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Designing Pak Taii Explorer: A Contextualized Roblox Game for Primary Learners and Pilot Evidence from a Design and Development Study

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Abstract

This design and development study reports the design rationale, development, and pilot evaluation of *Pak Taii Explorer*, a Roblox-based digital game for Thai primary school English learners at CEFR A1–A2 levels. The game was developed through the ADDIE process and is organized by the Contextual Language Action System (CLAS), a design framework proposed in this study in which each task embeds language in a culturally meaningful context, requires an action that makes comprehension observable, and returns immediate feedback. Three levels (Food Exploration, City Exploration, and Maze Challenge) situate vocabulary, reading, listening, and writing tasks in Southern Thai culture. The first prototype was piloted with 20 students during a four-week summer camp, using parallel pre- and post-tests and semi-structured interviews with three students. As pilot evidence, mean test scores rose from 52% to 78% (Welch's $t(35.6) = 6.78$, $p < .001$; Hedges' $g = 2.10$; both computed from summary statistics); in the absence of a comparison group, this gain indicates feasibility and promise and is not a demonstration of effectiveness. Interviewed students valued replayable audio, repeated attempts, and immediate feedback, while reading longer instructions remained difficult for some learners. From the design process and the pilot, five tentative design principles are derived for contextualized game-based language learning with young beginners.

Keywords: Digital Game-Based Language Learning, Gamification, Contextualized Language Learning, CLAS, English Learning Achievement, Student Perceptions, Roblox, Young Learners, Local Culture, Design and Development Research

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Introduction

In many Thai EFL classrooms, students have limited opportunities to practice and apply their English knowledge in meaningful contexts. English instruction often emphasizes isolated grammar and vocabulary exercises, providing fewer opportunities for learners to integrate language knowledge into real-life situations. Consequently, students may struggle to understand information, make decisions, solve problems, and complete tasks using English. Chulee et al. (2023) highlighted that limited opportunities to use English in daily life can discourage Thai learners from actively engaging with the language.

Another challenge concerns learners' confidence in using English. Limited exposure to meaningful language use may contribute to hesitation and anxiety when students are expected to communicate. Muengnakin and Narathakoon (2025) found that speaking anxiety was associated with less positive attitudes toward English communication among Thai learners. Conversely, opportunities for authentic language use and cultural exchange may promote more positive learning experiences (Pornthanachotanan et al., 2024). These findings emphasize the importance of creating learning environments where students can actively apply English rather than relying solely on isolated language exercises.

A growing body of research indicates that digital game-based language learning (DGBLL) can help to address these challenges. Meta-analyses have reported small-to-medium between-group effects and medium within-group effects of digital games on L2 development (Dixon et al., 2022), with particularly consistent benefits for vocabulary (Chen et al., 2018; Shahiwala & Rahul, 2026; Tsai & Tsai, 2018), and mobile games have recently been synthesized as well (Liu et al., 2025). Systematic reviews covering both learning and psychological outcomes (Hung et al., 2018; Li et al., 2025; Zou et al., 2021) further indicate that such gains are frequently accompanied by higher motivation and engagement and lower anxiety. Recent big-data syntheses of CALL innovations confirm that mobile, immersive technologies and digital game-based learning have become core drivers of pedagogical transformations over the past decade (Wu et al., 2025). According to Wu et al. (2025), successful CALL integration relies on a multi-layered hierarchy where technological affordances are translated into task design to foster learner agency and motivation. The design of *Pak Taii Explorer* addresses this need by embedding CEFR A1–A2 English tasks into a contextualized 3D Roblox environment.

Three gaps nevertheless remain. First, much of the evidence concerns secondary and tertiary learners; primary school learners at beginner proficiency levels are comparatively under-researched, although the available reviews and trials with children are encouraging (Acquah & Katz, 2020; Bang et al., 2024; Butler, 2017; Gatrell, 2025). Second, many of the games studied are commercial titles or generic educational applications whose content is culturally remote from learners' everyday lives, even though cultural familiarity has long been shown to facilitate L2 comprehension (Alptekin, 2006). Third, user-generated 3D platforms such as Roblox, which are widely used by children, have received little attention in the indexed language learning literature, in contrast to their use for cultural and experiential learning in other fields (Meier et al., 2020) and to emerging work on metaverse-based language instruction (Çelik & Yangın Ersanlı, 2025). Research is therefore needed on how purpose-built, locally contextualized game environments can support young EFL learners.

To address these gaps, the present study applied the Contextual Language Action System (CLAS), comprising Context, Action, and Feedback, as a design framework for contextualized language learning. The framework was informed by principles of contextual teaching and learning (Utami et al., 2023) and supported by gamification elements, including missions, challenges, rewards, and immediate feedback (Zainuddin et al., 2020; Zhang & Hasim, 2023).

Based on these principles, *Pak Taii Explorer* was developed as a Roblox-based digital game integrating Southern Thai cultural content with English learning activities for Thai primary

school students. The game features role-based gameplay and three learning levels: Food Exploration, City Exploration, and Maze Challenge. Students engage in vocabulary activities, reading tasks, listening and writing challenges, and contextualized decision-making missions. These activities provide opportunities to apply English through meaningful actions within culturally familiar environments. Accordingly, this paper reports a design and development study (Richey & Klein, 2007) with three aims: (1) to design and develop *Pak Taii Explorer* and to document the design decisions that link CLAS to concrete game tasks, (2) to obtain pilot evidence on students' English learning achievement and perceptions from a first implementation, and (3) to derive tentative design principles for subsequent iterations. The contribution of the paper therefore lies primarily in the designed artefact, the task-level framework, and the design principles; the outcome data are presented as pilot evidence from an under-researched learner population and platform, and not as a test of effectiveness.

Research Objectives

This study addresses the following research objectives:

1. To design and develop *Pak Taii Explorer* as a contextualized digital game-based English learning environment guided by CLAS, and to document its design rationale.
2. To obtain pilot evidence on students' English learning achievement following the first implementation of *Pak Taii Explorer*.
3. To explore students' perceptions of learning English through *Pak Taii Explorer* in order to inform its refinement.
4. To derive tentative design principles for contextualized game-based language learning with young beginner learners.

