPSS to evaluate the statistical significance of differences between pre- and post-intervention scores.

2.8. Development Procedures

The development stage began with a synthesis of thematic units from the Early Childhood Education curriculum. Vocabulary was selected to align with common kindergarten topics. A set of five traditional games was adapted: *congklak* or *Mancala*, *tali* (string game), *kelereng* (marbles), *petak umpet* (hide and seek), and *dore* (hopscotch). These games were integrated with simple digital elements (e.g., digital vocabulary prompts, sound effects, interactive buttons).

- Prototype 1 consisted of physical game boards and props, such as congklak boards with embedded vocabulary tokens
- Prototype 2 consisted of digital mini-games designed with accompanying audio and visual vocabulary cues.
- Teacher's Materials included an instructional manual and a weekly lesson plan guide.

2.9 Implementation Procedure

In The North Padang District Kindergarten (DW) Kindergarten (small-scale), teachers implemented the hybrid games over a 2-week cycle. Children played both the digital and traditional versions sequentially. Teachers introduced vocabulary, facilitated the game, and guided children in matching spoken/written words with actions and objects. The Kindergarten in Bukittinggi was selected for the large-scale, similar procedures were followed, with more students and extended trial duration. Observations were conducted throughout, and teachers recorded students' engagement and responses.

2.10. Data Analysis

2.10.1. Validity Analysis

Validation results were computed using Aiken's V. Content was rated by a panel of nine experts in the fields of language, Early Childhood Education, and instructional media. Items with Aiken's $V \geq 0.8$ were deemed "very valid". The overall Aiken's V score for the hybrid media was 0.92, indicating strong expert agreement and high validity.

2.10.2. Practicality Analysis

No.	Components	Scores	Category
1	Learning Material Book	91.2	Very Practical
2	Teacher's Guidebook	93.8	Very Practical
3	Hybrid Game Media	94.3	Very Practical

2.10.3. Effectiveness Analysis

N-Gain results showed:

- The Kindergarten in The North District of Padang City or DW Kindergarten: 0.83 (high)
- The Kindergarten in The East District of Padang City: 0.74 (medium-high)
- The Star Kindergarten in Bukittinggi: 0.94 (very high)

These results indicate that the hybrid media significantly enhanced vocabulary acquisition. A paired-sample t-test confirmed the statistical significance of the gains ($p < 0.05$), supporting the rejection of the null hypothesis (H_0) and acceptance of the research hypothesis (H_1) that post-test scores were significantly higher than pre-test scores.

3. Results

3.1. Development

The development of the hybrid game-based learning media began with a comprehensive needs analysis, involving classroom observations, curriculum evaluation, and interviews with kindergarten teachers in Padang and Bukittinggi, West Sumatra. These analyses revealed that while English vocabulary was already being introduced in most kindergartens, the instructional methods and media were limited in variety and engagement. The teaching of English at the early childhood level especially in the context of Early Childhood Education focused largely on vocabulary development through play, consistent with the principles of early childhood education. However, despite the importance of this foundational language exposure, available tools remained largely static and teacher-centered. Table 1 summarizes the learning methods and instructional media used in the three participating kindergartens.

Table 1.
English Teaching Methods and Media in Observed Kindergartens.

No.	Kindergarten Name	Teaching Methods	Media Used
1	A Kindergarten in Bukittinggi City	Card games, role-playing, storytelling, digital games	Picture cards, PowerPoint, realia, big books, storybooks
2	A Kindergarten in East Padang District	Letter card games, digital games	PowerPoint, digital games
3	A kindergarten in North Padang District	Letter card games, storytelling using books	Flash Card, Letter cards, storybooks

As illustrated in Table 1, English vocabulary is typically introduced through letter card games, storytelling, and visual media such as PowerPoint presentations and large illustrated books. In some schools, notably in the Star Bukittinggi and at Kindergartens in East District, digital games have been introduced, but they remain limited in interactivity and rarely incorporate movement or social collaboration. The lack of engaging and dynamic instructional tools highlights the need for more responsive, multimodal media that can bridge digital and physical learning.

In parallel, curriculum analysis revealed that English teaching in early childhood settings focuses on familiar and practical vocabulary based on everyday themes. Thematic instruction is central to the Early Childhood Education curriculum and includes topics that relate to the child's identity, environment, and cultural understanding. Table 2 outlines several of these thematic units, their sub-themes, and associated English vocabulary typically introduced at the kindergarten level.

Table 2.
Thematic Units and Target Vocabulary in Kindergarten English Curriculum.

No.	Theme	Vocabulary
1	Myself	Alphabet (A to Z), " introducing names and spelling one's nickname
	Parts of The Body	Head, hair, eyes, nose, ears, lips
	Numbers	Counting number 1 to 20
2	Fruits	Papaya, mango, pineapple, apple, melon, watermelon
	Vegetables	Carrot, broccoli, potato, spinach, cabbage
	Food	Rice, fried rice, bread, fried chicken
	Farm animals	Cow, sheep, goose, chicken, duck
	Wild animals	Tiger, giraffe, monkey, lion, bear, elephant
	Sea animals	Turtle, Starfish, whale, shark, fish, prawn
	School environment	School, playground, classroom, desk, chair
	Outer space	Universe, moon, earth, star, sky

The vocabulary presented in Table 2 reflects an emphasis on everyday nouns and simple expressions that align with children's lived experiences. These words are not taught in isolation but are embedded within thematic contexts, enabling meaningful language use and recall. However, the existing instructional media rarely take full advantage of these themes in an interactive, physical, or multimodal way. The analysis of both classroom practices and curriculum content demonstrated the necessity of developing instructional media that could more effectively engage children across cognitive, physical, and linguistic domains. The hybrid game-based media developed in this study were therefore designed to address these gaps by combining traditional Indonesian children's games with simple digital enhancements. This approach aimed to retain the embodied, collaborative, and culturally grounded qualities of traditional games while enriching them with visual, auditory, and interactive digital cues to support English vocabulary learning.

Five traditional games were selected for adaptation: *congklak* (*mancala*) string game, hide and seek, marbles, and hopscotch. Each game was modified to incorporate specific vocabulary sets aligned with the curriculum themes. For example, *congklak* was adapted to include fruit vocabulary, where seeds were labeled with words like "apple" and "mango." hide and seek game was used to reinforce animal vocabulary, as children searched for pictures of hidden animals based on audio prompts. The digital components included flash-based vocabulary prompts, interactive buttons with sound, and visual animations that complemented the physical activities.

