

Original Article

Developing Interactive Learning Games for Kids

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Abstract - The use of mobile devices by Vietnamese students is on the rise, making it more important than ever to use game-based learning technologies in schools. Even though there are a lot of educational games to help people learn English, these tools often don't take culture into account, which makes them less useful for people who don't speak English. This study presents Golden Words – The Fairy Tale Journey, an innovative educational game that uniquely combines Vietnamese cultural narratives with game-based English learning, a feature largely missing in existing language-learning games like Duolingo and Memrise. By incorporating traditional folklore into pedagogically sound game mechanics, the study addresses a significant deficiency in culturally contextualized game-based learning for non-English-speaking students. The game is based on local cultural stories and uses elements from traditional Vietnamese fairy tales, like The Golden Star Fruit Tree, to make learning more fun and meaningful. The game tries to get students more involved, motivated, and able to remember what they've learned by connecting language lessons to cultural content they already know.

Keywords - Game-Based Learning, English Language Acquisition, Vietnamese Primary Education, Culturally Responsive Pedagogy, Mobile-Assisted Language Learning (MALL).

1. Introduction

According to Fullerton (2014), a game is "a system in which players participate in artificial challenges, defined and limited by specific rules. Each rule determines how the game is played, how the player interacts, and the winning and losing conditions of the game." Game-Based Learning (GBL) is a pedagogical approach that leverages the principles and elements of games to facilitate learners' natural and effective knowledge absorption by integrating academic content into narratives and gameplay (Gee, 2003). Unlike "gamification," which is the application of game elements (such as points, badges, and leaderboards) to contexts outside of gaming (Hamari et al., 2014; Deterding et al., 2011), GBL integrates learning content into a complete game. Therefore, it helps reduce stress, increase interest and motivation, improve memory, and develop problem-solving skills in students, especially among younger learners (Filament Games, 2023). Studies in recent years have also shown that GBL improves language awareness and vocabulary in children between the ages of 5 and 6 when learning through digital games (Park et al., 2023), while promoting social-emotional skills and supporting the development of mathematical thinking in early primary school.

Consequently, building on this understanding, it is based on GBL effectiveness in classical learning theories, improving learning outcomes, and maintaining motivation. These theories not only give a framework for the design of the game but also provide support to effective knowledge acquisition:



- **Constructivism:** This theory is a fundamental theory in learning science, which states that people construct knowledge themselves through experience and interacting with the environment, whereas the traditional way is to receive knowledge (University XP, 2021) passively. And educational games can be an excellent context to apply the principles of experiential and game-based learning because they invite learners to experiment, fail, and investigate solutions. Empirical research signals that knowledge built inside virtual worlds is more effectively retained and put into practice - King, 2023.
- **Behaviorism:** This theory emphasizes behavior reinforcement through feedback (Skinner, 1954, 1968), wherein correct choices are rewarded with positive responses such as points, items, or progress indicators, while incorrect choices receive negative feedback. This "action-feedback-reinforcement" loop serves to shape learner behavior and strengthen knowledge retention (Madigan, 2019).
- **Cognitivism:** According to this, it is a theory about how people receive, process, and store information (Gee, 2003). In this regard, young learners should chunk the game content and include visual and audio to support memory retention, with an easy-to-understand interface (Steinkuehler & Duncan, 2008).
- **Storytelling:** Storytelling is not only a more colorful way of knowledge delivery, but it also gives an opportunity to establish, from a very early stage, emotional or social relations between learners and knowledge. The use of compelling narratives in education may make such abstracting-heavy knowledge more concrete, palpable, and memorable (Tsao, 2024; Bruner, 1991; Jayemanne, 2019).

In the context of globalization, GBL also proved to be helpful during the foreign language acquisition process.

- **Improved Vocabulary:** GBL leads to an improvement in the acquisition and retention of vocabulary among students as opposed to conventional processes. Most of the experimental studies on game-based learning of vocabulary for primary school students mention that the DGBL experience significantly helps in memorizing and learning new vocabulary.
- **Improvement in Grammar and Reading:** When the design is contextualized or embedded with reading activities, learners are found to commit fewer grammatical errors compared to those groups that involved themselves with traditional learning methods (C.-J. Lin et al., 2020).
- **Improved Overall Proficiency:** In most of these studies of academic proficiency, there is a general indication of higher improvement in the GBL group. However, this progress is all over proportionate to the quality of the game design and the integration of pedagogical content into the game (J. Cheng et al., 2025).
- **Increased Motivation and Reduced Foreign Language Anxiety:** GBL has been remarked upon for improving learners' motivation, engagement, and enjoyment of the foreign language. At the same time, it decreases anxiety linked to language learning, especially when the game creates a funny, safe, and low-pressure environment.

Psychological factors are especially crucial for children's learning since they impede or facilitate factors of knowledge and attitude. Some key psychological characteristics that affect how children learn include the following:

- **Concentration and Short Span of Attention:** Studies show that children's brains will often fail to focus and retain less information compared to adults (Max Planck, 2013).
- **Interests and Motivation:** Motivation, in most cases, comes from inside in the form of curiosity and personal interest-a human entity wanting to learn. Research using the Self-Determination Theory has shown that intrinsic motivation enhances learning performance and creativity, adding to the positive learning experiences in children (Di Domenico & Ryan, 2017).
- **Impact of Color and Sound:** Bright colors and fun sounds in the games have a strong psychological effect on children. Such features allow learners to have a feeling of a game rather than studying, which allows them to get knowledge more naturally and effectively. Indeed, Stern-Ellran et al. (2016) and Klatte et al. (2013) support this view.
- **Kids Need Support When Challenges Arise, or Things Get Tough:** when kids are tasked with something quite challenging, they easily lose all their confidence. Gentle encouragement is what will make them try again and

again. Furthermore, praise for the child's effort and attitude towards learning significantly enhances their confidence (Harvard University, 2019).

