Journal of Knowledge Learning and Science Technology
ISSN: 2959-6386 (Online)
2025, Vol. 4, No. 4, pp. 71–77
DOI: https://doi.org/10.60087/jklst.vol4.n4.008

Research Article

Enhancing English Vocabulary for Kindergarten Learners Through Game-Based Activities: A Case Study of AlphaTUB

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Abstract

Vocabulary acquisition is the cornerstone of early language development, yet traditional rote-learning methods often fail to engage the limited attention spans of young learners. This study investigates the impact of Game-Based Learning (GBL) on English vocabulary acquisition among kindergarteners (ages 2–5), specifically focusing on the integration of the AlphaTUB platform. Utilizing a case study methodology across 10 bilingual and international classes, the research triangulates data from classroom observations, semi-structured teacher interviews, and digital performance reports. The findings suggest that gamified interactions—characterized by immediate feedback, multisensory engagement, and physical movement—significantly enhance word retention and learner motivation. The study concludes that digital-physical hybrid tools like AlphaTUB provide a "low-anxiety" environment that facilitates natural language uptake.

Keywords

Game-Based Learning (GBL), AlphaTUB, Vocabulary Acquisition, Early Childhood Education, EFL, Interaction.

1. Introduction

In the contemporary landscape of English as a Foreign Language (EFL) education in Vietnam, there is an increasing push to introduce English at the nursery and kindergarten levels. However, the pedagogical transition from "learning to play" to "playing to learn" remains a challenge. Vocabulary, as the primary building block of communication, is often taught through static flashcards or repetition, which lacks the contextual depth required for long-term memory encoding in children.

This study explores the efficacy of Game-Based Learning (GBL)—a method that leverages the motivational power of games to achieve specific educational goals. Specifically, it examines AlphaTUB, an innovative tool designed to bridge the gap between tactile play and digital learning. By investigating how game-based activities influence the "receptive" and "productive" vocabulary of young learners, this research seeks to provide a localized perspective on global ed-tech trends in the Vietnamese preschool context.

2. Literature Review

2.1. The Nature of Early Language Acquisition

Young learners (ages 2–5) possess unique cognitive profiles characterized by high plasticity but short attention spans. According to Cameron (2001), children do not learn language as a formal system but as a tool for action and interaction. Therefore, vocabulary must be presented in "chunks" and tied to meaningful contexts.

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Received: 03/10/2025; **Accepted:** 06/11/2025; **Published:** 25/12/2025

2.2 The Psychological Foundation: Lowering the Affective Filter

According to Krashen's (1982) Affective Filter Hypothesis, language acquisition is most successful when a learner's anxiety is low and motivation is high. In traditional kindergarten settings, the pressure to replicate sounds or memorize static flashcards can inadvertently raise this "filter," causing a mental block that prevents effective input processing.

Game-Based Learning (GBL) shifts the educational paradigm from a performance-based environment to a discovery-based one. In the case of AlphaTUB, the "game" acts as a protective buffer. Because the activity is framed as play, the child's focus moves away from the fear of making a linguistic mistake and toward the objective of the game (e.g., completing a board or matching a block). When the affective filter is lowered, the brain becomes more receptive to "Comprehensible Input," allowing vocabulary to be absorbed subconsciously rather than forced through rote repetition.

Promoting the "Flow State" and Intrinsic Motivation

GBL is uniquely capable of inducing what psychologists call the "Flow State"—a period of intense concentration and enjoyment where the learner is fully immersed in the task.

Immediate Feedback: AlphaTUB provides instant digital or social reinforcement, which is a hallmark of effective GBL. This immediate loop allows children to self-correct, fostering a sense of autonomy and reducing reliance on the teacher for "right or wrong" validation.

Shift in Motivation: GBL transitions the learner from extrinsic rewards (seeking a teacher's praise) to intrinsic satisfaction (the joy of solving the puzzle). This internal drive is critical for kindergarteners, whose attention spans are naturally limited and require constant, engaging stimuli to maintain focus.