In addition to the games themselves, two core support materials were developed: a student activity book, containing coloring, matching, and writing tasks based on vocabulary themes; and a teacher's guidebook, offering detailed lesson plans, instructional procedures, vocabulary lists, and reflection sheets. These materials were intentionally aligned with the observed curriculum and classroom needs, ensuring that they could be smoothly integrated into existing teaching routines without requiring extensive training or digital infrastructure.

Thus, the development phase culminated in a fully integrated hybrid learning package that was both culturally relevant and pedagogically sound. It addressed the gap between the play-based principles of early childhood education and the practical limitations of current media by offering a structured, engaging, and research-informed solution tailored for Indonesian kindergarten learners.

3.2. Implementation

After developing the hybrid game media, teachers from three kindergartens were trained on its implementation through online briefings. The learning process follows these steps: (1) Teachers introduce vocabulary using visual aids; (2) Children watch instructional video game content; (3) Teachers explain game rules; (4) Students play the digital game in guided, interactive sessions; (5) Vocabulary reinforcement occurs through complementary traditional gameplay. This blended approach combines digital and physical play for effective language acquisition.

3.2.1. Small-Scale Implementation at The North Padang District / DW Kindergarten

Following successful validation of the hybrid game media, instructional materials, and guidebooks, the traditional game-based hybrid learning was introduced. This phase encouraged blended learning through digital and traditional gameplay, actively engaging children in the hybrid activities. Observations showed increased motivation and participation, demonstrating the effectiveness of this approach in making learning interactive and enjoyable.

3.2.2. Implementation of Hybrid Games in Kindergarten

The hybrid *Congklak* game began with teachers assessing children's alphabet knowledge through a pretest. Using flashcards and educational videos, the teachers introduced English letters, which students enthusiastically repeated. During the digital portion, children interacted with an alphabet video that paused for pronunciation practice. Later, they transitioned to the physical *Congklak* board game, using letter beads to spell their names. Interestingly, many students who struggled with the digital version showed improved accuracy during the hands-on activity, demonstrating how traditional play can reinforce digital learning.

For the Hide and Seek hybrid game, the digital component first taught basic self-introduction phrases like "My name is..." and "Nice to meet you" through an interactive guessing game. This prepared students for the physical version, where they played a modified hide-and-seek using cardboard boxes as hiding spots. The seeker would ask "What's your name?" in English, prompting the hidden child to respond with their name. This activity proved particularly successful, generating spontaneous English use and higher engagement levels compared to the *Congklak* or *Mancala* game. Teachers noted children's genuine excitement as they shouted English phrases during gameplay.

Both hybrid approaches effectively blended digital and traditional games to teach English vocabulary. The physical games consistently generated stronger participation and better retention than their digital counterparts, though the digital components served as valuable introductory tools. The Hide and Seek format emerged as the more engaging of the two, likely due to its active, social nature that encouraged natural language use. These results suggest that while digital tools have their place, traditional games remain powerful educational instruments when thoughtfully integrated with technology.

3.2.3. Children's Participation and Motivation at The North Padang District (DW Kindergarten / anonymous)

To assess the effectiveness of hybrid games in boosting children's motivation and participation in learning English, classroom observations were conducted using structured observation forms to track engagement levels during activities.

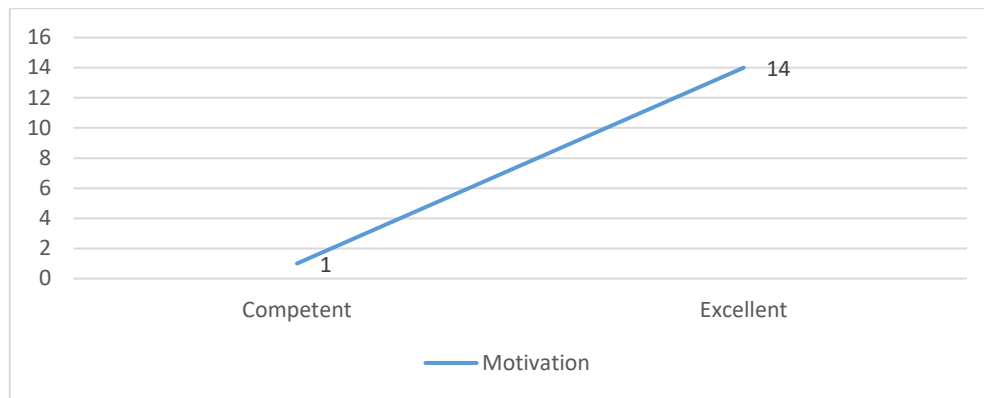


Figure 1.
Motivation of Young Learners at The North Padang District (DW Kindergarten).

The findings revealed that 14 out of 15 children at DW Kindergarten demonstrated high motivation in learning English through hybrid games, with one child showing competent engagement. This suggests that hybrid games are effective in fostering motivation among early childhood learners in acquiring a new language.

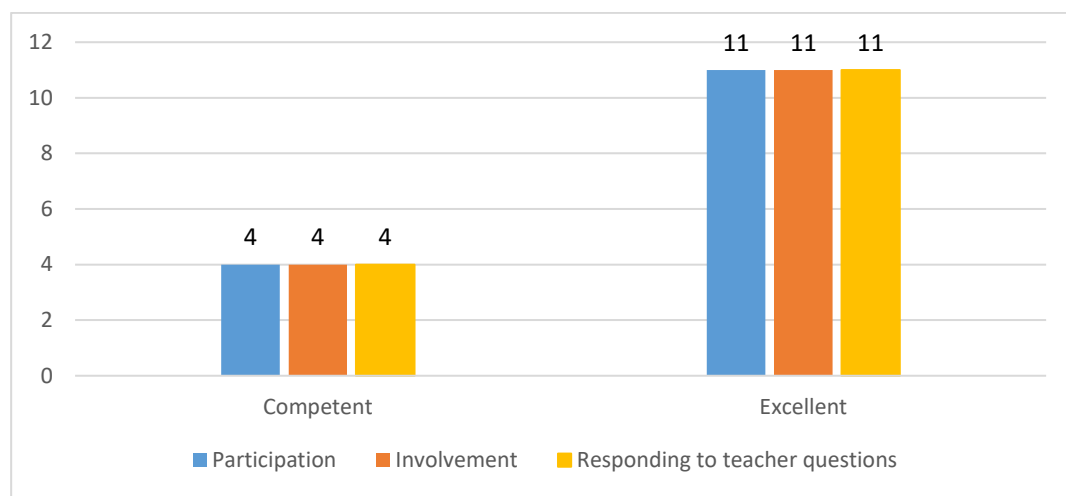


Figure 2.
Participation of Young Learners at DW Kindergarten.