- Pressure-Free Learning: Children learn most effectively being allowed to have fun and learn in a stress-free environment. It allows for exploration and builds creativity, embedding confidence in overcoming challenges (Harvard University, 2019).

The novelty of this study is that it is different from most prior game-based learning studies, which highlight primary foci on cognitive skills and general mechanics of gamification (e.g., Hamari et al., 2014). The present study proposes a culturally responsive GBL model in which Vietnamese folklore is integrated into the process of learning English. In fact, this approach contributes to a new perspective in both game design and language pedagogy regarding how cultural familiarity can enhance motivation, engagement, and retention. The innovativeness of this study lies in: (1) Embedding local cultural identity into the gameplay, (2) Aligning design features with constructivist, behavioral, and cognitive learning theories all at once, and (3) Empirically comparing its design against mainstream language learning platforms such as Duolingo and Memrise.

2. Analyzing the Current Situation of the Problem

2.1. The Current Need for Educational Games in Children's Learning

Traditional learning methods usually create boredom and stress for children. In contrast, video games with high interactivity, attractive challenges, and immediate rewards are always very attractive to young learners. According to a survey in Vietnam conducted by Q&Me in 2023, over 50% of children in this country use their phones to download game applications. The results also show that the majority of parents want their children to use a mobile phone for learning rather than just playing. Therefore, the combination of learning and playing with educational games is urgent. It is expected that educational games will provide fun and goal-oriented games to achieve clear learning outcomes, particularly for English.

2.2. Combining Foreign Language Learning with Cultural Identity

Acquiring the English language in an early age brings a lot of advantages, such as cognitive development and creativity (Mai Thanh Nguyễn, 2017), linguistic and cultural competence (Nguyen Thi Thu Ha & Nguyen Thuy Nga, 2018), and wider opportunities for international communication (Hà Tú Anh & Huertas-Abril, 2022; Ly Thị Thu Nga, 2025). Therefore, the Ministry of Education and Training of Vietnam (2021) has included English in compulsory learning within grades 3 to 5. However, most conventional pedagogical methods often suffer from a high degree of passiveness and a lack of interactivity in traditional practice, reducing students' interest in learning English and increasing the demand for more engaging game-based tools.

Moreover, integrating local cultural elements into learning materials is essential for enhancing engagement and improving learning outcomes among children. Research indicates that when lesson content reflects students' lived experiences and incorporates familiar cultural elements, such as folk games, folktales, and recognizable local characters, learners display greater interest, active participation, and improved academic performance. At the primary school level in particular, early exposure to their community's cultural heritage fosters more effective learning, nurtures respect for diversity, and contributes to the development of an inclusive society (UNESCO, 2021). For example, a project by War Child that incorporated cultural components into educational games in African contexts recorded significant increases in children's engagement and motivation to learn (War Child, 2018).

Recently, language learning applications like Duolingo and Memrise have been widely adopted by learners in most countries in the world, including Vietnam, because of their easy access and game-based learning architectures. In addition, most of these applications lack meaningful inclusions of Vietnamese cultural elements that make them less relatable to the locals (Q&Me, 2023). While several English learning games have been domestically developed, a large proportion of them fail to embed distinctive Vietnamese cultural content. This might compromise their

effectiveness, especially among young learners who learn better within familiar contexts and culturally situated learning experiences.

To address this pedagogical and cultural gap, the present study would like to propose the development of an English learning game that embeds Vietnamese cultural elements in order to develop both the engagement and educational relevance of learners. Guided by the principle of culturally responsive education, the approach emphasizes integration while preserving respect for a student's cultural origin, and so the proposed game will be designed to combine language learning with traditional Vietnamese imagery, folklore, and values. Situating learning in recognizable cultural contexts can expand the game's ability to foster learner participation, motivation, and retention.

3. Organizing the Design of Interactive Learning Games for Children

3.1. General Design Process

The game's general design process consists of two main stages (Vu et al., 2023): Pre-Production and Production (see Figure 1).

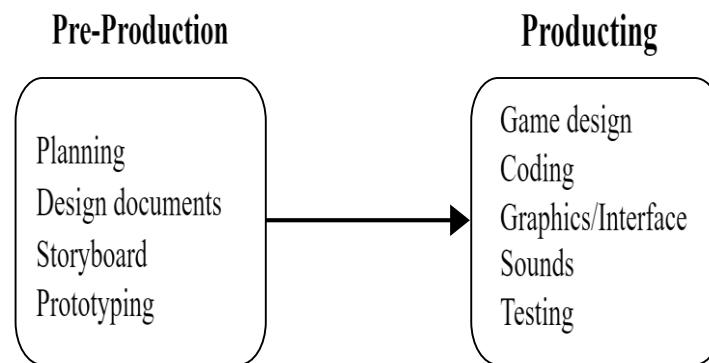


Fig. 1 Game design process

The Pre-production stage serves as the foundation, focusing on developing narratives, gameplay rules, and core mechanics. This crucial process also encompasses user research and analysis of existing educational games to inform and refine game development.

