Digital Game-Based Chinese Language Learning for Adults: A Critical Review of Apps in the Apple App Store
(面向成人的数字游戏化中文学习：对苹果应用商店中相关应用的批判性评估)

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Abstract: This study investigates the availability and suitability of Digital Game-Based Chinese Language Learning applications for adult learners, focusing on apps available in the Apple App Store. While English language learning apps were also examined, they serve primarily as a baseline for comparison rather than a central focus. Using a structured, multi-variable search under eight distinct conditions involving system language, search language, and App Store region, the research identified 32 unique applications. Findings reveal that most game-based language learning apps are designed for children, especially those labeled 4+, and prioritize basic vocabulary and grammar through simplified, repetitive mechanics. Very few applications cater to adult or university-level learners seeking context-rich, communicative, and cognitively engaging experiences. Among the limited options, "懒人英语 (Lazy English)" stands out for its dubbing feature, which aligns with communicative language teaching principles and illustrates the potential of game-based strategies for older learners. The paper concludes by discussing the pedagogical implications of these findings and calling for the development of more sophisticated game-based tools that address the linguistic needs and motivational profiles of adult learners of Chinese.

摘要：本研究调查了基于数字游戏的语言学习应用在成人中文学习领域中的可用性与适用性。虽然本文也考察了部分英文学习应用，但其作用仅限于提供基准对照，而非研究的核心。通过对苹果应用商店的多变量结构化检索，本研究在涉及系统语言、搜索语言和应用商店区域等八种不同搜索条件下，共筛选出 32 款独特应用。研究发现：绝大多数游戏应用专为儿童设计。这些应用，尤其是标注"4+"(四岁以上)的应用，通过简单重复的机制侧重基础词汇和语法训练；而能为成人或大学阶段学习者提供情境化、交际性及认知参与体验的应用屈指可数。在有限的选择中，"懒人英语"因其配音功能而脱颖而出，该功能契合交际语言教学的理念，展示了游戏化策略在成人学习者中

的潜在价值。本文最后讨论了这些发现的教学启示，并呼吁开发更多契合成人中文学习者语言需求和动机特征的高水平游戏化学习工具。

Keywords: Game-Based Language Learning, Chinese Language Acquisition, Adult Learners, Mobile Applications, Apple App Store

关键词：游戏化语言学习，中文学习，成人学习者，移动应用程序，苹果应用商店

1. Introduction

Digital Game-Based Learning (DGBL) has long been recognized as an effective and engaging pedagogical approach, particularly in second language acquisition (SLA), where it combines the motivational power of play with structured learning objectives (Prensky, 2007; Gee, 2004; Peterson, 2009; Shaffer, 2006). Widely adopted in English language instruction, applications such as *Duolingo, Kahoot*, and *LingQ* leverage gamification features—like level progression, reward systems, and adaptive feedback—to support vocabulary retention, grammar practice, and learner autonomy. These tools are grounded in robust theories of cognitive and social development. For instance, Piaget's (1962) stages of cognitive development and Vygotsky's (1978) concept of the Zone of Proximal Development (ZPD) emphasize the critical role of play and interaction in learning, providing theoretical support for the educational value of games.

Despite DGBL's growing use and its solid theoretical foundation, its application in Chinese as a Foreign Language (CFL) instruction—particularly for adult learners—remains significantly underexplored (Poole et al., 2022; Yang & Li, 2023). Chinese presents unique challenges for language learners, including character recognition, tonal pronunciation, and syntactic differences (Lan, 2015; Xu et al., 2022; Zhang et al., 2024), which may not be adequately addressed by game-based strategies originally designed for alphabetic languages. While some studies highlight the potential of DGBL to support CFL learners in areas like vocabulary retention and pronunciation (Yu & Tsuei, 2023), few have systematically evaluated whether existing applications are pedagogically appropriate for adult learners or tailored to the specific complexities of Chinese. Moreover, most current GBL applications available on digital platforms such as the Apple App Store were not originally designed with CFL instruction in mind. A preliminary review suggests that many focus on rote memorization or vocabulary drills without fully engaging learners in meaningful, contextualized language use—an essential component for adult learners aiming for real-world proficiency.