Literature Review

Challenges in English Language Teaching (EFL Context)

In EFL contexts, learners may have limited opportunities to apply English beyond classroom exercises. Although students may develop knowledge of vocabulary and grammatical structures, they may experience difficulty applying this knowledge in meaningful situations. Contextualized learning therefore emphasizes connecting language knowledge with situations in which learners interpret information, make decisions, and respond appropriately (Utami et al., 2023). For Thai learners, limited opportunities to use English in daily life may also contribute to hesitation and low confidence in using the language (Chulee et al., 2023). These challenges highlight the need for learning environments that provide opportunities to practice and apply English in meaningful contexts.

Digital Game-Based Language Learning (DGBLL)

Digital Game-Based Language Learning (DGBLL) provides an interactive environment in which learners can practice language through exploration, problem-solving, and task completion. Digital game-based environments can support English learning by providing opportunities to encounter vocabulary, understand instructions, and respond to contextualized situations (Xu et al., 2019). Such environments also allow learners to experiment with language in a relatively low-risk setting. Research syntheses support these claims. A meta-analysis of DGBLL studies found a small-to-medium overall effect in between-group designs ($d = 0.50$) and a medium effect in within-group designs ($d = 0.95$), with vocabulary among the outcomes examined (Dixon et al., 2022). A recent Bayesian meta-analysis similarly reported a substantial positive effect of digital games on vocabulary learning, which varied with intervention length, learner proficiency, and game type (Shahiwala & Rahul, 2026). For school-age learners specifically, a systematic review of studies with 6- to 18-year-olds identified six game features

associated with positive outcomes: ease of use, appropriate challenge, rewards and feedback, learner control, goal orientation, and interactivity (Acquah & Katz, 2020). Experimental work with young children corroborates this picture. In a randomized controlled trial, Japanese seven- and eight-year-olds who used a research-based English app for 16 weeks outperformed a control group, and the number of activities completed, rather than total playtime, predicted learning gains (Bang et al., 2024).

Gamification further supports game-based learning through elements such as goals, challenges, progression, rewards, and immediate feedback (Kapp, 2012). Rather than functioning only as external rewards, these elements can be incorporated into meaningful learning tasks that encourage learners to participate and continue working toward specific goals (Zhang & Hasim, 2023). Challenge-based gamification has also been associated with improved learning performance in language-related tasks (Chavangklang & Chavangklang, 2024). These principles informed the design of missions, challenges, progression, and feedback in *Pak Taii Explorer*. Meta-analytic evidence indicates that gamification has small but significant positive effects on cognitive, motivational, and behavioral learning outcomes (Sailer & Homner, 2020) and a positive overall effect on academic performance (Bai et al., 2020). A systematic review of gamification in ESL learning likewise reported predominantly positive learning experiences and outcomes (Dehghanzadeh et al., 2021), and a comparable synthesis is now available for K–12 education (Dehghanzadeh et al., 2024). At the level of individual game elements, challenge has been found to engage learners most strongly in digital game-based vocabulary learning (Zhang et al., 2025), and matching cognitive complexity to gaming level has been reported to benefit vocabulary performance and learning anxiety (Yang et al., 2020).

Gamification Design and Motivational Frameworks

The design of gamified learning environments is often informed by motivational frameworks that explain how and why students engage with tasks. One influential framework is the Octalysis Framework, developed by Chou (2015), which conceptualizes motivation through multiple dimensions such as purpose, achievement, creativity, ownership, social interaction, curiosity, and avoidance of loss. In *Pak Taii Explorer*, these principles were reflected in the use of missions, challenges, exploration, achievement systems, and progressive tasks. Rather than using game elements only as rewards, the game was designed to encourage students to complete meaningful tasks and continue progressing through the learning experience. Combined with contextualized language learning, these game-design principles allow students to use English while exploring, making decisions, solving problems, and completing specific objectives. Young learners' own preferences are consistent with these principles: in a study in which Japanese sixth graders designed their own vocabulary games, the analysis pointed to the importance of individualized learning and learner autonomy for sustaining intrinsic motivation (Butler, 2017).

Contextualized Language Learning and CLAS

Another important theoretical perspective relevant to this study is contextualized language learning, which emphasizes that language is best learned when it is embedded in meaningful contexts that reflect real-life situations. According to Utami et al. (2023), contextualized learning enhances comprehension and retention by connecting new knowledge to students' prior experiences and real-world applications. Instead of learning language in isolation, students engage with content that is relevant and situated within authentic or simulated environments.

Building upon this concept, this study introduces the Contextual Language Action System (CLAS), which extends contextualized learning by linking language use directly to student actions. In this system, language is not treated as a separate subject but as a tool for interaction, decision-making, and task completion. Students are required to interpret information, respond to situations, and complete missions using English within a simulated environment. This

reflects a shift from "learning about language" to "using language as action," which is increasingly recognized as essential in modern language education. CLAS thus operationalizes, at the level of the individual game task, design features that prior syntheses associate with successful DGBLL, namely goal orientation, interactivity, and rewards and feedback (Acquah & Katz, 2020), within a three-step cycle that can be replicated across tasks and proficiency levels. Repeated cycles are expected to matter because frequency of encounter is positively related to vocabulary learning (Uchihara et al., 2019).

CLAS is related to, but distinct from, three established lines of work. From task-based language teaching, it takes the premise that language is learned through tasks that have a primary focus on meaning, some kind of gap to be closed, and an outcome other than the display of language (Ellis, 2009); each CLAS action is a small task of this kind. From situated cognition, it takes the claim that knowledge is bound to the activity, context, and culture in which it is used (Brown et al., 1989), which motivates the use of locally familiar settings. From game-based learning research, it takes the recurring loop of challenge, response, and feedback that is central to models of how games support learning (Garris et al., 2002; Plass et al., 2015), and from feedback research the view that feedback is most useful when it informs learners about their progress toward a clear goal (Hattie & Timperley, 2007). What CLAS adds is not a new learning mechanism but an integration at the grain size of a single game task for young beginner-level learners. It specifies that the context should be culturally familiar, that the action should be one whose success depends on comprehension, and that the feedback should have a consequence in the game world. General models of game-based learning leave these choices open, and task-based frameworks were not formulated for moment-to-moment game mechanics. CLAS is therefore best understood as a design heuristic that translates these traditions into decisions a game designer can act on.