The Production stage is where the complete game is created and takes its final form. During this intensive phase, game assets such as characters, environments, visuals, music, and sound effects are meticulously designed and perfected through build tools.

3.2. Core Design and Functional Requirements for English Learning Games for Children

- Data storage model: Based on the "Offline-first" model, storing contents and progress locally, enabling offline access, and synchronizing only when online.
- UI Design: Since the game targets primary school-aged children, bright colors, easy-to-read fonts, and friendly icons that incorporate familiar and culturally relevant visuals for Vietnamese audiences should be used. This will help create a sense of familiarity and leave a more lasting impression than abstract images alone.
- Hardware Interaction: Interacting with the game should be as simple as tapping, dragging, and dropping. The extremely simple operations are to prioritize the acquisition and cultivation of knowledge, because the game is a learning support tool, players need to focus entirely on academic content, as young players may become easily discouraged by overly complex tasks. Complex gestures like long presses, double taps, or shaking should only be used in specific contexts, not generally for all situations, such as touch and drag.

- Mini dictionary design: The game should include a built-in dictionary, allowing children to look up words and answers quickly and easily. A dictionary should display information including word meanings, synonyms, and word variations. Also, it should have audio pronunciation to help children learn correct word sounds. In addition, words need to be divided into small groups so that children can easily learn.
- Activities: The game should support vocabulary and grammar acquisition through diverse minigames, foster flexible thinking via a narrative that integrates multiple challenges, and promote positive content while discouraging exposure to inappropriate or non-educational material.

Table 1. Functional and interface requirements for in-game features

Feature	Request
Character Groups	Characters should be visible, with smooth animations.
Content	Align with the A1 level of the CEFR English curriculum. Questions must be clear, grammatically accurate, and free of sensitive content. Visuals must be clear, child-friendly, and do not contain prohibited content. All external resources must have proper copyright clearance.
Sound	The music and sound effects should be age-appropriate.
Dictionary	Words should be organized by topic and include correct spelling, meaning, phonetic transcription, pronunciation, plural forms, and related phrases.
Game Modes	Two modes: Practice (individual minigames by skill) and Story (engaging, creative, and progressively challenging).
Minigames	Should enhance core cognitive skills (remembering, understanding, analyzing, applying), feature diverse questions, intuitive mechanics, and provide immediate answer explanations.
Levels	Levels unlock sequentially, with rewards after each stage.
Supporting Items	Support items should be varied, with balanced value and effects to prevent overuse.

3.3. Developing an English Language Game for Young Learners

3.3.1. Narrative Structure and Pedagogical Foundations

The game is designed to help primary students practice A1-level English through simple minigames, inspired by the Vietnamese folktale "The Golden Star Fruit Tree. It features friendly graphics and incorporates familiar elements of Vietnamese culture, aligning with CEFR, making it suitable for children aged 7 to 11.

CEFR is chosen as the foundation for in-game learning content because it is a widely recognized international framework for language assessment that clearly defines proficiency levels and provides suitable learning pathways for all age groups. By dividing competencies into six specific levels (A1-C2), the CEFR helps to track progress more systematically and clearly than score-based systems like TOEIC, TOEFL, or IELTS. In addition, the CEFR is complemented with a free self-assessment tool (ELP), empowering learners to evaluate their language level and monitor their progress effectively.

Featuring intuitive gameplay and clear content, the game cultivates a sense of adventure and exploration. Correct answers are rewarded with in-game gold, incentivizing children to value their achievements and encouraging cautious decision-making throughout their learning journey. The storyline has been developed to sustain engagement across the entire educational experience (see Figure 2).