The diagram illustrates that most children actively participated in English learning activities involving hybrid games, particularly showing strong levels of engagement. Of the 15 children observed, 11 demonstrated excellent participation, while 4 showed competent involvement. These results suggest that hybrid games play a significant role in increasing classroom engagement in language learning. Visual documentation of classroom activities, such as the hybrid *Congklak* game at DW, The Kindergarten in North District of Padang, supports the findings related to the increased learners' engagement.

Data from the bar chart further confirm the strong participation of children in English vocabulary learning through hybrid games. Specifically, 11 children demonstrated excellent involvement in the hybrid *Congklak* and *Hide-and-Seek* activities, while 4 showed competent participation. These results affirm the positive influence of hybrid games on learner engagement.

Findings indicate strong English learning participation through hybrid games among young learners at DW UNP Kindergarten, particularly in responding to teacher questions. From the 15 children, 11 showed excellent engagement while 4 demonstrated competent participation, confirming hybrid games' positive impact on early childhood language learning involvement.

3.3. Large-Scale Implementation of Hybrid Games

For the large-scale implementation two location were chosen as the research setting; a kindergarten in the East of Padang City and a Kindergarten in Bukittinggi City. The kindergartens were chosen because in both kindergarten children were taught English with the focus of teaching vocabulary.

Children in The Kindergarten of East Padang District focused on the themes such Parts of The Body and fruits, while in The Star Bukittinggi taught wild and aquatic animals. At the east Padang District Kindergarten, nine students participated in the three hybrid games sessions over multiple meetings. Teachers first introduced vocabulary digitally through videos and interactive games, though prolonged screen time led to decreased focus after about 40 minutes. Then, It continuous to physical marble games. The hybrid games proved more engaging - Children threw marbles at target images

while naming Parts of the Body in English. While only two of eight students hit targets on their first try. All of them showed remarkable enthusiasm, eagerly awaiting turns and participating actively.

The implementation demonstrated that while digital tools effectively introduce vocabulary, physical hybrid games sustain higher engagement. The combination of both approaches created a balanced learning experience that maintained children's interest while reinforcing English language skills. These findings suggest hybrid games successfully support vocabulary acquisition when combining brief digital introduction with hands-on physical play.

3.4. Implementation of the String Game Hybrid Activity

The string game was implemented to teach fruits vocabulary through a combination of digital and physical play. During the digital phase, teachers introduced the game mechanics by showing a video where children jumped rope while naming fruits. Then, students took turns interacting with the digital version, enthusiastically identifying fruits displayed on screen and receiving instant feedback with "correct" or "incorrect" prompts.

The physical adaptation proved challenging for the 4-5 years old participants. Many struggled with rope jumping due to developmental limitations in balance and coordination. Teachers creatively modified the activity by having children simply step over a stationary rope while naming fruits, rather than attempting full jumps. This adjustment-maintained engagement while accommodating the children's motor skills. Despite the initial difficulties, all students participated actively in both the vocabulary recognition and modified physical activity.

The session demonstrated that while digital games successfully introduced vocabulary, physical adaptations were necessary to match the children's developmental stage. The hybrid approach ultimately achieved its goals - students remained engaged in learning English fruit names while developing gross motor skills through age-appropriate movement activities. The teachers' flexibility in modifying the physical component proved crucial to the activity's success.

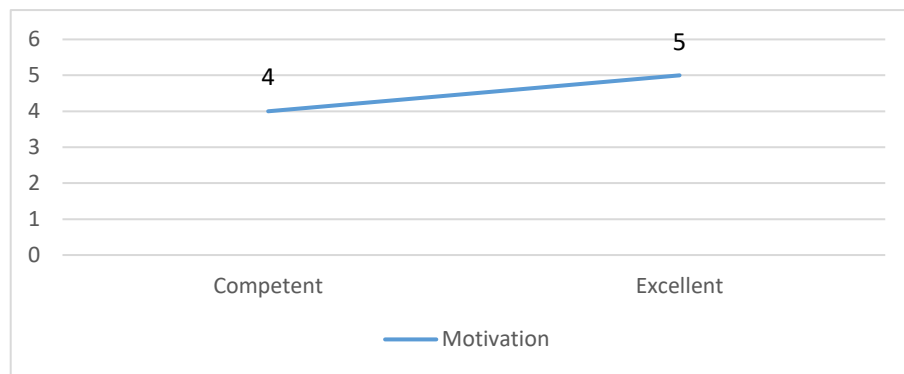


Figure 3.
Motivation of Young Learners at The East District Kindergarten.

The data reveals that hybrid games effectively motivated English learning among preschoolers at the Kindergarten in The East Padang District, with 5 of 9 children showing excellent progress and 4 demonstrating competent engagement. These results confirm the positive impact of hybrid games on early childhood language learning motivation.

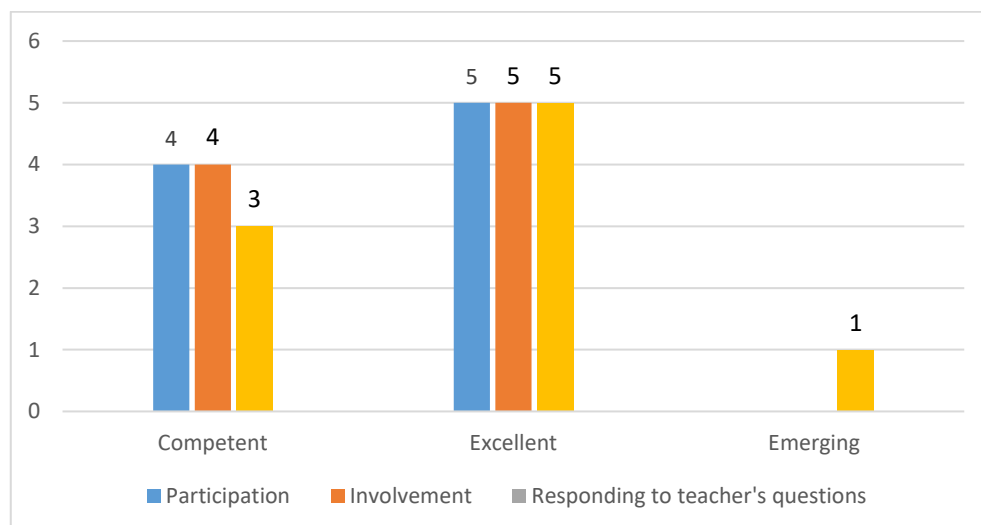


Figure 4.
Participation of Young Learners at The East Padang District Kindergarten.