Game Platforms for Cultural and Experiential Learning

Digital platforms such as Roblox have been increasingly used to support immersive and experiential learning. Meier et al. (2020) demonstrated that virtual environments on Roblox can facilitate collaborative learning and cultural exploration by allowing students to interact with content and other users in real time. These environments support experiential learning by enabling students to explore virtual spaces, engage in tasks, and communicate within meaningful contexts. As a result, students are not only exposed to language input but also actively use language as part of their experience. More recently, researcher-designed metaverse environments have been used to teach EFL listening, with reported gains in listening scores, self-determination, motivation, and confidence, alongside constraints such as internet speed, device quality, and cognitive load (Çelik & Yangın Ersanlı, 2025). Classroom-oriented work with young learners likewise argues that game environments can expose children to authentic L2 use and foster collaboration and intrinsic motivation when tasks are carefully planned (Gatrell, 2025). Nevertheless, empirical studies of purpose-built Roblox environments for primary-level EFL learners remain scarce in the indexed literature.

Local Cultural Context in Language Learning

Integrating local cultural content into language learning can provide learners with familiar and meaningful contexts for using the target language. When language tasks are connected to learners' surroundings, experiences, and prior knowledge, students can relate new language to situations that are more relevant to their everyday lives. This is consistent with contextualized learning, which emphasizes connecting new knowledge with meaningful situations and learners' existing experiences (Utami et al., 2023). This view is supported by empirical evidence that cultural familiarity facilitates L2 reading comprehension, particularly inferential comprehension (Alptekin, 2006).

In *Pak Taii Explorer*, Southern Thai cultural elements, including local food, places, and everyday situations, were incorporated as contexts for English language tasks. Rather than

teaching culture as a separate learning outcome, these elements were used to create situations in which students could apply vocabulary, interpret information, and complete contextualized missions. In this way, local cultural content served as a meaningful context for English language use while connecting the learning experience with students' familiar environment.

Taken together, the literature suggests that digital games and gamification can support L2 learning, that their effects depend on specific design features, and that familiar cultural content can ease comprehension. What is missing is research that combines these strands for beginner-level primary school learners on a platform they already use. The present study addresses this gap.

Methodology

Research Design

This study is a design and development study of the product-development type, in which the design, development, and evaluation of an instructional product are systematically documented so that both the product and the lessons learned from creating it are open to scrutiny (Richey & Klein, 2007). It also draws on design-based research, which treats interventions as embodiments of theoretical conjectures that are refined through iterative cycles in real settings and which yields design principles as a main outcome (Anderson & Shattuck, 2012; Design-Based Research Collective, 2003; McKenney & Reeves, 2019; Wang & Hannafin, 2005). The present paper reports the first cycle: the development of a working prototype and its formative pilot evaluation.

This study employed the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) as a systematic framework for developing *Pak Taii Explorer*. The model guided the development process from identifying learners' needs to designing, implementing, and evaluating the digital game-based learning environment (Branch, 2009).

For the formative pilot evaluation of the prototype, a pre-test and post-test were used to examine changes in students' English learning achievement before and after the implementation. Semi-structured interviews were also conducted to explore students' perceptions of the game-based learning experience. The evaluation therefore followed a one-group pretest–posttest design complemented by qualitative interview data. This design is appropriate for a formative pilot whose purpose is to establish feasibility and initial promise and to identify design problems; it does not permit causal claims about effectiveness, as acknowledged in the Limitations section.

Context and Participants

The participants were 20 Thai primary school students (14 males and 6 females), aged 8–12 years, who attended a four-week summer camp program at Gogokids, a private tutoring institute in Songkhla, Thailand. Nineteen participants were enrolled in upper primary grades (Grades 4–6), while one participant was in Grade 3 and met the English proficiency requirements for participation. The participants were recruited through convenience sampling. Their English proficiency was approximately classified as CEFR A1–A2 based on school-administered English placement assessments. All participants had prior experience playing Roblox and were familiar with the platform before participating in the study.

From the 20 participants, three students were purposively selected for semi-structured interviews. The selection criteria included (1) variation in pre-test performance (low, medium, and high), (2) willingness to participate, and (3) availability during the summer camp schedule. This approach aimed to capture a range of learning experiences across different initial performance levels. The interviews were intended to provide illustrative insights into students' perceptions rather than statistically representative findings.

Research Instruments

Two research instruments were used to evaluate *Pak Taii Explorer*: a pre-test and post-test to measure students' English learning achievement, and semi-structured interviews to explore students' perceptions of the game-based learning experience.

1. Pre-test and Post-test

A pre-test and post-test were administered to measure students' improvement in their ability to use English in meaningful contexts. The parallel tests were designed to reflect the learning activities within the game and focused on practical language use rather than isolated knowledge. The test consisted of three main components:

- Vocabulary use: students selected appropriate words or phrases based on given situations (aligned with the food mission level)
- Reading comprehension: students read short instructions and selected correct responses (aligned with game instructions)
- Context-based tasks: students responded to simple scenarios requiring them to choose appropriate expressions or actions

The results from the pre-test and post-test were compared to gauge the initial promise of the innovation for enhancing students' contextualized language use. The pre-test and post-test were developed to assess students' English learning achievement before and after the implementation of *Pak Taii Explorer*. Both tests consisted of 20 multiple-choice questions covering three components: vocabulary knowledge, reading comprehension, and contextual language use. Each correct answer was awarded one point, with a maximum score of 20 points. The two tests were designed with comparable content and difficulty levels while using different questions to reduce the influence of answer memorization. The test structure is presented in Table 1.