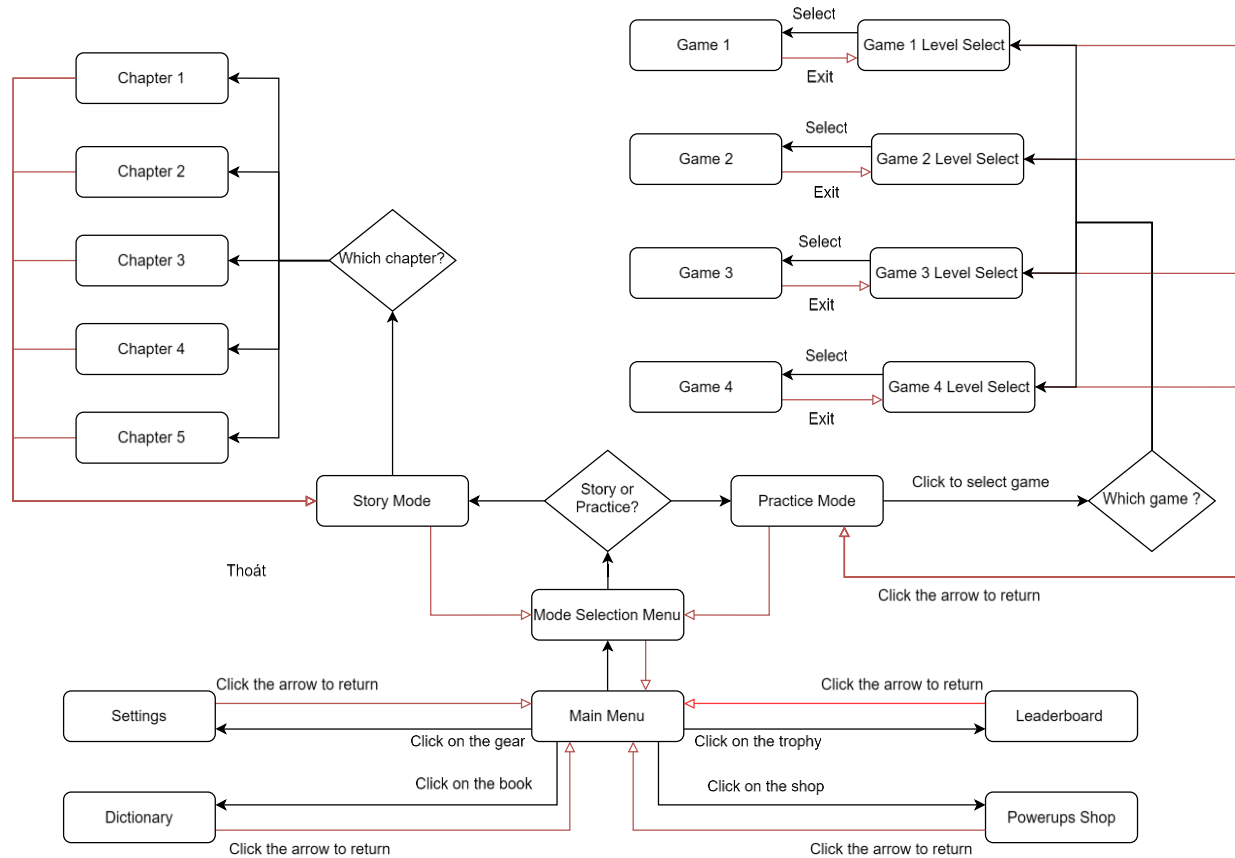


Fig. 2 Game screen stream overview

3.3.2. Learner Personas and Behavioral Insights

To better tailor the product to real user needs, a user persona was created to represent the motivations, behaviors, and challenges experienced by young learners. The following is one example:

Linh, 8 years old, is a third-grade student who typically uses her mother's phone for about 30–45 minutes per day after completing homework. Linh lives in a family of four, including her parents and a one-year-old younger brother. Her parents are often busy and have limited time to support her English learning. At school, English instruction is basic, with a focus on vocabulary and pronunciation, but limited class time reduces interactivity and depth.

Linh is naturally curious and enjoys activities that involve challenges and visually appealing graphics. Her learning goals include improving her pronunciation to feel more confident speaking in class and expanding her vocabulary to complete assignments more easily. She prefers learning through games, which helps her stay engaged and alert.

However, Linh struggles with vocabulary retention, often forgetting new words after just a few days without review. She also finds it difficult to identify grammatical errors, especially when she doesn't understand how rules apply in context. Traditional learning methods like reading, writing, or paper-based assignments bored her and caused her to lose focus. In her free time, Linh enjoys simple mobile games like puzzles or light adventure games. She is familiar with touchscreen operations such as tapping, dragging, and swiping. Since she does not have a personal device, her access to games depends on her parents' availability.

The English learning game is designed to support users like Linh by incorporating short, engaging minigames that help reinforce vocabulary, pronunciation, and grammar. Features such as gold rewards and level progression provide a sense of achievement and allow her to track her improvement. The content is skill-based and delivered in manageable chunks to reduce overload and maintain focus. Immediate feedback helps her recognize mistakes and adjust her learning approach. The integration of Vietnamese fairy tales also creates a familiar and emotionally engaging learning experience.

A secondary user persona is Minh, a 10-year-old student with a different learning style. Minh is motivated by competition and discovery. He dislikes repetitive tasks and is driven by the thrill of overcoming challenges. To meet these preferences, the game includes features such as a three-star rating system in practice mode and a global leaderboard, fostering a more competitive and adventurous learning environment.

3.3.3. Story-Driven Learning Journey

The game's storyline is inspired by the Vietnamese folktale The Golden Star Fruit Tree. It depicts the journey of the kind younger brother and the mythical bird as they return from the golden island with a three-span sack of gold. Within the game, they must cross five distinct oceans, with each representing both a chapter in the storyline and a progressive stage in the English language learning journey.

Each ocean is designed to symbolize a different level of difficulty, with the challenge increasing to reflect the learner's progress. Furthermore, players are required to complete minigames in each chapter to retain the gold they already possess, a departure from the typical accumulation mechanics found in most games. This mechanic is intended to embody the original character's humble personality and his contentment with what he receives and his aversion to greed. Conversely, had the older brother been the protagonist, the game would likely have focused on excessive accumulation, aligning with his inherently contrasting character traits.

By emphasizing the retention of gold over its acquisition, gameplay introduces a novel challenge. This design encourages players to adapt to unfamiliar goals and situations, thereby fostering cognitive flexibility and reinforcing learning through a familiar but reimagined cultural narrative. In turn, the game's structure supports continuous engagement, promoting skill development through meaningful storytelling deeply rooted in Vietnamese tradition.

3.3.4. Core Gameplay Mechanics

Gameplay primarily involves tapping buttons and dragging blocks.