The findings demonstrate strong participation in English learning through hybrid games among preschoolers at The Kindergarten in East of Padang District, with 5 of 9 children showing excellent engagement and 4 demonstrating competent

involvement. This confirms hybrid games' effectiveness in enhancing young learners' classroom participation in language acquisition.

The study reveals that hybrid games significantly enhanced English learning participation among preschoolers at East Padang District. There were five of nine children demonstrated excellent engagement during hybrid gameplay, while four showed competent participation. These results clearly indicate that the hybrid games effectively increase young learners' active involvement in language acquisition.

The data demonstrates that hybrid games effectively increased English language participation among preschoolers at The East Padang District Kindergarten. Of the nine children involved, five showed advanced engagement (particularly in responding to teacher questions in English), three demonstrated competent participation, and one exhibited emerging skill. These results clearly indicate that the hybrid games positively contribute to young learners' active involvement in English language acquisition.

3.5. The Star Kindergarten in Bukittinggi City

At The Star Kindergarten in Bukittinggi (anonymous), a bilingual approach integrating English and Indonesian was implemented during hybrid gameplay activities. The hybrid game "Dore" or hopscotch effectively introduced vocabulary for wild animals and sea animals, generating enthusiastic participation among students.

Observations revealed particularly high engagement levels, with children actively competing for turns during both digital and physical gameplay components. In the digital version, students eagerly came forward to identify animal images, while the physical game maintained equal enthusiasm through hands-on interaction. This consistent engagement across both digital and tangible formats demonstrates the successful application of hybrid methodology in bilingual early childhood education settings.

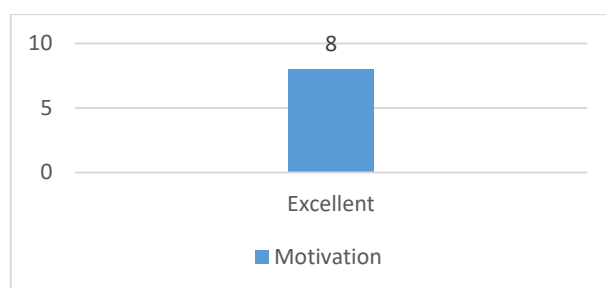


Figure 5.
Motivation of Young Learners at The Star Kindergarten in Bukittinggi.

The findings demonstrate outstanding motivation levels among preschoolers at Kindergarten in Bukittinggi during English hybrid games activities, with all children achieving the highest participation category. Children in this kindergarten are taught in bilingual (Indonesian and English). These exceptional results confirm the significant positive impact of the hybrid games on early childhood English language learning motivation in this bilingual educational setting.

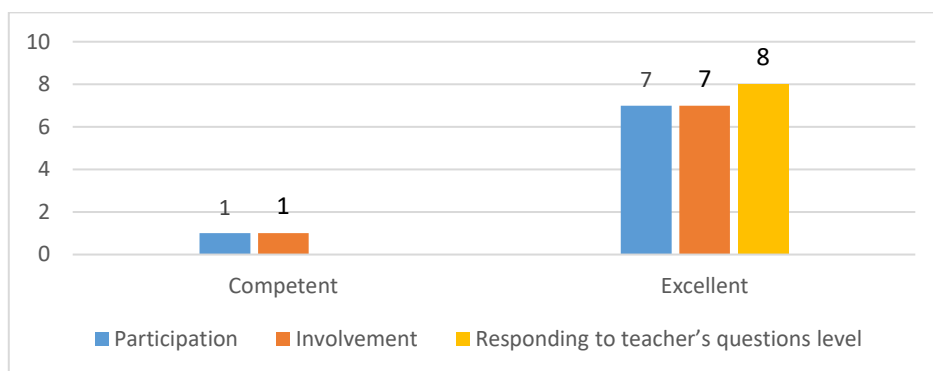


Figure 6.
Participation of Young Learners at The Star Kindergarten in Bukittinggi.

The data from The Star Kindergarten reveals remarkable English learning participation through hybrid games, with 7 of 8 preschoolers showing excellent engagement and 1 demonstrating competent involvement. These results highlight the hybrid games' have strong positive impact on young learners' active participation in bilingual language acquisition.

The results demonstrate that hybrid games successfully enhanced English learning engagement at The Star Bukittinggi Kindergarten, with 7 of 8 preschoolers showing excellent participation during gameplay and 1 demonstrating competent involvement. These findings clearly indicate that the hybrid approach effectively promotes active language learning in early childhood bilingual education.

The data reveals outstanding English learning engagement through hybrid games at The Star Kindergarten, with all children demonstrating excellent participation - particularly in actively responding to teachers' English questions. These

universal high achievement levels provide compelling evidence that hybrid games significantly enhance young learners' language participation in bilingual education settings.

3.6. Evaluation

Evaluation was conducted during the design, development, and implementation stages of the product. In the development of this hybrid game-based media, the evaluation aimed to gather feedback to improve and refine the product. The evaluation consisted of effectiveness and practicality tests, both on a small and large scale.

3.7. Small-Scale Effectiveness Test

The small-scale trial was conducted at DW Kindergarten in The North Padang District. The learning activities in this trial used two types of hybrid traditional games: the *hybrid congklak game* for the *Alphabet* theme and the *hybrid hide-and-seek game* for the *Self Identity* theme. The evaluation focused on measuring the media's effectiveness in improving young children's English vocabulary acquisition.

3.8. Effectiveness Test of the Hybrid Congklak Game (Alphabet Theme)

The effectiveness test was carried out using hypothesis testing on the pretest and posttest results. Prior to this, normality and homogeneity tests were conducted. The data did not meet the assumption of normality; thus, the non-parametric Wilcoxon test was used.

Table 3.
Normality Test Results for Pretest and Posttest (Alphabet Theme).

Aspect	Asymp. Sig. (2-tailed)
Posttest_A – Pretest_A	< 0.001
Posttest_B – Pretest_B	< 0.001
Posttest_C – Pretest_C	< 0.001
Posttest_D – Pretest_D	< 0.001

As all p-values are below 0.05, it can be concluded that there is a statistically significant difference between pretest and post-test scores. This indicates that the hybrid congklak game had a significant positive effect on vocabulary acquisition for the *Alphabet* theme.

Table 4.
Effectiveness Test Results – Alphabet Theme (DW Kindegarten).