Table 1 Assessment Components of the English Achievement Tests

Assessment Component	Number of Items	Maximum Score
1. **Vocabulary Knowledge**	8	8
2. **Reading Comprehension**	6	6
3. **Contextual Language Use**	6	6
Total	20	20

2. Semi-structured Interview

Semi-structured interviews were conducted with three purposively selected students to explore their perceptions and experiences of learning English through *Pak Taii Explorer*. The interviews were conducted individually in Thai to minimize potential language barriers and allow students to express their experiences comfortably in their first language. Each interview lasted approximately two minutes and was audio-recorded.

The first author used an intelligent verbatim transcription approach to preserve the students' original wording and informal expressions while omitting non-essential hesitations and repetitions. Portions unrelated to the research objectives were excluded from the analysis. Selected excerpts were subsequently translated from Thai into English by the first author, with attention to preserving the students' original meanings and natural expressions.

The interviews consisted of three open-ended questions focusing on students' learning experiences, difficulties in understanding English, and perceived improvement through repeated gameplay.

The interview questions were as follows:

1. Learning Experience: How did you feel about playing *Pak Taii Explorer*? What did you like or dislike about the game, and why?
2. Language Difficulties: Were there any English words or instructions that you found difficult to understand? What did you do when you encountered these difficulties?
3. Perceived Improvement: Do you think playing the game repeatedly helped you understand or use English better? How?

Pak Taii Explorer Development Process

Analysis Phase

During the analysis phase, students' English learning needs and difficulties were identified. The analysis indicated that students had difficulties applying vocabulary and English knowledge in contextualized situations and showed limited confidence in using English. These findings informed the development of learning tasks that provided opportunities for students to practice and apply English through meaningful situations.

Design Phase

Based on the analysis, *Pak Taii Explorer* was designed as a contextualized digital game-based learning environment for students at the CEFR A1–A2 levels. The learning objectives focused on vocabulary use, reading comprehension, and the application of English in contextualized tasks.

The Contextual Language Action System (CLAS) guided the design of tasks in which students used English to perform actions, make decisions, and complete missions. The Octalysis Framework (Chou, 2015) also informed the game design through elements such as achievement, progression, exploration, and challenges. These principles were incorporated into missions and interactive tasks to encourage students to progress through the learning experience. Table 2 summarizes how the three CLAS components were instantiated in each level of the game.

Table 2 Instantiation of CLAS Components in the Three Levels of Pak Taii Explorer

Level and focus	Context	Action	Feedback
Level 1: Food Exploration (vocabulary)	Southern Thai cuisine (e.g., Khao Yum, Gaeng Som); quests given by non-player characters	Selecting the appropriate ingredients and food vocabulary to complete local dishes and quests	Immediate correct or incorrect-answer feedback on each selection
Level 2: City Exploration (reading and communication)	Southern Thai landmarks and the Mermaid Legend; a tourist seeking information	Reading illustrated materials, completing location-based vocabulary and navigation tasks, and giving tourist information to non-player characters	Immediate feedback on responses; progression through the mission

Level and focus	Context	Action	Feedback
Level 3: Maze Challenge (listening and writing)	A maze in which English audio instructions must be followed	Listening to audio instructions, writing the words heard, and choosing doors	Correct answers open the way forward; incorrect answers trigger a zombie penalty

Note. Game elements informed by the Octalysis Framework (missions, experience points, achievements, and progression) operate across all three levels.

Following Sandoval's (2014) conjecture mapping, the design rests on one high-level conjecture: young beginner-level learners will learn and apply English more readily when language is encountered in culturally familiar game situations, used to perform actions on which progress depends, and followed by immediate feedback. This conjecture is embodied in the features summarized in Table 2. The design is expected to work through three mediating processes that can be observed during play: learners attend to and interpret English input in order to act; they repeat tasks and re-encounter the same language after unsuccessful attempts; and they use feedback to adjust subsequent responses. The intended outcomes are gains in vocabulary use, reading comprehension, and contextual language use, together with positive perceptions of learning through the game. The pilot evaluation addressed the outcomes and, through the interviews, gave a first indication of the mediating processes; direct observation of these processes through gameplay data is planned for the next cycle.

Development Phase

During the development phase, *Pak Taii Explorer* was created using the Roblox platform. The virtual environment incorporated Southern Thai cultural contexts, including local places, food, and everyday situations, to provide meaningful settings for English language use.

Learning tasks and missions were developed to align with the learning objectives. This included vocabulary selection, reading and following instructions, interactions with non-player characters (NPCs), and scenario-based decision-making tasks. Students were required to understand and apply English in order to complete tasks and progress through the game.

Game elements, including experience points (XP), achievement systems, mission progression, challenges, and immediate feedback, were integrated into the learning experience. Visuals, text prompts, and interactive instructions were also incorporated to support comprehension. The tasks were designed to be appropriate for CEFR A1–A2 learners and gradually increased in difficulty.

Implementation Phase

The implementation was conducted over four weeks during a summer camp program at Gogokids Songkhla. Students attended regular English classes three days per week, with each class lasting approximately 60 minutes. *Pak Taii Explorer* was integrated as a supplementary game-based learning activity twice a week, with each gameplay session lasting approximately 15 minutes. This resulted in eight gameplay sessions, totaling approximately 120 minutes over the four-week implementation.

Students accessed the game using mobile phones and participated either individually or in pairs, depending on the availability of personal devices. Students who had their own mobile phones played individually, while those without personal devices shared a mobile phone with another student to participate in the game-based activities. During gameplay, students completed interactive missions involving vocabulary, reading comprehension, listening, and contextualized language use, with teacher guidance provided when necessary.

In addition to the regular English classes, students participated in English-integrated cultural activities once a week. These activities focused on aspects of Songkhla's local culture, including traditional food and cultural landmarks. The activities provided further opportunities to encounter and use English in culturally meaningful contexts.

After the four-week implementation, students completed the post-test and participated in semi-structured interviews.

Evaluation Phase

The formative evaluation of the first prototype focused on two areas: students' English learning achievement and their perceptions of learning English through the game.

The pre-test and post-test results were compared to examine changes in students' English learning achievement, particularly in vocabulary use, reading comprehension, and context-based tasks. These data addressed Research Objective 2.