Level selection. Players initiate their experience by pressing the "Start" button on the main menu to choose a game mode. Practice Mode allows players to select individual minigames, with successful completion of each level yielding up to three stars per round. Conversely, the Story Mode mandates sequential progression through chapters. Players unlock subsequent chapters by completing all minigames within the current one. A critical prerequisite for unlocking the final stage in Story Mode is the accumulation of a predetermined number of stars in Practice Mode. This interdependency between both modes is designed to sustain player motivation and cultivate a clear sense of progression. In Story Mode, the primary reward for completion is gold.

Minigames include Letters Unscramble, a minigame designed to cultivate word recognition skills by requiring players to identify the correct letter order. This process facilitates vocabulary acquisition through visual cues and intuitive drag-and-drop mechanics. Within the game's narrative, successful completion of letter arrangements with minimal errors enables the younger brother to retain a larger quantity of gold during his journey across the ocean. Conversely, frequent errors result in a proportional loss of gold throughout the expedition. This core mechanic is intentionally crafted to embody the younger brother's inherent values from the original folktale: emphasizing moderation, prudence, and contentment, rather than greed or excessive risk-taking. Consequently, the game not

only reinforces language proficiency but also subtly encourages players to exercise responsibility and critical thinking, thus mirroring the meticulous effort of preserving gold as depicted in the traditional Story (see Figure 3).

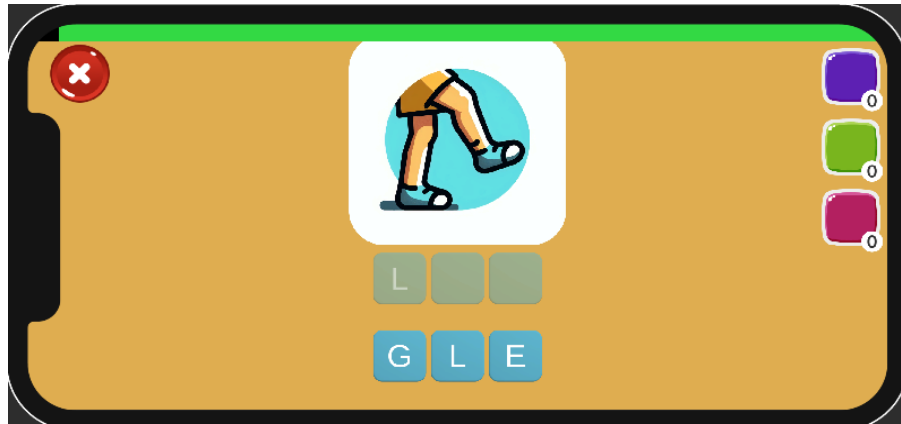


Fig. 1 Letters unscramble

The True or False minigame is designed to assess and enhance players' vocabulary recall and comprehension, simultaneously strengthening their ability to rapidly evaluate information. Players are required to tap to select the correct answer within a stringent time limit, a mechanic that directly mirrors the younger brother's need for swift and accurate decision-making during his perilous journey across the ocean. Each correct selection contributes to smoother progression and the preservation of gold; conversely, frequent incorrect choices lead to a detrimental loss of gold. Thus, this game not only augments language proficiency but also cultivates improved reflexes and fosters decisive yet prudent thinking, qualities directly attributable to the younger brother's eventual success in the original narrative (see Figure 4).

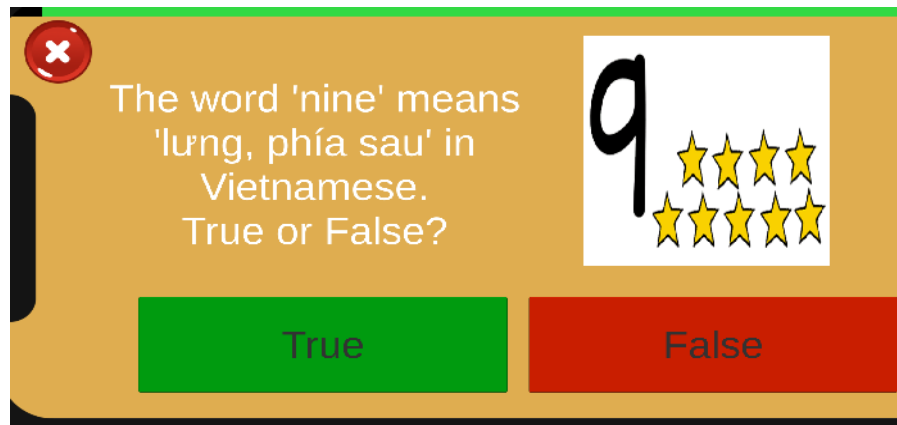


Fig. 2 Game true or false

The Card Matching minigame enhances visual memory and vocabulary recognition through the pairing of correct cards via intuitive touch interactions. Each successful match reveals relevant vocabulary information and, in turn, reinforces language acquisition. Within the game's narrative, this activity symbolizes the younger brother's crucial efforts to remember his route home while laden with gold. Forgetting the way could lead to the bird becoming exhausted, straying off course, or inadvertently dropping the precious cargo. Consequently, the game not only strengthens language retention but also profoundly symbolizes the adage of 'protecting knowledge like gold,' fostering a deeper, more meaningful connection for players between the act of learning and its practical application (see Figure 5).