This study aims to bridge this gap by systematically investigating and categorizing Chinese language learning applications available on the Apple App Store. Through empirical analysis of their game mechanics, instructional design, and target user base, the research evaluates whether these tools effectively support adult CFL learners' linguistic and cognitive needs. By integrating developmental theory and practical application, this

study contributes to the broader discourse on technology-enhanced language learning. It offers insights into how DGBL can be more effectively implemented in Chinese language education.

2. Literature review

2.1 Game-Based Learning (GBL)

Game-Based Learning (GBL) has gained significant attention in education due to its ability to enhance learner engagement and motivation. The theoretical foundations of GBL are rooted in constructivist theories, particularly those of Piaget (1962), who emphasized the importance of learning through active exploration, and Vygotsky (1978), who highlighted the social interaction aspect in cognitive development. Gee (2007) suggests that games provide immersive environments where learners can develop critical thinking and problem-solving skills through structured challenges and feedback mechanisms. These environments create opportunities for learners to actively engage with content actively, making learning more interactive and meaningful. Shaffer (2006) expands on this by arguing that GBL enables learners to participate in role-playing and simulated environments, fostering deeper understanding and encouraging the practical application of knowledge in realistic contexts.

Furthermore, well-designed educational games, as Egenfeldt-Nielsen (2007) noted, enhance cognitive development by aligning gameplay mechanics with learning objectives. This alignment ensures that learners face appropriate challenges and remain motivated to progress through game-based tasks that reinforce learning goals. Prensky (2007) highlights how the interactive nature of games captures learners' interest and fosters a sense of ownership in their learning journey. Additionally, Squire (2011) discusses the scaffolding potential of games, emphasizing their ability to provide incremental challenges and timely feedback, which promote active participation and sustained engagement. By integrating these elements, GBL creates a holistic learning environment that supports both cognitive development and learner motivation, making it a powerful tool in modern educational settings.

2.2 Game-Based Language Learning (GBLL)

The application of GBL in language education, known as Game-Based Language Learning (GBLL), has shown promising results in second language acquisition (SLA). Peterson (2009) explores how digital games create opportunities for immersive interaction in target language environments, allowing learners to practice conversational skills in authentic contexts. According to Reinders & Wattana (2015), game-based language learning promotes confidence and reduces communication anxiety by providing a low-stress setting for learners to experiment with language use. Yudintseva (2015) highlights the impact of game-based approaches on vocabulary acquisition, demonstrating that learners retain new words more effectively through contextual gameplay. Choo (2015) argues that games facilitate incidental vocabulary learning by exposing learners to repeated

input within meaningful contexts. DeHaan (2005) examines the effects of video games on reading comprehension, showing that narrative-driven games can enhance learners' reading skills by engaging them with interactive storytelling. Rankin et al. (2006) provide evidence that game-based environments support reading comprehension by offering contextually rich text and visual cues. They further discuss how game-based activities can improve oral communication skills through interactive dialogues and decision-making scenarios. Despite these advantages, we argue that effective implementation of GBLL requires careful consideration of game selection to ensure alignment with pedagogical objectives and to maintain an appropriate balance between entertainment and educational value.

2.3 Game-based learning in Chinese language instruction

Chinese language learning presents unique challenges due to the complexity of its writing system, aural reception, and reading abilities, as highlighted by Gabbianelli and Formica (2017), who found that first-level Mandarin Chinese learners perceive the learning process as long and complex while maintaining high achievement expectations. GBL offers an effective solution by providing interactive and engaging methods tailored to these specific challenges. Lan (2015) found that repeated exposure and interactive exercises in game-based approaches significantly enhance conversation performance, reinforcing memory retention and aiding in the mastery of complex sentence structures. Similarly, Peterson (2009) highlights how digital games support listening skills development by combining contextualized audio input with visual cues, helping learners distinguish tones and improve pronunciation accuracy, which is particularly important given the tonal difficulties inherent in Chinese (Gabbianelli & Formica, 2017).

In speaking practice, Xu et al. (2022) underscore the value of role-playing scenarios and speech recognition features in games, which encourage consistent practice in a low-pressure environment, crucial for mastering tonal variations and reducing the anxiety often experienced by learners of tonal languages (Ng et al., 2022). Supporting the motivational and emotional aspects relevant to Chinese language learners, Zhang and Chen (2021) found that gamification helps visualize learning goals and creates a relaxing learning environment that reduces foreign language anxiety, a common barrier to oral proficiency and participation, especially in complex languages such as Chinese (Zhang & Chen, 2021).