No.	Student	Aspect	Pretest	Posttest	N-Gain
1	E1	Meaning	1	3	0.67
		Pronunciation	1	4	1.00
		Picture Identification	1	4	1.00
		Word-Image Matching	1	4	1.00
...
13	E13	Meaning	1	3	0.67
		Pronunciation	1	3	0.67
		Picture Identification	1	3	0.67
		Word-Image Matching	1	3	0.67

The table above shows an overall increase in all aspects after the use of the media. The N-Gain values range from 0.67 to 1.00. An N-Gain score of 1.00 indicates very high effectiveness, while 0.67 is considered moderately effective. Overall, the hybrid congklak game was effective in helping children develop vocabulary, particularly in pronunciation, which showed the highest improvement.

Table 5.
Effectiveness Test Results – Self Identity Theme (DW Kindergarten).

No.	Student	Aspect	Pretest	Posttest	N-Gain
1	F1	Meaning	1	3	0.67
		Pronunciation	1	3	0.67
		Picture Identification	1	3	0.67
		Word-Image Matching	1	3	0.67
...
13	F13	Meaning	1	4	1.00
		Pronunciation	1	4	1.00
		Picture Identification	1	4	1.00
		Word-Image Matching	1	4	1.00

3.9. Effectiveness Test of the Hybrid Hide-and-Seek Game (Self Identity Theme)

The effectiveness test for the *Self Identity* theme followed the same procedure. The Wilcoxon test results indicated a significant improvement across all measured aspects.

Out of 13 children, 8 achieved an N-Gain score of 1.00 across all aspects, indicating a very high level of improvement. The remaining students scored 0.67, which is still considered moderately effective. These findings demonstrate that the hybrid hide-and-seek game effectively enhanced children's English vocabulary in the *Self Identity* theme, including meaning, pronunciation, image recognition, and word-image association.

Based on the small-scale effectiveness tests conducted at DW Kindergarten, both the *Alphabet* and *Self Identity* themes showed significant improvement in vocabulary mastery among young learners. The hybrid traditional games led to moderate to high gains in various aspects, with the most substantial improvement seen in pronunciation.

3.10. Large-Scale Trial

The large-scale implementation testing was conducted at two kindergartens, The-East Padang District (PT Kindergarten) and The Star Bukittinggi. Each kindergarten conducted research on two different themes using different hybrid games.

3.11. The Kindergarten in The East District of Padang City

After conducting English vocabulary learning activities using the hybrid marbles game, a post-test was administered to measure the effectiveness of the game. A pre-test had been given beforehand to assess the children's vocabulary knowledge. The results of the pre-test and post-test indicate that the hybrid marbles game was effective in introducing English vocabulary to kindergarten children. The effectiveness results are presented in the table below.

Table 6.
Effectiveness Test at The Kindergarten PT in The East District of Padang City with the Theme "Parts of the Body" Using the Hybrid Marbles Game.

No.	Name	Aspect	Pre-test	Post-test	N-Gain
1	D1	Meaning	1	3	0.67
		Pronunciation	1	3	0.67
		Identifying Pictures	1	3	0.67
		Matching Words & Pictures	1	3	0.67
2	D2	... (continues similarly for other participants)			

Based on the table above, there was a significant improvement in all aspects of English language ability in young children at The Kindergarten PT. Children were taught vocabulary with the theme *Parts of the Body*, using the hybrid marbles game for vocabulary introduction. The N-Gain results show that in the *meaning* aspect, five out of eight children improved from a pre-test score of 1 or 2 to a post-test score of 4, with N-Gain values reaching 1.00, which is categorized as effective. The remaining children improved to a score of 3, with an N-Gain of 0.67, categorized as moderately effective.

Similar trends were observed in other aspects such as pronunciation and identifying vocabulary images, where most children improved and received positive N-Gain scores. For instance, Child 6 showed a full score (1.00) in meaning and pronunciation, but only 0.67 in identifying images—indicating that media effectiveness varies depending on each child's skill aspect. In general, the traditional-based hybrid games proved to be quite to highly effective in improving English vocabulary in early childhood education, as reflected in the N-Gain values ranging from 0.67 to 1.00 across all assessment aspects.

Table 7.
Effectiveness of the Hybrid Game on the Theme "Fruits".

No.	Name	Aspect	Pre-test	Post-test	N-Gain
1	C1	Meaning	1	3	0.67
		Pronunciation	1	3	0.67
		Identifying Pictures	1	3	0.67
		Matching Words & Pictures	1	3	0.67
...

Based on the above table, a significant improvement is evident across all aspects of English language skills in young learners on the theme *Fruits* following the application of the traditional-based hybrid games for vocabulary introduction. All children at The Kindergarten PT in the East Padang district showed consistent scores across aspects, with a pre-test score of 1 and a post-test score of 3. This resulted in an N-Gain score of 0.67 for all aspects—*understanding word meaning*, *pronunciation*, *identifying pictures*, and *matching words with pictures*. An N-Gain of 0.67 falls into the moderately effective category. These findings indicate that the use of hybrid traditional games positively contributed to children's English vocabulary development.

Table 8.

Average Effectiveness Test Results for Each Aspect at The Kindergarten PT (The East District of Padang City).

Theme	Aspect	Average N-Gain Score	Effectiveness
Fruits	Meaning	0.67	Moderately Effective
	Pronunciation	0.67	Moderately Effective
	Identifying Pictures	0.67	Moderately Effective
	Matching Words & Pictures	0.67	Moderately Effective
Parts of Body	Meaning	0.83	Effective
	Pronunciation	0.83	Effective
	Identifying Pictures	0.79	Effective
	Matching Words & Pictures	0.79	Effective

Based on the average N-Gain scores, the effectiveness of learning using traditional-based hybrid games to improve vocabulary in the *Fruits* theme is categorized as **moderately effective**. All aspects—meaning, pronunciation, image identification, and word-picture matching—scored equally (0.67), indicating noticeable improvement but suggesting that learning strategies for this theme still need to be refined to achieve optimal results.

Conversely, the *Parts of the Body* theme showed stronger results, with average N-Gain scores falling in the **effective** category. Aspects like meaning and pronunciation scored 0.83, while identifying images and matching words to pictures scored 0.79. Although some variation exists between aspects, all scores remain within the effective range. This indicates that the traditional game-based hybrid approach was consistently effective in enhancing vocabulary understanding and skills in early childhood learners for the *Parts of the Body* theme.