Semi-structured interviews were used to explore students' perceptions of learning through *Pak Taii Explorer*. The interview data addressed Research Objective 3 and provided additional insights into students' experiences, difficulties, and confidence during the game-based learning activities.

Together, the quantitative and qualitative data were used to evaluate the learning outcomes and students' experiences with the innovation.

Data Analysis

Quantitative data from the pre-test and post-test were analyzed using descriptive statistics (means, percentages) to compare performance before and after the intervention. Because the analysis reported here is based on summary statistics, the paired structure of the data could not be modelled directly, and a conservative approach was taken. The pre-test and post-test were compared with Welch's t-test computed from the means, standard deviations, and sample sizes, which treats the two sets of scores as independent. When pre-test and post-test scores are positively correlated, as is typical of repeated measures, this procedure underestimates the paired test statistic, so the result can be read as a lower bound. A sensitivity analysis then estimated the paired-samples t statistic under assumed pre–post correlations of 0, .30, .50, and .70. To aid interpretation, a standardized mean difference (Cohen's d) was additionally computed from the pre-test and post-test means and standard deviations, using the pooled standard deviation, and interpreted against field-specific benchmarks for within-group contrasts in L2 research (small = 0.60, medium = 1.00, large = 1.40; Plonsky & Oswald, 2014). Hedges' g was also computed to correct for small-sample bias. Qualitative data from semi-structured interviews were analyzed following the general procedures of thematic analysis (Braun & Clarke, 2006), and the resulting patterns were then related to the mediating processes specified in the design conjecture. Because the data set was small, the analysis was descriptive, and the patterns are treated as illustrative. The first author transcribed the interviews, familiarized herself with the data, and generated initial codes. Codes were then grouped into themes that captured patterns related to students' perceived difficulties, perceived improvement, and perceptions of the game-based learning experience. Because the purpose of the evaluation was formative, all outcome data are treated as pilot evidence of feasibility and initial promise.

Results

The Designed Artefact: Pak Taii Explorer

The results are presented in alignment with the research objectives, beginning with the designed artefact. The development of *Pak Taii Explorer* was successfully completed by

integrating the Contextual Language Action System (CLAS), gamification, and digital game-based learning principles. The innovation was developed on the Roblox platform and consisted of three main levels: Food Exploration, City Exploration, and Maze Challenge. Each level was designed around Southern Thai cultural contexts and provided opportunities for students to practice English through interactive missions, problem-solving activities, and contextualized language use.

Role-selection system in *Pak Taii Explorer* is seen from Figure 1: (a) the three available professions—Community Volunteer, Heritage Collector, and Heritage Photographer; and (b) the in-game interface for choosing a new career.



Figure 1(a) Character profession options in Pak Taii Explorer.

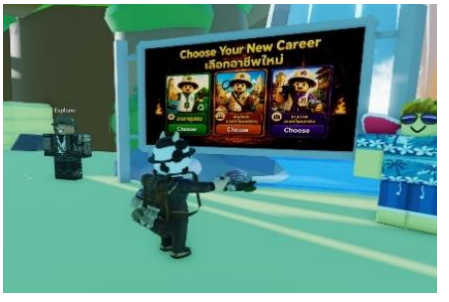


Figure 1(b) Career selection interface in Pak Taii Explorer.

Pak Taii Explorer includes three levels with specific content and language activities.

Level 1: Food Exploration focused on English vocabulary related to Southern Thai cuisine, including Khao Yum and Gaeng Som (Figure 2). Students practiced English through interactive ingredient-selection tasks, received immediate feedback on their responses (Figure 3), and interacted with NPCs to complete quests (Figure 4). Students also selected appropriate ingredients for local dishes (Figure 5). These activities reflected the CLAS framework through contextualized learning, game-based actions, and immediate feedback.



Figure 2 Food vocabulary in Pak Taii Explorer.



Figure 3 Incorrect-answer feedback in Pak Taii Explorer.



Figure 4 NPC quest interaction in Pak Taii Explorer.



Figure 5 Khao Yum ingredient-selection task in Pak Taii Explorer.

Level 2: City Exploration focused on English reading and communication through Southern Thai cultural landmarks. Students explored the Mermaid Legend through illustrated reading materials (Figure 6), completed location-based vocabulary and navigation tasks (Figure 7), and interacted with NPCs to provide tourist information (Figure 8). These activities integrated cultural knowledge with contextualized English use, following the CLAS framework.

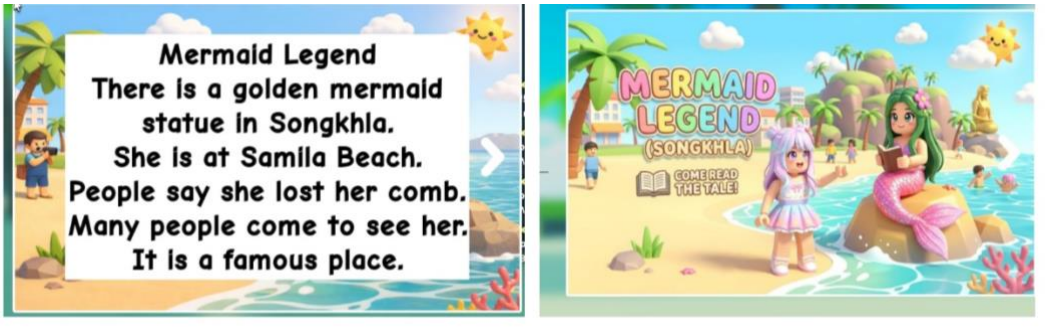


Figure 6 Mermaid Legend reading materials in Pak Taii Explorer.

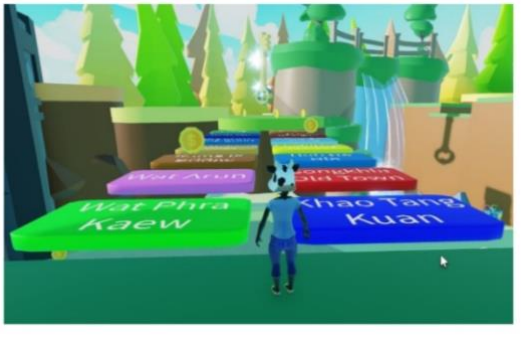


Figure 7 Location-based vocabulary and navigation tasks.