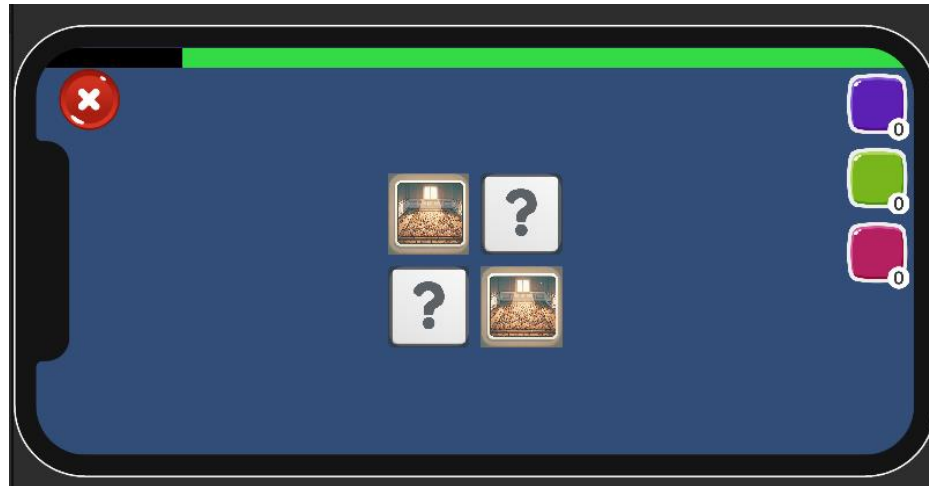


Fig. 3 Card matching

The Multiple Choice minigame helps facilitate players' application of vocabulary within specific English contexts. To succeed, chosen answers must demonstrate both grammatical accuracy and contextual appropriateness. The core gameplay mechanic serves as an analogy for the younger brother's crucial task of guiding the bird in the correct direction towards home; an incorrect trajectory could lead to both characters becoming disoriented or encountering peril. Players are therefore required to meticulously analyze the sentence context before selecting an answer, which, in turn, refines their ability to decipher meaning and identify the most suitable word. This process metaphorically represents the act of 'keeping the gold' safe throughout the journey (see Figure 6).

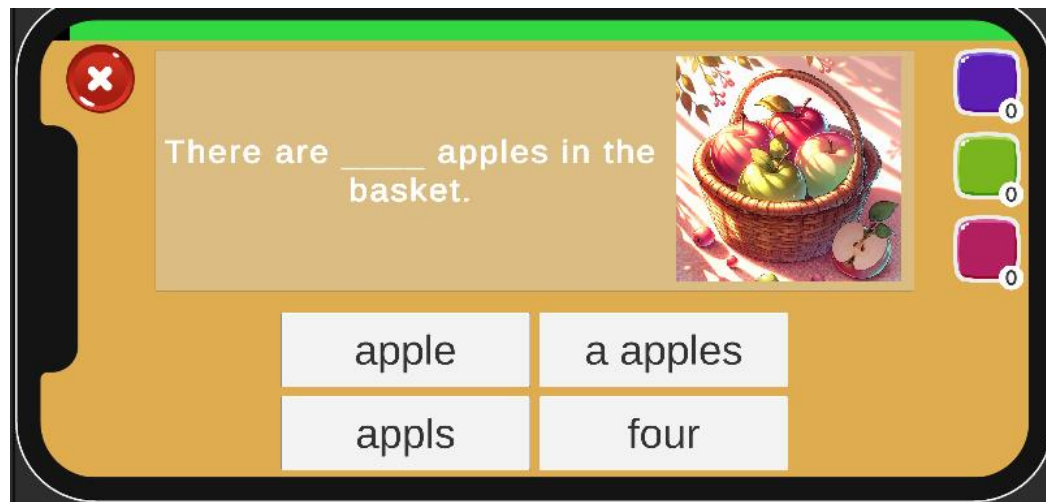


Fig. 4 Multiple-choice game

3.3.5. Other Features

Mini Dictionary System: It includes over 800 vocabulary words organized into 36 topics, 7 grammar topics, and 29 content-related topics. Each word entry provides the Vietnamese meaning, pronunciation, word forms, synonyms, and illustrative visuals. Players can view vocabulary through simple tap interactions.

A System of Supporting Items: Features a variety of tools, including 2 shared support items usable across all 4 minigames (pause timer and dictionary access) and 1 unique support item tailored to each minigame. Players can select items through tap-based operations.