3.12. Effectiveness Test

3.12.1. Assessment of English Vocabulary Introduction for Young Learners at The Star Bukittinggi Kindergarten

The following table presents the effectiveness test results at The Star Bukittinggi of the theme *Wild Animals*.

Table 9.

The Effectiveness Test of the Wild Animals Theme at The Star Kindergarten (Bukittinggi City).

No.	Name	Aspect	Pretest	Posttest	N-Gain
1	A1	Meaning	1	4	1.00
		Pronunciation	1	4	1.00
		Identifying Vocabulary Pictures	1	4	1.00
		Matching Words with Pictures	1	4	1.00
2	A2	Meaning	2	4	1.00
		Pronunciation	2	4	1.00
		Identifying Vocabulary Pictures	1	4	1.00
		Matching Words with Pictures	1	4	1.00
3	A3	Meaning	3	4	1.00
		Pronunciation	3	4	1.00
		Identifying Vocabulary Pictures	1	3	0.67
		Matching Words with Pictures	1	3	0.67
4	A4	Meaning	3	4	1.00
		Pronunciation	3	4	1.00
		Identifying Vocabulary Pictures	3	4	1.00
		Matching Words with Pictures	3	4	1.00
5	A5	Meaning	3	4	1.00
		Pronunciation	3	4	1.00
		Identifying Vocabulary Pictures	3	4	1.00
		Matching Words with Pictures	3	4	1.00
6	A6	Meaning	2	4	1.00
		Pronunciation	2	4	1.00
		Identifying Vocabulary Pictures	2	4	1.00
		Matching Words with Pictures	2	4	1.00
7	A7	Meaning	3	4	1.00
		Pronunciation	2	4	1.00
		Identifying Vocabulary Pictures	3	4	1.00
		Matching Words with Pictures	1	3	0.67
8	A8	Meaning	3	4	1.00
		Pronunciation	3	4	1.00
		Identifying Vocabulary Pictures	3	4	1.00
		Matching Words with Pictures	3	4	1.00

Based on the table above, there is a clear and significant improvement in all aspects of English vocabulary skills among early childhood education learners after the implementation of hybrid media based on traditional games. All children at The Star Kindergarten showed consistent scores across each assessed area. The N-Gain values indicate a substantial increase in vocabulary skills for most participants. For the aspects of meaning and pronunciation, every child achieved an N-Gain score of 1.00, which falls into the effective category. This finding supports the idea that learning which integrates Physical movement and verbal activities simultaneously is effective in improving the ability to understand and pronounce new vocabulary. The ability to identify vocabulary pictures also improved significantly, with most children achieving an N-Gain score of 1.00. However, a few participants reached only 0.67, suggesting that while children's visual abilities developed positively, individual differences existed in how quickly they adapted to visual stimuli. In the aspect of matching words to pictures, most children showed substantial improvement, although some still achieved a moderate effectiveness score of 0.67. The effectiveness test was also conducted using the *Sea Animals* theme, and the results are presented in the table below.

Table 10.
The Effectiveness Test at The Star Kindergarten Bukittinggi with the Sea Animal Theme.

No.	Name	Aspect	Pretest	Posttest	N-Gain
1	B1	Meaning	1	4	1
		Pronunciation	1	4	1
		Identifying Vocabulary Pictures	1	4	1
		Matching Words with Pictures	1	4	1
2	B2	Meaning	1	4	1
		Pronunciation	1	3	0.67
		Identifying Vocabulary Pictures	1	4	1
		Matching Words with Pictures	1	3	0.67
3	B3	Meaning	1	4	1
		Pronunciation	1	3	0.67
		Identifying Vocabulary Pictures	1	3	0.67
		Matching Words with Pictures	1	4	1
4	B4	Meaning	2	4	1
		Pronunciation	2	4	1
		Identifying Vocabulary Pictures	2	4	1
		Matching Words with Pictures	2	4	1
5	B5	Meaning	2	4	1
		Pronunciation	2	4	1
		Identifying Vocabulary Pictures	2	4	1
		Matching Words with Pictures	2	4	1
6	B6	Meaning	1	4	1
		Pronunciation	1	4	1
		Identifying Vocabulary Pictures	1	4	1
		Matching Words with Pictures	1	4	1
7	B7	Meaning	2	4	1
		Pronunciation	2	4	1
		Identifying Vocabulary Pictures	1	3	0.67
		Matching Words with Pictures	2	4	1
8	B8	Meaning	1	3	0.67
		Pronunciation	1	3	0.67
		Identifying Vocabulary Pictures	1	3	0.67
		Matching Words with Pictures	1	3	0.67
9	B9	Meaning	3	4	1.00
		Pronunciation	3	4	1.00
		Identifying Vocabulary Pictures	3	4	1.00
		Matching Words with Pictures	3	4	1.00

The results show a significant improvement in all aspects of English vocabulary introduction under the sea animal theme after implementing the hybrid traditional game-based learning media. The N-Gain scores reveal that most children experienced a notable increase in learning outcomes. In the meaning aspect, all participants achieved an N-Gain score of 1.00, categorized as effective. This indicates that the hybrid media used was successful in building vocabulary comprehension. The pronunciation aspect also improved significantly, although two participants (B2 and B3) had scores of 0.67, classified as moderately effective. For the ability to identify vocabulary pictures, most children were also in the effective category, although three participants (B3, B7, and B8) scored 0.67. This suggests variation in children's visual-spatial skills. The aspect of matching words with pictures showed more uniform results, with most children reaching

effective posttest scores of 4, except for two (B2 and B8) who were in the moderately effective range. To better understand the overall effectiveness of each vocabulary aspect across the two themes, the average N-Gain scores are presented below.

Table 11.
The Average N-Gain Scores for Each Aspect at The Star Kindergarten Bukittinggi.

Theme	Aspect	Average N-Gain Score	Interpretation
Wild Animal	Meaning	1.00	Effective
	Pronunciation	1.00	Effective
	Identifying Vocabulary Pictures	0.95	Effective
	Matching Words with Pictures	0.91	Effective
Sea Animal	Meaning	0.96	Effective
	Pronunciation	0.89	Effective
	Identifying Vocabulary Pictures	0.89	Effective
	Matching Words with Pictures	0.92	Effective

From the average N-Gain analysis, the *Wild Animal* theme showed a very high level of effectiveness. All vocabulary aspects were in the effective category, with perfect scores of 1.00 for meaning and pronunciation, and high scores for identifying pictures and matching them with words. These outcomes indicate that traditional game-based learning approaches are very successful in helping children understand vocabulary related to wild animals. The high level of effectiveness across all aspects also demonstrates the method's success in enhancing both conceptual and visual-associative language learning. Similarly, the *Sea Animal* theme using the hybrid "*dore*" game produced highly positive results, with all aspects falling into the effective category. The meaning aspect reached an N-Gain score of 0.96, while pronunciation and picture identification each scored 0.89. The aspect of matching words with pictures recorded an even higher score of 0.92. The consistent high scores suggest that the learning materials matched the children's level of understanding, and that the instructional strategy effectively strengthened various dimensions of English vocabulary acquisition for young learners.