Figure 8 NPC interaction and tourist guidance mission.

Level 3: Maze Challenge focused on English listening and writing skills through maze-based missions. Students listened to English audio instructions and wrote the words they heard to complete language tasks (Figures 10–11). Correct answers allowed students to progress (Figure 12), while incorrect responses triggered a zombie penalty (Figure 9). These activities reflected the CLAS framework through contextualized listening tasks, written responses, and immediate feedback.



Figure 9 Incorrect-answer feedback and zombie penalty.



Figure 10 Maze exploration and door-selection tasks.

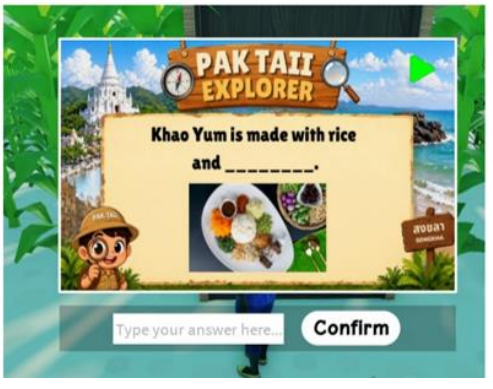


Figure 11 English vocabulary completion task.



Figure 12 Correct-answer feedback and level progression.

Across the three levels, the CLAS framework was implemented through a sequence of Context, Action, and Feedback. Students first encountered language within a culturally meaningful situation, applied their understanding through game-based actions, and received immediate feedback based on their responses. Gamification elements, including missions, challenges, rewards, and progression, were incorporated to encourage active participation and repeated practice. Overall, the completed innovation demonstrated how English language learning activities could be integrated into interactive digital environments in which language was used to accomplish meaningful tasks rather than simply memorized.

Pilot Evidence: Learning Achievement

For the pilot evaluation, students' English learning achievement was examined by comparing

their pre-test and post-test scores following the four-week implementation of *Pak Taii Explorer*. The assessment consisted of 20 multiple-choice questions covering three components: vocabulary knowledge, reading comprehension, and contextual language use.

As presented in Table 3, the reported mean pre-test score was 10.40 out of 20 (52%), while the mean post-test score increased to 15.60 (78%), representing a mean gain of 5.20 points, equivalent to 26 percentage points. These results suggest an overall improvement in students' English learning performance following the intervention. The corresponding standardized mean difference, computed from the descriptive statistics in Table 3, was d = 2.14, which exceeds the benchmark for a large within-group effect in L2 research (Plonsky & Oswald, 2014). Welch's t-test on the summary statistics indicated that the gain was statistically significant, $t(35.6) = 6.78$, $p < .001$, with a 95% confidence interval for the mean gain of 3.64 to 6.76 points. Under assumed pre–post correlations of 0, .30, .50, and .70, the estimated paired-samples statistic was $t(19) = 6.78$, 8.05, 9.43, and 11.92, respectively, so the conclusion does not depend on the unknown correlation provided that it is not negative. Corrected for small-sample bias, the effect size was Hedges' g = 2.10. All of these estimates are derived from summary statistics.

Table 3 Descriptive Statistics of Pre-test and Post-test Scores

Assessment	n	Mean	SD	Min (0)	Max (20)
Pre-test	20	10.40	2.09	7	15
Post-test	20	15.60	2.72	10	19

Component-level scores are not reported, so the gain is presented for the total score only and is not attributed to particular skills. Although some students continued to face difficulties, particularly in reading comprehension and the maze challenge, most were able to progress with the support of immediate feedback provided within the game.

Overall, students' scores improved from pre-test to post-test, suggesting that the intervention may have contributed to their learning.

Pilot Evidence: Learner Perceptions

Semi-structured interviews were conducted with three students to explore their perceptions of learning through *Pak Taii Explorer*. Given the small number of interviews, the responses are reported as illustrative learner accounts and are not presented as a saturated thematic analysis. Three patterns were identified: support for language comprehension, repeated practice, and perceived improvement in English performance.

Pattern 1: Support for Language Comprehension Through Replayable Input.

Student 3 (male) described *Pak Taii Explorer* as an enjoyable learning experience, particularly because of its interactive missions and listening activities. He appreciated the opportunity to replay audio when he encountered unfamiliar English instructions. As he explained, "*I liked that I could listen again. When I didn't understand, I pressed the button and listened again. Then I knew what to do.*" His response suggests that replayable audio helped him understand instructions and complete tasks more independently.

Pattern 2: Repeated Practice.

Student 7 (female) described the game as more engaging than conventional English exercises. She enjoyed comparing scores with her friends and replaying missions to improve her performance. She also perceived an improvement in her reading speed after repeated practice.

As reflected in the following illustrative quote, "*I liked playing with my friends and comparing our scores. I wanted to play again to get a better score. After playing many times, I could read English faster.*" Her response suggests that repeated practice encouraged engagement and increased familiarity with English reading tasks.

Pattern 3: Perceived Improvement.

Perceived improvement was also evident in the account of Student 7 above, who reported reading faster after repeated play. In the same vein, Student 17 (male) reported that some vocabulary in the food missions was unfamiliar at first. However, repeated exposure helped him remember more words and improve his performance. An illustrative quote based on his reported experience is, "*Some food words were new to me. At first, I didn't know the answers. But after playing two or three times, I remembered more words and got better scores.*" His experience suggests that repeated exposure to vocabulary within meaningful contexts may have supported vocabulary recognition and retention.

Overall, the interview findings suggest that repeated practice, opportunities to retry tasks, and immediate feedback were perceived as helpful features of *Pak Taii Explorer*. Students reported positive experiences related to language comprehension, vocabulary learning, and confidence in completing English-based tasks. Table 4 summarizes the three patterns and relates them to the mediating processes specified in the design conjecture.