3.4. Theoretical Integration in Game Feature Design

Table 2. Associates in-game features with learning theories

In-game features	Applied Theory
The gold-holding mechanism in story mode	The gold-holding mechanism in the game integrates four learning theories simultaneously. From a constructive perspective, players actively plan how and when to use items to preserve as much gold as possible. From a behavioral standpoint, gold acts as a reward, reinforcing correct answers through the "action–feedback–reinforcement" loop. Cognitively, the mechanism encourages players to observe and analyze strategies that minimize gold loss. Narratively, the concept of preserving gold is woven throughout the adventure, creating continuity with the original storyline.
Letters Unscramble	Demonstrates the integration of multiple learning theories. Constructively, players analyze visuals and arrange letters to form correct words, promoting critical thinking and observation. Behaviorally, limiting the number of attempts introduces moderate pressure, encouraging learning from mistakes. Cognitively, pairing images with words builds visual associations, aiding memory retention.
True or False	Constructively, players must evaluate content before selecting an answer, reducing impulsive choices. Behaviorally, the game provides immediate feedback for each response, reinforcing correct knowledge or correcting errors. Cognitively, players need to assess question details carefully to make accurate decisions.
Card Matching	Constructively, players must uncover and remember card positions. Behaviorally, the lack of penalties encourages experimentation and exploratory learning. Cognitively, successful matches rely on memory and content recognition, promoting better recall.
Multiple Choices	Constructively, the game guides players to analyze sentence context before answering, avoiding random guessing. Behaviorally, feedback is given even for incorrect answers, promoting learning through correction. Cognitively, players must understand word type, meaning, and usage within context to answer correctly.
Mini Dictionary	Constructive: Enables active, topic-based vocabulary exploration. Behavioral: Encourages the habit of independent word lookup. Cognitive: Thematic word grouping fosters semantic association.
Supporting Items	Constructive: Players must strategically choose items to maximize effectiveness in retaining gold and answering questions. Behavioral: Items provide motivation and assist in overcoming in-game challenges. Cognitive: Players analyze options to make optimal purchasing decisions.
Practice Mode	Provides a low-pressure environment for players to become familiar with and master each minigame before progressing. Constructively, unlimited trial opportunities help players learn mechanics through direct experience. Behaviorally, the star-based reward system promotes motivation via a "trial–error–adjustment" loop, without the stress of gold loss. Cognitively, varied practice builds systems thinking, memory skills, and application in realistic contexts. This pressure-free setting supports personalized learning strategies.

3.5. Comparative Evaluation of Golden Words and Existing Language Learning Games

Table 3. Comparative evaluation of Golden Words, Duolingo, and Memrise

Game Title	Golden Words	Duolingo	Memrise
Target Audience	Primarily children aged 7–11	All ages	All ages
Main Learning Methods	Game-Based Learning (GBL) combines constructive, behavioral, cognitive, and narrative storytelling methods.	Personalized learning using constructive, behavioral, and cognitive approaches with spaced and intermittent repetition.	Mnemonics and spaced repetition.
Vietnamese Cultural Elements	High. The storyline is based on the Vietnamese fairy tale <i>The Golden Star Fruit Tree</i> , with culturally familiar graphics and settings.	None.	Low. Some content references Vietnamese customs and practices at a basic level with Vietnamese language support; however, visuals and characters are mostly from other cultures.
Gamification	Stars and gold bars serve as virtual currencies. A leaderboard is also included.	Experience points, badges, daily streaks, and leaderboards are used.	Uses scores, daily streaks, leaderboards, and badges.
Advantages	Culturally relatable and engaging for Vietnamese children. Motivates learning through storytelling and psychological alignment. Content is aligned with the CEFR A1 standard.	Offers a wide range of languages, a large user base, effective vocabulary retention through repetition, and is friendly for beginners.	Provides diverse learning content and vocabulary-building techniques.
Market Gaps	Lacks online features and community-building support. Currently operates offline only.	Limited advanced-level content may reduce long-term retention. Lack of cultural relevance may disengage Vietnamese users.	Basic content focus; lacks a user community for interaction and exchange.

3.6. Summary

In contrast to global applications such as Duolingo and Memrise, Golden Words offers a localized, story-driven educational experience that resonates with Vietnamese learners' cultural and linguistic context. This cultural integration represents a novel pedagogical advancement in the domain of game-based English learning, moving beyond gamified repetition toward meaningful, identity-based engagement.

3.7. Proposed Evaluation Approach

The experimental content includes below:

3.7.1. Audience:

The study involves 30-40 primary school students (ages 7-11) from public schools, a demographic with generally less exposure to English compared to private school students. Participants are divided into two groups:

the Gaming Group (using the Golden Words game) and the Traditional Group (using flashcards). Flashcards were chosen as a control method because they align with three major learning theories.

- From a behavioral perspective, repeated exposure and right–wrong feedback reinforce memory through a reward–punishment mechanism (Reddy et al., 2016; Smolen et al., 2016).
- Cognitively, flashcards help encode and retrieve information effectively by breaking content into chunks and strengthening retrieval practices.
- From a constructivist viewpoint, physically flipping flashcards and discussing answers promotes active knowledge construction based on personal experience (Lasry, 2007; Singh, 2016). Additionally, illustrations enhance memory retention by creating visual and emotional associations (Harissant et al., 2020).

3.7.2. Process

- Phase 1 – Pre-experiment: All students complete a standardized textbook-based test. Based on results, students are grouped: higher scorers join Group A (aimed at reinforcing knowledge), while lower scorers join Group B (focused on improvement).
- Phase 2 – Experiment: Both groups study the same material for equal amounts of time over 1-2 weeks.
- Phase 3 – Post-experiment: Students retake the same test (post-test). Group B also completes an additional survey measuring their level of interest and engagement.

3.7.3. Measurement and Analysis

- Learning Effectiveness: The difference between pre-test and post-test scores will be compared across the two groups to determine which group demonstrates greater improvement.
- Engagement and Interests: Survey responses from Group B will be analyzed to assess user experience and motivational impact.