4. Discussion

The findings confirm the foundational theory by Hake [18] that vocabulary acquisition in early childhood is most effective when embedded in meaningful and contextual learning. The hybrid media utilized in this study did just that by integrating vocabulary learning into culturally relevant and age-appropriate traditional games such as *congklak*, *petak umpet*, and *dore*. These games provided not only linguistic exposure but also embodied experiences that reinforced meaning through movement and interaction, aligning with Naderiheshi [19] and Alwi, et al. [20] argument that games promote participation and retention.

The study also builds on sociocultural learning theories, particularly Vygotskian notions emphasizing the importance of interaction and context. By embedding English vocabulary within traditional games, the study mirrors Frimaulia and Sari [11] and Putri, et al. [21] findings that language learning is enriched when associated with physical and social activities. The strong engagement and improved test scores observed across the participating kindergartens affirm this theoretical position. For instance, in The Star Bukittinggi, nearly all students achieved N-Gain scores of 1.00 in multiple vocabulary aspects, indicating exceptionally high learning gains. These results suggest that the physical-social dimension of traditional games, when supported by digital stimuli, creates an optimal condition for vocabulary development.

In relation to digital learning, the study echoes insights from Zahra and Harahap [8] and Wilkins [22] who argue that digital games can enhance language skills when paired with meaningful content and guided interaction. However, unlike these previous studies that focused on purely digital tools, this research uniquely combines them with traditional games to mitigate issues like screen fatigue and reduced physical activity noted by Keskin and Aral [3] and Rachmat, et al. [5]. The data from East District Padang Kindergarten, where children lost focus during prolonged digital exposure but re-engaged actively during marble-based physical games, illustrates this balance effectively.

Moreover, this study's use of traditional games as instructional media supports claims by Hasibuan, et al. [9] and Kancanadana, et al. [12] about the cognitive, physical, and social benefits of indigenous games. However, the present study extends these insights by providing empirical evidence that these games, when hybridized with digital elements, do not merely preserve culture but also significantly boost foreign language acquisition. This integrative model aligns with UNESCO [13] and Alfurqan, et al. [23] call for preserving cultural heritage through digital adaptation while simultaneously meeting educational and pedagogical goals.

From an instructional design perspective, the research validates the selective application of the ADDIE model [14, 24] in early childhood education. By focusing on the development, implementation, and evaluation stages, the study demonstrates a pragmatic approach tailored to the real-world constraints of kindergarten classrooms, as encouraged by Setiawan, et al. [25] and Sovia, et al. [26]. The very high practicality scores from teachers (above 90%) suggest that the hybrid media was not only pedagogically sound but also adaptable and user-friendly in everyday classroom settings.

Importantly, this study makes a distinct contribution to the literature by introducing a *localized hybrid game model* that blends digital and traditional formats in culturally specific ways. While earlier works such as those by Qu [27] and Gil-Arias, et al. [28] examined hybrid learning broadly, they lacked contextual grounding in local traditions. The present study, by embedding English into well-known Indonesian children's games, offers a replicable and scalable framework for culturally responsive foreign language instruction—especially relevant for resource-constrained educational settings.

In summary, the findings confirm and extend multiple strands of the literature. They align with established theories of contextual vocabulary learning, sociocultural interaction, and game-based instruction. They also offer a novel synthesis of traditional and digital pedagogic grounded in local culture, addressing gaps in prior research and practical challenges faced by early childhood educators. This study's unique contribution lies in implementing hybrid game-based learning not just as a technological innovation, but as a culturally embedded, developmentally appropriate, and pedagogically effective method for early English instruction in Indonesian kindergartens.

5. Conclusion

This study has demonstrated that integrating traditional Indonesian games with digital components into a hybrid learning medium significantly enhances young learners' English vocabulary acquisition. The hybrid game model was shown to be valid, practical, and effective across multiple kindergarten settings in West Sumatra, with strong learning gains and high engagement levels recorded in both small- and large-scale implementations. The findings reinforce theoretical claims that contextual, interactive, and embodied learning-when rooted in cultural familiarity-promotes language development more effectively than isolated digital or conventional methods. In contrast to previous research focusing primarily on digital games, this study's culturally embedded hybrid approach offers a more balanced, inclusive, and sustainable model for early language education.

The results further highlight that traditional play, when supported by simple yet targeted digital enhancements, can retain children's attention while also stimulating cognitive, motor, and linguistic skills. The implications of this research are particularly relevant for educators in similar sociocultural contexts seeking low-cost, high-impact instructional innovations. However, the study is not without limitations. It was limited to a relatively small number of participants across three schools and focused solely on vocabulary learning. Additionally, long-term retention and transfer of vocabulary knowledge were not measured. Future research should explore broader linguistic skills such as sentence formation and speaking fluency, include longitudinal data to assess retention, and examine parental involvement and community perspectives on hybrid educational models. Expanding the model across diverse geographical and linguistic settings in Indonesia could also help determine its scalability and cultural adaptability on a national level.