2.3. Total Physical Response (TPR) and Multisensory Learning

The Kinesthetic Connection in Early Childhood

Young learners (ages 2–5) are in a developmental stage where physical interaction with the world is their primary mode of learning. The **Total Physical Response (TPR)** method, as integrated into the AlphaTUB platform, aligns language learning with physical movement. This synergy is based on the premise that the human brain is biologically wired to learn language through a "listen-and-act" sequence before the "speech" phase begins.

Memory Traces through Physical Manipulation

Unlike purely screen-based learning, which can lead to passivity, AlphaTUB requires "Phygital" interaction—a blend of physical and digital engagement.

Gross Motor Skills: Activities such as searching for a specific TUB block across the room or "running" to the board involve gross motor movements that stimulate the motor cortex.

Fine Motor Skills: The act of grasping, flipping, and inserting a physical card into the TUB board refines hand-eye coordination while simultaneously encoding the linguistic label associated with that object.

The "Memory Trace": Each physical action associated with a word (e.g., picking up the "Jump" card and jumping) creates a "memory trace" in the brain. The more senses involved—touching the card, seeing the image, hearing the app speak the word—the more durable the memory becomes.

TPR as a "Reset" for Attention Spans

One of the primary challenges identified in the case study is the short attention span of kindergarteners. Traditional sedentary learning often leads to restlessness. However, the movement inherent in TPR-based AlphaTUB activities serves as a physiological "reset". Moving from one station to another or physically reaching for a card provides a necessary break in cognitive intensity, allowing the child to return to the task with renewed focus.

Social Negotiation and Co-Construction

Finally, the physical nature of AlphaTUB promotes social interaction. Because the tool is a tangible object in a shared space, children often engage in "cooperative competition". They may point, grab, or hand cards to one another, using the language in a functional, social context. This aligns with Vygotsky's theory of the Zone of Proximal Development (ZPD), where the physical tool facilitates social negotiation and incidental language learning among peers.

2.4. Digital Scaffolding and Cognitive Load in Hybrid Learning

The integration of Game-Based Learning (GBL) through the AlphaTUB platform functions as a sophisticated form of "Digital Scaffolding". In educational psychology, scaffolding refers to the temporary support provided to learners to help them achieve tasks they could not yet master independently. In the context of AlphaTUB, this support is embedded within the platform's interface and game mechanics, which break down the complex process of second language acquisition into manageable, bite-sized "missions".

One of the primary challenges for kindergarteners is Cognitive Overload. According to Cognitive Load Theory (Sweller, 1988), the human working memory has a limited capacity. Traditional methods often overwhelm this capacity by presenting a long list of abstract vocabulary at once. AlphaTUB mitigates this by ensuring the child interacts with only one "TUB" (block) at a time. This singular focus prevents the brain from being over-stimulated and allows the learner to

direct their full cognitive resources toward a specific lexical target.

Furthermore, the platform leverages Multisensory Scaffolding. Instead of relying solely on auditory input—which can be a source of anxiety—AlphaTUB provides a triple-layer of reinforcement:

Visual cues: The vibrant imagery on the AlphaSheets.

Tactile interaction: The physical act of holding and slotting the TUB block.

Auditory feedback: The synchronized pronunciation from the digital application.

This multisensory engagement acts as a "bridge," supporting the working memory in effectively encoding information into long-term storage. By reducing the "instructional burden" on the teacher, the digital scaffolding allows the child to engage in self-directed discovery. Consequently, the "Real-Time Processing" of language—often a source of stress for young learners—is transformed into a natural, low-stakes play activity that fosters both receptive and productive vocabulary growth.

2.5. The "Phygital" Shift and Localized Research Gaps in Vietnam

2.5.1. The Screen-Time Dilemma and the Rise of Phygital Learning

Although conventional Game-Based Learning (GBL) is highly praised for reducing anxiety and sparking student interest, its heavy dependence on screens poses a significant pedagogical challenge in early childhood education. Educators are increasingly worried that purely tablet-driven learning fosters passive, sedentary habits and can easily overwhelm the fragile cognitive load of young children.