Additionally, Bytheway (2014) emphasizes the importance of designing culturally adaptive games that align with learners' cognitive abilities and real-life applications, ensuring meaningful engagement. Building on this, Chen & Lin (2015) demonstrated that digital game-based situated learning, which simulates authentic historical and cultural contexts—such as those found in Tang Dynasty poetry—can deepen learners' understanding by immersing them in meaningful language use situations, addressing the cultural and contextual difficulties that often arise in Chinese language learning. Together, these findings demonstrate how game-based and gamified learning approaches can holistically address linguistic, cultural, and affective challenges inherent in Chinese language acquisition.

2.4 Digital game-based learning for CFL students

The rapid advancement of technology has significantly transformed the field of education, introducing innovative tools such as artificial intelligence (AI), virtual reality (VR), and mobile applications (Luckin et al., 2016; Shadiev et al., 2023). These technologies have revolutionized content delivery and learner engagement by enabling personalized and interactive learning experiences. AI-driven platforms analyze learners' progress and provide adaptive content, while VR immerses students in realistic environments that enhance cultural and linguistic understanding (Lan & Lin, 2015; Qiao & Zhao, 2023). Additionally, mobile applications provide on-the-go access to gamified learning materials, making language acquisition more accessible and flexible (Chen & Hsu, 2020).

The integration of these technological advancements has significantly enhanced the effectiveness of game-based learning in Chinese language instruction. VR, as highlighted by Zhang et al. (2024), fosters cultural immersion and provides contextualized language practice, reducing learners' anxiety and increasing motivation. AI-powered systems, according to Poole and Clarke-Midura (2020), offer personalized feedback and track progress, helping students adjust their learning strategies effectively.

3. Research gap

Existing studies on game-based learning and game-based language learning have primarily focused on theoretical frameworks and the general benefits of integrating games into language education. While prior research (Gee, 2007; Prensky, 2007) has established the cognitive and motivational advantages of DGBL, and studies specific to Chinese as a foreign language (Poole et al., 2022) have explored how games support areas such as character recognition, pronunciation, and cultural understanding, these works largely remain theoretical or exploratory in nature.

Moreover, much of the current literature tends to focus on games designed for children and beginners, with minimal attention to the adaptation and evaluation of game-based tools for advanced or professional language use. Preliminary observations indicate that many technology-enhanced language-learning games appear to target young learners (ages 4–12). This tendency will be examined and clarified in the findings section, but it points to a potential mismatch between the needs of adult CFL learners and the current resources available to them.

Therefore, this research aims to address this gap by identifying and analyzing technology-enhanced language learning games that are suitable for adult CFL learners. Through an examination of existing applications and their pedagogical features, this study seeks to provide practical recommendations and contribute a comparative evaluation of DGBL designed or adaptable for adult Chinese language education.

4. Methodology

This study employs a structured methodology for data collection and analysis to examine the availability and categorization of game-based Chinese and English language learning applications in the Apple App Store because Apple devices are widely used among U.S. university students, the target demographic for adult CFL learners (Denoyelles et al., 2023). Limiting the scope to a single platform also ensured methodological consistency, as rankings and app availability differ across systems. Future studies may extend the analysis to Android platforms for broader comparison.

4.1 Data collection

All data were collected in January 2024 using a single Apple iPhone 12 Pro running iOS version 18.3.1, in order to control for device- and system-related variations. A two-stage approach was used to ensure both breadth and depth in the data collection process. In the **first stage**, language learning applications were retrieved using the following predefined search terms:

- "English Learning App" / "Chinese Learning App"
- "English Learning Game" / "Chinese Learning Game"

In the **second stage**, search conditions were systematically varied to assess how search results might be influenced by key factors, including:

- **System Language**: English vs. Chinese
- **App Store Region**: United States vs. China
- **Search Language**: English vs. Chinese

Each search query was conducted under carefully controlled conditions to ensure the comparability of results. To minimize algorithmic fluctuations and regional personalization biases, all searches were performed on the same device within a short time frame. Combinations deemed improbable or irrelevant—such as a Chinese system language paired with the U.S. App Store, or an English system language paired with the China App Store—were excluded, as these configurations are unlikely to reflect the experience of typical users, particularly adult Chinese language learners based in the U.S.