References

- [1] N. i. Na'imah, "The urgency of English being developed since early childhood," *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, vol. 6, no. 4, pp. 2564-2572, 2022. <https://doi.org/10.31004/obsesi.v6i4.1916>
- [2] M. R. Rochmawan, "Game-based English learning for early childhood: A literature review," *Sentra Cendekia*, vol. 4, no. 2, pp. 100-108, 2023.
- [3] A. D. Keskin and N. Aral, "Positive and negative aspects of digital games from the perspective of adolescents," *Turkish Psychological Counseling and Guidance Journal*, vol. 12, no. 67, pp. 543-557, 2022. <https://doi.org/10.17066/tpdrd.12241172>
- [4] F. Aydemir, "Digital games and their effects on children," *Adıyaman Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, vol. 41, pp. 40-69, 2022. <https://doi.org/10.14520/adyusbd.1116868>
- [5] I. F. Rachmat, S. Hartati, and E. Erdawati, "The influence of gadget addiction on emotional dysregulation in early childhood," *Jurnal Jendela Bunda Program Studi PG-PAUD Universitas Muhammadiyah Cirebon*, vol. 8, no. 2, pp. 33-45, 2021.
- [6] K. T. Yaralı, "An examination of children's digital gaming habits and preferred games," *Journal of Learning and Teaching in Digital Age*, vol. 10, no. 1, pp. 75-86, 2024. <https://doi.org/10.53850/joltida.1483847>
- [7] R. Maeneja, J. Rato, and I. S. Ferreira, "How is the digital age shaping young minds? A rapid systematic review of executive functions in children and adolescents with exposure to ICT," *Children*, vol. 12, no. 5, p. 555, 2025. <https://doi.org/10.3390/children12050555>
- [8] S. F. Zahra and A. S. Harahap, "Hybrid learning-based educational Game Frog to improve speaking skills," *International Journal of English and Applied Linguistics*, vol. 3, no. 1, pp. 9-15, 2023. <https://doi.org/10.47709/ijeal.v3i1.1850>
- [9] C. A. Hasibuan, S. N. U. R. H. Harahap, V. C. A. T. R. I. Hayatun, E. R. Rizki, and N. A. K. Z. Amanda, "Development of physical motor skills through traditional games for early childhood," *Incrementapedia: Jurnal Pendidikan Anak Usia Dini*, vol. 6, no. 1, pp. 23-29, 2024. <https://doi.org/10.36456/incrementapedia.vol6.no1.a8721>
- [10] Y. M. Mantri, "The preservation effort of Sundanese traditional game kaulinan barudak for increasing local culture resilience," *Jurnal Silatene (Jurnal Sosial Humaniora)*, vol. 1, no. 1, pp. 23-35, 2021.
- [11] S. Frimaulia and Y. Sari, "Application of traditional games in improving English vocabulary," *Jurnal Pengabdian Kepada Masyarakat*, vol. 3, no. 2, pp. 88-99, 2022.
- [12] G. Kancanadana, O. Saputri, and V. Tristiana, "The existence of traditional games as a learning media in Elementary School," in *International Conference on Early and Elementary Education (ICEEE)*, 2021.
- [13] UNESCO, "Consultative meeting of the UNESCO global project: Creation of an open digital library on traditional games," 2019. <https://www.unesco.org/en/articles/safeguarding-traditional-games-needs-actions-all-especially-young-people>
- [14] C. Peterson, *The ADDIE model: Instructional design*. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology*. Mahwah, NJ: Lawrence Erlbaum Associates, 2003.
- [15] L. R. Aiken, "Three coefficients for analyzing the reliability and validity of ratings," *Educational and Psychological Measurement*, vol. 45, no. 1, pp. 131-142, 1985. <https://doi.org/10.1177/0013164485451012>
- [16] H. Retnawati, *Quantitative analysis of research instruments*. Yogyakarta, Indonesia: Parama Publishing, 2016.
- [17] R. Gitnita, A. Hidayat, and P. Santoso, "Development and validation of practical assessment instruments for educational products," *Journal of Educational Measurement and Evaluation*, vol. 2, no. 1, pp. 45-57, 2018.
- [18] R. R. Hake, "Analyzing change/gain scores. Unpublished Manuscript," 1999. https://www.semanticscholar.org/paper/ANALYZING-CHANGE-GAIN-SCORES*%E2%80%A0Hake-Reece/ee433f272764045eede29180e06f62c963d42
- [19] A. Naderiheshi, "Review of literature on teaching English vocabularies through games to young language learners," *Journal of Language Teaching and Research*, vol. 13, no. 1, pp. 12-19, 2022. <https://doi.org/10.17507/jltr.1301.02>

- [20] N. A. Alwi, A. K. Kenedi, Y. Anita, C. Handrianto, and S. Rasool, "Socio-cultural approach through digital teaching modules: A solution to improve beginning reading skills in elementary schools," *Journal of Ecohumanism*, vol. 3, no. 7, pp. 4366-4377, 2024. <https://doi.org/10.62754/joe.v3i7.4552>
- [21] L. D. Putri, M. F. Rozi, C. Handrianto, and M. A. Rahman, "A conceptual family partnership model with Paud institutions in developing the potential of early children based on blended learning," *Ensaio: Avaliação e Políticas Públicas em Educação*, vol. 32, no. 125, p. e0244444, 2024. <https://doi.org/10.1590/S0104-40362024003204444>
- [22] B. Wilkins, "Harnessing learner interest: Integrating interactive online learning in the foreign language classroom," *Journal of Language Teaching and Learning*, vol. 11, no. 2, pp. 138-147, 2021.
- [23] Alfurqan, A. Fakhruddin, S. Narulita, and C. Handrianto, "Fostering self-regulated learning skills through flipped learning strategy projects: An exploration of pre-service teachers' experiences in Indonesia," *Perspektivy nauki i obrazovania – Perspectives of Science and Education*, vol. 72, no. 6, pp. 154–170, 2024. <https://doi.org/10.32744/pse.2024.6.10>
- [24] A. Arwin, A. Kenedi, Y. Anita, C. Hamimah, and M. Zainil, "STEM-based digital disaster learning model for disaster adaptation ability of elementary school students," *International Journal of Evaluation and Research in Education*, vol. 13, no. 5, pp. 3248-3259, 2024. <https://doi.org/10.11591/ijere.v13i5.29616>
- [25] M. E. Setiawan, E. Sastria, D. R. Monica, J. Januherman, and W. Purnawati, "Validity and practicality of the guidebook for guided inquiry-based science learning practices for students of SMPAt-Thayyibah Semurup," *Sainsmat: Jurnal Ilmiah Ilmu Pengetahuan Alam*, vol. 10, no. 2, pp. 224-234, 2021. <https://doi.org/10.35580/sainsmat102330742021>
- [26] A. Sovia, T. Murdiyanto, and D. A. Wijayanti, "Practicality of fraction textbooks for slow learners in elementary schools," *Jurnal Math-UMB.EDU*, vol. 11, no. 1, pp. 86–93, 2023. <https://doi.org/10.36085/mathumbedu.v11i1.5859>
- [27] X. Qu, "Hybrid game-based learning research at English class of primary school. Unpublished Manuscript," 2021.
- [28] A. Gil-Arias, S. Harvey, F. García-Herreros, S. González-Víllora, A. Práxedes, and A. Moreno, "Effect of a hybrid teaching games for understanding/sport education unit on elementary students' self-determined motivation in physical education," *European Physical Education Review*, vol. 27, no. 2, pp. 366-383, 2021. <https://doi.org/10.1177/1356336X20950174>