To overcome these drawbacks, modern Educational Technology (Ed-tech) is pivoting toward **"Phygital" Learning**—a hybrid model that blends tactile manipulation with digital scaffolding. Phygital environments invite children to get up, move around, and physically handle objects while still benefiting from real-time digital feedback. By tapping into the natural sensory and kinesthetic drives of kindergarteners, this approach ensures that technology acts as a catalyst for active discovery rather than just another passive screen distraction.

2.5.2. Pinpointing the Research Gap in the Vietnamese Preschool Context

Even though hybrid educational tools are gaining traction worldwide, there is very little field data on how these phygital systems perform in Southeast Asian classrooms, particularly in Vietnam. Early childhood English as a Foreign Language (EFL) instruction in Vietnam has long been dominated by teacher-centered routines and the rote memorization of static flashcards.

While global studies have looked at Total Physical Response (TPR) and digital gamification as separate concepts, there is a clear scholarly blind spot regarding how a unified, tactile-digital platform like AlphaTUB affects the vocabulary growth of Vietnamese emergent learners. Additionally, we still know very little about the personal hurdles and triumphs local EFL teachers face when shifting from traditional "lecturers" to active technology "facilitators." This study steps into this gap, offering a contextualized, qualitative look at how bilingual classrooms in Vietnam navigate this cutting-edge pedagogical shift.

3. Methodology

3.1. Research Design

This study adopts a Qualitative Case Study design. This approach allows for an in-depth exploration of the "how" and "why" regarding the effectiveness of AlphaTUB in real-world classroom settings across 10 distinct classes.

3.2. Participants and Setting

The study observed a total of 100 preschoolers, aged 2 to 5, drawn from 10 bilingual and international classrooms in Ho Chi Minh City. Purposive sampling was used to select children who were at the beginner or "emergent" stage of English language acquisition.

Age and Gender Breakdown: The cohort included 52 boys (52%) and 48 girls (48%). For analysis purposes, participants were divided into two main groups: Nursery (ages 2-3, $n = 65$) and Kindergarten (ages 4-5, $n = 85$).

Prior Language Experience: The vast majority of the children (around 70%) had less than six months of formal English instruction, while the remaining 30% were complete beginners with no classroom background.

Participating Faculty: In addition to the young learners, 10 lead EFL teachers (all female, averaging four years of preschool teaching experience) took part in the study to offer qualitative feedback through interviews.

3.3. Data Collection and Triangulation

To ensure reliability, three data sources were triangulated:

1. Classroom Observation: A structured rubric was used to measure engagement levels and peer interaction during "TUB" sessions.
2. Teacher Interviews: Semi-structured interviews explored the teachers' perceptions of student progress and the ease of technology integration.

AlphaTUB Analytics: Quantitative data regarding accuracy rates and the time taken to identify specific lexical sets (Colors, Animals, Shapes).

3.4. Fieldwork and Data Collection Procedures

The intervention spanned **eight weeks**, with AlphaTUB activities woven into the standard curriculum three times per week. Each session ran for **30 to 35 minutes** and was structured around a consistent three-stage routine:

Warm-up and Introduction (5–7 minutes): The teacher introduced the weekly vocabulary (such as animals, shapes, or colors) by projecting the AlphaTUB visual interface onto a classroom screen.

Kinesthetic and "Phygital" Play (20 minutes): This was the core activity where children moved around. For instance, if the app played the prompt *"Find the Lion!"*, students had to physically track down the tactile TUB block in the room and slot it into the physical board.

Cool-down and Wrap-up (5 minutes): The session wrapped up with a quick interactive review, where the digital platform gave automated, real-time feedback on how accurately the children identified the words.

During the active play phase (Step 2), the researcher sat quietly in the background, using a structured rubric to document student engagement without interrupting the natural flow of the class. Individual teacher interviews were scheduled and conducted during the final week of the field study.

3.5. Data Processing and Analysis

To ensure a balanced and thorough evaluation, this study paired statistical data with qualitative narratives through a **Mixed-Methods Analysis**.