Table 4 Interview Patterns and Their Relation to the Design Conjecture

Pattern	Source	Excerpt	Related mediating process
1. Support for comprehension through replayable input: replaying audio helped the learner understand instructions and act independently	Student 3	"When I didn't understand, I pressed the button and listened again. Then I knew what to do."	Attending to and interpreting English input in order to act
2. Repeated practice: comparing scores with peers and wanting a better score prompted the learner to replay missions	Student 7	"I wanted to play again to get a better score."	Repeating tasks and re-encountering the same language
3. Perceived improvement: learners reported reading faster and remembering more words after repeated play	Students 7 and 17	"After playing many times, I could read English faster." "But after playing two or three times, I remembered more words and got better scores."	Using feedback to adjust subsequent responses; intended outcomes

Note. Excerpts are taken from the learner accounts reported above. The mediating processes are those specified in the design conjecture in the Design Phase section.

Summary of Pilot Findings

Overall, the pilot findings suggest that *Pak Taii Explorer* may have supported students' English learning achievement through contextualized and game-based learning activities. The

increase in the mean score from 52% in the pre-test to 78% in the post-test indicates improvement in students' performance after the four-week implementation. Because component-level scores are not reported, the gain cannot be attributed to particular skills. These findings suggest that providing opportunities to apply English through meaningful tasks may support learners in connecting language knowledge with contextualized use.

The interview findings provided further insights into students' perceptions of learning through *Pak Taii Explorer*. The three interviewed students described positive experiences with the game-based activities. Repeated exposure to vocabulary, opportunities to replay listening input, repeated attempts at tasks, and immediate feedback were perceived as helpful features of the learning experience. Students also reported perceived improvements, such as remembering vocabulary more effectively, reading more quickly after repeated attempts, and achieving better scores in subsequent attempts. These findings are consistent with previous research suggesting that digital game-based learning and gamification can provide interactive and engaging opportunities for language learning (Zhang & Hasim, 2023).

However, reading comprehension remained challenging for some students, particularly when tasks involved longer or more complex instructions. This finding suggests that game-based learning does not eliminate the need for instructional support. Teacher facilitation and appropriate scaffolding remain important, particularly for learners who require additional assistance with reading and unfamiliar language.

Overall, the findings suggest that the integration of contextualized language tasks, repeated practice, immediate feedback, and game-based design in *Pak Taii Explorer* can provide meaningful opportunities for students to practice and apply English. While the findings indicate improvement in English learning achievement and positive student perceptions, further research would be needed to determine whether the innovation leads to measurable changes in learner confidence or motivation.

Discussion

This design and development study set out to design a contextualized, Roblox-based game for Thai primary EFL learners, to pilot it, and to derive design principles. The pilot evidence is discussed first, followed by the design principles and the theoretical contribution of CLAS.

First, the pre-post gain was large (d = 2.14). Within-group effects in DGBLL research are typically larger than between-group effects; Dixon et al. (2022) reported a weighted mean of d = 0.95 for within-group designs against d = 0.50 for between-group designs. The present estimate is well above that average and should be read cautiously: the sample was small, the tests were closely aligned with the game content, and the design cannot separate the effect of the game from test familiarity or other instruction during the camp. With these caveats, the direction of the result is consistent with meta-analytic evidence that digital games benefit L2 vocabulary learning (Chen et al., 2018; Shahiwala & Rahul, 2026; Tsai & Tsai, 2018) and with trial evidence that well-designed digital applications can produce measurable English gains in young children (Bang et al., 2024). Whether the gain was concentrated in particular components, such as vocabulary, for which reviews report consistent gains from game-based learning (Zou et al., 2021), could not be examined without component-level scores.

Second, the interview data point to the mechanisms through which the game may have supported learning. Students emphasized replaying audio, retrying missions, and receiving immediate feedback. These features correspond to design characteristics that Acquah and Katz (2020) associated with positive outcomes for school-age learners, namely rewards and feedback, learner control, and appropriate challenge, and they are in line with meta-analytic evidence that repeated encounters with words are positively related to vocabulary learning (Uchihara et al., 2019). The students' reported wish to replay missions to obtain a better score echoes the finding that challenge is the game element that engages learners most

strongly (Zhang et al., 2025) and that enjoyment and autonomy are salient in learners' accounts of game-based English learning (Zhou, 2024). Bang et al.'s (2024) finding that the number of completed activities, rather than total playtime, predicted children's gains suggests that the mission-based structure of *Pak Taii Explorer*, which rewards task completion, may be a productive design choice; this possibility should be tested with in-game analytics.

Third, the persistence of reading comprehension difficulties indicates the limits of the current design. Longer written instructions appear to have exceeded what some learners could process independently, even in a culturally familiar setting. Cultural familiarity has been shown to support inferential comprehension in particular (Alptekin, 2006), but it does not remove the linguistic demands of a text. This finding is consistent with reports that immersive game environments can impose cognitive load on learners (Çelik & Yangın Ersanlı, 2025) and with the argument that young learners benefit when game tasks are carefully planned and mediated by the teacher (Gatrell, 2025). Matching task complexity to learners' level, as in complexity-based game designs (Yang et al., 2020), is therefore a priority for the next version of the game.

Tentative Design Principles

A central output of design-oriented research is a set of design principles that others can adapt and test (Anderson & Shattuck, 2012; McKenney & Reeves, 2019). Five tentative principles are derived from the design process and the pilot. They are grounded in one prototype and one small implementation, and they are offered as conjectures for subsequent iterations, not as validated guidelines.

Principle 1: Anchor language in locally familiar contexts. Tasks should be set in places, foods, and situations that learners already know, so that the context supplies both a reason to use English and background knowledge that eases comprehension. In the prototype, this was realized through Southern Thai dishes, landmarks, and legends; the principle is consistent with evidence that cultural familiarity facilitates L2 comprehension (Alptekin, 2006).

Principle 2: Make comprehension observable through action. Progress in the game should depend on an action that can only be completed correctly if the language has been understood, such as selecting the ingredients of a dish, guiding a tourist, or writing a word that was heard. This ties language to goal-directed, interactive tasks, features associated with positive outcomes for school-age learners (Acquah & Katz, 2020).