3.8. Causes of Improved Performance

Golden Words aligns with children’s cultural and cognitive context to boost engagement and learning. Embedding Vietnamese references and familiar scenarios makes English content immediately relevant for young learners; connecting new words to learners’ lived experience strengthens interest and provides background knowledge that supports comprehension and memory. Culturally familiar scenes (festivals, foods, local landmarks, folk characters) help children anchor vocabulary in meaningful contexts rather than learning items in isolation.

Equally important is the narrative-driven structure of Golden Words. Words, grammar, and tasks are introduced in a developing story so that, over multiple chapters, learners encounter vocabulary in various meaningful situations. The narrative immersion encourages incidental learning as the children pay attention to the plot and pick up the language through contextual clues. This extends both the number and the quality of contextual exposures. Sustained attention is more feasible with a continuous story, making practice feel like play, and less annoying in terms of the boredom and anxiety associated with drill-focused approaches.

The game includes practical scaffolds that reduce frustration and support independent study. The built-in mini-dictionary (with images and audio) allows just-in-time lookups, so children need not interrupt the Story when they meet unfamiliar words. Visual cues combined with audio pronunciation and short definitions strengthen encoding and recall while letting learners control their own pace. This autonomy, choosing when to consult the dictionary or which practice mode to use, helps sustain motivation and makes learners active participants in their progress.

Golden Words’ interface and mechanics are tailored to the developmental needs of 7–11 year-olds. Clear navigation, large icons, concise on-screen instructions, and immediate feedback lower extraneous cognitive load so children can focus on language tasks rather than on controls. Progressive challenges, visible objectives, and friendly

reinforcement signals (stars, gold, short animations) maintain a sense of achievement and competence without overwhelming the learner. These child-centered UI choices ensure the application supports learning rather than creating barriers.

Finally, the design embeds established learning and motivational principles: story-based progression, immediate feedback, incremental difficulty, for the repetition at spaced intervals of vocabulary and grammar; reward mechanics and meaningful goals promote engagement and emotional investment. All together, the main reasons why Golden Words' cultural contextualization, narrative scaffolding, and learner supports, joined with a child-pleasant interface, can be expected to yield better results in effective engagement, vocabulary retention, and motivation compared to generic drill-based platforms lacking those child-centered culturally grounded mechanisms are now explained.

3.9. Ethical Considerations in Game-Based Learning for Children

When applying Game-Based Learning (GBL) in the context of children's education, ethical principles must be carefully considered to ensure the safety, fairness, and well-being of all participants. First, data privacy and child protection are paramount. The game must comply with relevant child data protection standards, ensuring that no personal information is collected, stored, or shared without explicit parental consent. Any in-game data, such as progress tracking or user feedback, should be anonymized and used solely for educational improvement.

Second, screen time and digital balance should be thoughtfully managed. While interactive games can motivate learning, prolonged exposure may lead to fatigue or dependence. The design should therefore promote moderate, purposeful engagement, encouraging learners to take breaks and apply their knowledge offline.

Third, content appropriateness and inclusivity are essential. All visuals, sounds, and language must be age-appropriate, culturally sensitive, and free from bias or commercial influence. The game should also accommodate diverse learners by considering accessibility features, such as simple navigation, visual clarity, and potential adaptations for students with learning differences or disabilities.

Finally, fairness and autonomy must guide gameplay design. Reward systems should encourage persistence and effort without exploiting children's psychological vulnerabilities or creating undue competition. The educational value of gameplay must remain the central priority, ensuring that entertainment serves as a tool for learning rather than a distraction from it. By integrating these ethical considerations, this study ensures that the proposed game-based learning environment supports effective knowledge acquisition and the holistic development and protection of young learners.

4. Conclusion and Future Research Directions

This study introduced an English learning game grounded in the Game-Based Learning (GBL) approach and infused with Vietnamese cultural elements. It provides the first structured example of a Vietnamese culturally contextualized English learning game that applies multiple learning theories within a unified design framework. This novel contribution bridges the gap between global GBL principles and local cultural relevance, offering a replicable model for culturally adaptive educational technologies. Designed for children aged 7-11, the game aims to enhance vocabulary and English proficiency at the CEFR A1 level. With a user-friendly interface, fairy tale-inspired audio design, and engaging gamification mechanics, the game provides an effective and enjoyable learning environment. In the future, the game can be enhanced by integrating voice recognition features, allowing children to practice pronunciation and receive real-time feedback. Additional developments may include online capabilities such as cooperative play, 1v1 matches, chatrooms, and expanded content aligned with the CEFR A2 level. These upgrades would include minigames that focus on sentence construction and more advanced grammar patterns.

The proposed experimental plan aims to evaluate the game's impact on students requiring additional support. For more robust validation, a large-scale Randomized Controlled Trial (RCT) could be conducted, randomly assigning students to different groups to compare the overall effectiveness of game-based learning versus traditional methods across a broader, more representative population. Furthermore, expanding the game's storyline by incorporating additional Vietnamese folktales will increase cultural resonance and variety. Developing iOS and web-based versions will also broaden accessibility, especially for children without access to Android devices.

Authors' Contributions

Minh-Dat Nham: Conceptualization, Methodology, Software, Validation, Formal Analysis, Investigation, Writing Original Draft Preparation, Visualization. Chi-Tan Nguyen: Software, Validation, Data Curation. Thi-Vuong Pham: Validation, Resources, Project Administration. Thai-Phuong-Thanh Cao: Conceptualization, Writing – Review & Editing, Supervision.

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