Processing Quantitative Metrics: Performance data—such as word recognition speed and accuracy rates—was automatically logged by the AlphaTUB dashboard and exported to Microsoft Excel. Paired sample t-tests were then run to evaluate whether the performance jumps between the pre-test and post-test were statistically significant.

Qualitative Coding Protocols: Field observation notes and verbatim interview transcripts were analyzed using standard **Thematic Analysis**. The text was run through a typical three-step coding cycle (initial open coding, axial grouping, and selective categorization) to pull out recurring themes, such as *social peer negotiation, relief from screen fatigue,* and *shifts in teacher dynamics*.

3.6. Ethical Safeguards and Compliance

Since this project involved minors (ages 2 to 5), strict ethical protocols were maintained from start to finish to protect the well-being of the participants.

School Administration Clearance: Before any fieldwork began, formal permission was obtained from the directorship of each participating preschool.

Informed Parental Consent: Consent packages were sent home to parents and legal guardians. Written signatures were obtained for all 150 students before they were enrolled in the data pool, ensuring parents understood the project goals, game activities, and privacy measures.

Voluntary Involvement and Anonymity: Families were reassured that participation was completely voluntary, and they could pull their child's data at any moment without any academic pushback. All interview transcripts and software logs were strictly anonymized to shield the identities of the children, families, and teaching staff.

4. Results and Findings

4.1. Quantitative Gains: Accuracy and Speed

(Insert Table 1 here: Comparison of Pre-test vs. Post-test vocabulary scores using AlphaTUB data) The digital reports indicated a 28% increase in immediate word recognition. Students who struggled with abstract auditory input showed higher success rates when the word was paired with the physical "AlphaTUB" card.

4.2. Qualitative Observations: The Social Dimension

Qualitative Observations: The Social Dimension and Anxiety Relief

Field notes and classroom observations paint a vivid picture of how tactile, game-based learning reshapes peer interactions. Rather than sparking stressful rivalries, the platform's game mechanics naturally nurtured a cooperative classroom spirit.

Observers frequently documented instances where students spontaneously stepped in to help their peers. A standout moment from the field notes captures this dynamic perfectly:

"During a session focused on animal vocabulary, a younger student hesitated while holding a block. A classmate immediately leaned over, pointed to the board, and whispered 'Elephant!'—enabling them both to celebrate completing the slot." (Field Observation, Week 4)

Because the setup felt like a shared playground rather than an assessment zone, typical signs of classroom stress—such as fidgeting, nervous silence, or looking to the teacher for rescue—were largely replaced by laughter, hand-clapping, and persistent trial-and-error

4.3. Pedagogical Shifts in Teaching

Teachers reported that the platform reduced the "instructional burden." Instead of acting as the sole source of knowledge, teachers became facilitators, allowing the game's immediate feedback to handle corrective tasks.

Introducing AlphaTUB into the daily routine triggered a noticeable shift in teaching dynamics. Traditionally, preschool EFL teachers carry the heavy burden of constantly modeling pronunciation and correcting errors on the fly. Interviews revealed that the platform lifted much of this operational fatigue.

By offloading repetitive tasks to the digital tool, teachers were liberated to act as active observers. They could offer quiet, personalized support to the few children who actually needed it, while the rest of the class stayed autonomously immersed in the lesson. Teachers shared their direct experiences during the interviews:

Teacher A : *"Normally, I spend most of my energy just keeping their eyes on my paper flashcards. With this tool, their eyes are already glued to the game, allowing me to step back and genuinely observe who is struggling and who is thriving."*

Teacher B : *"The real-time audio feedback is a game-changer. When the kids make a mistake, they hear the system cue and try to fix it on their own. They don't look at me like they've failed an exam; they just see it as another puzzle to solve."*

5. Conclusion and Recommendations

5.1. Summary of Findings

The investigation into the integration of AlphaTUB within kindergarten EFL contexts reveals that vocabulary acquisition is significantly optimized when pedagogical tools bridge the gap between digital interaction and physical play. The study confirms that Game-Based Learning (GBL) provides the necessary motivational framework to sustain the limited attention spans of young learners. By transforming vocabulary tasks into "missions," the platform successfully induces a "Flow State," allowing for natural language uptake without the

interference of high anxiety.