Principle 3: Provide immediate, consequential feedback with unlimited retries. Every action should receive an immediate response that has a consequence in the game world (progression, rewards, or a playful penalty), and learners should be free to try again. Interviewed students linked retrying missions to remembering more words and obtaining better scores, which accords with evidence on rewards and feedback (Acquah & Katz, 2020) and on repeated encounters with vocabulary (Uchihara et al., 2019).

Principle 4: Make input replayable. Beginners should be able to replay audio and revisit texts on demand. In the pilot, a student described replaying audio instructions until he knew what to do, which suggests that learner control over input supported independent task completion.

Principle 5: Grade the reading load and plan for teacher mediation. Written instructions should be short and graded to learners' level, with visual support, and the teacher's facilitating role should be designed into the implementation. This principle responds to the reading difficulties observed in the pilot and to prior work on cognitive load in immersive environments (Çelik & Yangın Ersanlı, 2025), task complexity (Yang et al., 2020), and teacher-planned game tasks for young learners (Gatrell, 2025).

Theoretical Contribution

Theoretically, the study offers CLAS as a compact account of how contextualized language use can be organized in a game: a culturally meaningful context supplies the reason to use language, an action makes comprehension observable, and feedback closes the loop. The framework is consistent with features identified in previous syntheses (Acquah & Katz, 2020; Sailer & Homner, 2020), and its value lies in specifying them as a repeatable task cycle. The preliminary findings of *Pak Taii Explorer* align with the broader CALL innovation landscape, which highlights the central role of interactive task design and learner affect in digital environments (Wu et al., 2025). By operationalizing contextual language use through actionable tasks and immediate feedback, the game addresses the 'Design' and 'Psychology' layers of CALL innovation proposed by Wu et al. (2025). Whether the three components contribute independently to learning remains an open empirical question. In terms of the conjecture map, the interview accounts of replaying audio and retrying missions are consistent with the second and third mediating processes, whereas the reading difficulties indicate that the first process, interpreting input in order to act, broke down for some learners when the written input was long.

Limitations

Several limitations should be considered in this study. Consistent with its developmental purpose, the study reports a single design cycle and a formative pilot, and it makes no claim about the effectiveness of the game. First, the study used a single-group pre-test and post-test design without a control group. Therefore, the improvement in students' scores cannot be attributed solely to *Pak Taii Explorer*, as other factors, such as test familiarity and additional instruction during the summer camp, may have influenced the results. Second, the study involved only 20 students from one tutoring institute, which limits the generalizability of the findings. In addition, only three students participated in the interviews, and the implementation lasted four weeks. Also, while some students played individually using their own mobile phones, others shared devices and played in pairs. These differences may have affected opportunities for individual interaction, task completion, and engagement with the game. These factors may limit the understanding of students' learning experiences and long-term progress. Future research should include a larger sample, a control group, and a longer implementation period to provide stronger evidence of the innovation's effectiveness. Furthermore, the achievement tests were researcher-developed and closely aligned with the game content, and their reliability and validity were not formally established; the effect size reported here was computed from summary statistics and may overestimate the true effect. Finally, the interview data were analyzed by a single coder. In addition, the gain could be reported only for the total score, because component-level scores were not available.

Future Work and Implications for English Language Learning

Future Work

In design-based terms, this paper reports the first cycle of prototype development and formative piloting, and several areas will be addressed in the next iteration. Future versions of *Pak Taii Explorer* could include additional levels and more complex language tasks to support learners at higher proficiency levels. Adaptive features could also be incorporated to provide tasks and feedback based on individual learners' performance and progress.

Future research should involve a larger sample and a longer implementation period to provide stronger evidence of the effectiveness of the innovation. Additional measures could also be included to examine changes in learner confidence and motivation, as these outcomes were not directly measured in the present study. Furthermore, learning analytics, such as task completion rates, number of attempts, response accuracy, and time spent on individual missions, could be collected to provide more detailed information about students' learning

processes and progress. Such studies should employ quasi-experimental or randomized designs with a comparison group and longer interventions, as recommended in a recent synthesis of the field (Shahiwala & Rahul, 2026), and should use validated measures of affective outcomes.

Future studies could also examine whether the learning gains are retained over time by including a delayed post-test after the intervention.

Implications for English Language Learning

The findings of this study have several implications for English language learning in EFL contexts. First, digital game-based learning can provide learners with opportunities to apply English knowledge in meaningful and contextualized situations. In *Pak Taii Explorer*, English was integrated into missions that required students to understand instructions, apply vocabulary, make decisions, and complete specific tasks. This approach is consistent with contextualized and communicative approaches to language learning, which emphasize the use of language for meaningful purposes rather than isolated practice (Richards, 2006; Utami et al., 2023).

Second, repeated practice and immediate feedback may play an important role in supporting language learning. The interview findings showed that students valued opportunities to repeat tasks, replay listening input, encounter vocabulary multiple times, and learn from feedback. These features are consistent with digital game-based and gamified learning environments that provide learners with opportunities for active participation, repeated attempts, and feedback during the learning process (Zainuddin et al., 2020; Zhang & Hasim, 2023).

Finally, *Pak Taii Explorer* illustrates how local cultural content can be incorporated into digital English learning environments. Southern Thai food, places, and everyday situations were used as contexts for English language tasks, allowing students to encounter the target language through familiar content. Although cultural learning was not directly measured in this study, the use of local contexts demonstrates a practical approach to connecting English learning with learners' surrounding environment.

Overall, the study suggests that contextualized tasks, repeated practice, immediate feedback, and familiar local content can be meaningfully integrated into digital game-based environments to support English language learning.

Conclusion

This paper has documented the design and development of *Pak Taii Explorer*, a Roblox-based game that situates beginner-level English tasks in Southern Thai culture, and has proposed CLAS as a task-level framework linking context, action, and feedback. A four-week pilot with 20 primary school students yielded encouraging gains and positive learner accounts, together with a clear design problem concerning reading load. The designed artefact, the framework, and the five tentative design principles are offered to designers and teachers working with young EFL learners, and to researchers who can test them in further iterations with comparison groups, validated instruments, and in-game analytics.

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Declaration of Interest Statement

There is no potential conflict of interest.

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