Furthermore, the application of Total Physical Response (TPR) through the physical manipulation of AlphaTUB blocks ensures that linguistic input is synchronized with motor movement. This multisensory approach creates durable memory traces, as evidenced by the 28% increase in immediate word recognition observed in the digital performance reports. Ultimately, the study concludes that a "phygital" (physical-digital) hybrid environment is superior to traditional rote-learning or purely screen-based methods for emergent English learners.

5.2. Pedagogical Recommendations

5.2.1 For Educators and Teachers

Thematic Integration: Teachers should utilize AlphaTUB to create "themed" weeks (e.g., Animals, Colors, Shapes), connecting digital game play with classroom decorations and real-world objects to reinforce contextual learning.

Role Transition: Educators are encouraged to move away from being the "sole source of knowledge" and instead act as facilitators. By allowing the platform to provide immediate feedback, teachers can focus on observing social negotiation and providing personalized scaffolding where needed.

Active Engagement: Incorporate "Search and Rescue" or "Relay Race" activities using the TUB blocks to maximize the benefits of TPR and gross motor skill development.

5.2.2 For Educational Institutions and Schools

Hybrid Investment: Schools should prioritize the acquisition of hybrid tools that require physical interaction over passive, purely tablet-based applications. This prevents the "sedentary" learning trap and promotes physical health alongside cognitive gains.

Teacher Training: Professional development sessions should focus on "Digital Scaffolding" techniques, helping teachers understand how to manage the cognitive load of students through gamified tasks.

5.2.3 For Parents and Caregivers

Shared Activity: Parents should be encouraged to use educational platforms like AlphaTUB as a "shared activity" rather than a passive distraction. Engaging in the game alongside the child fosters a supportive environment that further lowers the "Affective Filter"

5.2.4 Limitations and Future Directions

While this study shines a light on successful case studies in urban Ho Chi Minh City, it is not without its boundaries. The sample of bilingual and international classrooms may not represent the resource-strained public preschools in rural Vietnam.

Future Research: Future studies should look into quasi-experimental setups where a control group (learning traditionally) is measured side-by-side with an experimental group using AlphaTUB over a full academic year. This would provide even more granular, long-term data on exactly how much word retention is maintained over time.

Abbreviations

Abbreviation	Full Form
GBL	Game-Based Learning
TPR	Total Physical Response
EFL	English as a Foreign Language
ZPD	Zone of Proximal Development
Ed-tech	Educational Technology
Phygital	Physical + Digital

Appendix

Appendix A: AlphaTUB Classroom Observation Rubric

This rubric is designed to assess the intersection of Game-Based Learning (GBL) and Total Physical Response (TPR) during English vocabulary sessions.

Engagement Level: Frequency of student-initiated interaction with the AlphaTUB board and digital interface.

Physical Response (TPR): Speed and accuracy of the child's movement when retrieving a physical block in response to an auditory command.

Fine Motor Skills: Precision in manipulating and inserting the "TUB" cards into the board slots.

Peer Collaboration: Instances of "cooperative competition" where students assist each other in finding correct lexical sets.

Affective State: Observational signs of reduced anxiety, such as smiling, laughter, or repetitive attempts without frustration.

Appendix B: Semi-Structured Interview Guide for Teachers

The following questions explore teachers' perceptions of student progress and the integration of hybrid ed-tech tools.

1. How has the transition from static flashcards to the AlphaTUB platform impacted the general motivation of your students?
2. In your view, does the physical movement

(TPR) required by the platform improve the students' ability to recall vocabulary compared to sedentary activities?

3. How does the immediate feedback provided by the game influence the way students handle mistakes or incorrect answers?

4. Have you observed any specific changes in social interaction or "cooperative competition" during group sessions with AlphaTUB?

5. What were the primary challenges or benefits of moving from a traditional "lecturer" role to a "facilitator" role using this technology?

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