For each valid search condition, the top four applications as ranked and displayed in the App Store search results were selected for analysis. In the Apple App Store, ranking refers to the order in which applications are presented to users in response to a search query. This display order is determined by Apple's proprietary algorithm, which is not publicly disclosed but is generally understood to reflect a combination of factors such as total downloads, user ratings and reviews, update frequency, and, in some cases, paid promotions. As a result, higher-ranked applications are more visible to users conducting casual searches and are therefore more likely to be encountered and downloaded. Focusing on the top four results under each condition thus provided a representative sample of the

applications that adult learners would realistically encounter when navigating the App Store without prior familiarity.

4.2 Data analysis

After collection, the selected applications were categorized and analyzed according to predefined criteria to evaluate their alignment with the principles of game-based language learning. The analysis focused on three key dimensions:

- **Target Age Group**: Based on Apple's user age recommendations (e.g., 4+, 12+, 17+), to identify whether the app was intended for children, adolescents, or adults.
- **Game Elements**: Documentation of the types of game mechanics used (e.g., flashcards, sentence construction, role-playing, or interactive mini-games).
- **Learning Approach**: Categorization of the pedagogical focus, such as pronunciation, grammar, vocabulary acquisition, or conversational practice.

A comparative analysis was then conducted to identify broader trends across the dataset and evaluate the suitability of these applications for adult learners. The analysis also considered cognitive and pedagogical factors relevant to university-level learners, including motivation, engagement, and communicative competence.

The findings are presented in Section 5, beginning with a summary table of the applications retrieved under different search conditions. The discussion then highlights significant gaps in the availability of game-based learning tools for adult users, evaluates the potential of existing apps, and identifies one application—*懒人英语 (Lazy English)*—as a particularly promising example for future instructional design.

5. Findings

5.1 Overview of identified applications

This study identified 32 game-based language learning applications through systematically varied searches on the Apple App Store. These applications were retrieved using targeted keyword combinations under different search conditions, such as system language (English vs. Chinese), App Store region (U.S. vs. China), and search language. These conditions were designed to reflect realistic usage scenarios for U.S.-based university learners of Chinese, as well as learners of English in the China App Store. The selected applications represent the top four results for each query, assuming they will most likely be encountered and downloaded by users unfamiliar with the app landscape. Table 1 presents a comprehensive overview of the top four search results across eight distinct search conditions, yielding 32 entries in total. Since some applications—such as *Studycat*—appear under both Chinese and English search results due to offering bilingual learning content, we consider them unique applications.

A close examination of the table reveals several key trends. First, most applications—regardless of target language—are geared toward young learners, with most marked as suitable for users aged 4+. This age classification aligns with the types of game mechanics employed, which include matching games, flashcards, phonics drills, and animated interactions—features commonly designed to appeal to children's developmental stages and learning preferences. While some apps, such as *懒人英语 (Lazy English)* and *Johnny Grammar Word Challenge,* target older users (12+ or 17+), they are exceptions rather than the norm.

In terms of functionality, the listed applications strongly focus on basic language acquisition, emphasizing vocabulary drills, pronunciation practice, and sentence construction. Game types vary from casual puzzles and swipe-based input to speech recognition and interactive lessons but remain generally limited in scope. Few apps incorporate immersive or context-rich scenarios appropriate for advanced learners or adult users seeking deeper linguistic engagement. This distribution underscores a significant gap in the marketplace: despite the prevalence of game-based learning in language education, there is a notable lack of well-designed, pedagogically sound applications tailored specifically for adult or university-level learners, particularly for those studying Chinese.

Table 1 Top Four Language Learning Applications Identified Under Eight Distinct Apple App Store Search Conditions

Search condition	Ranking Search-result position[1]	APP name	User age	Game type	Target learning language
Chinese system, China Mainland App Store, Search in Chinese	1	英语天天练	4+	Reading & collection, text-based exercises, reward system	English
	2	Study cat	4+	Interactive animation, vocabulary drills, mini-games	English
	3	懒人英语	12+	Creative dubbing, pronunciation practice, speech mimicry	English
	4	狐狸快跑	4+	Adventure-based, character selection, progression levels	English
	1	Study cat	4+	Interactive animation, vocabulary drills, mini-games	Chinese
	2	成语接龙	12+	Word puzzle, idiom connection, level-based challenge	Chinese
	3	成了个语	4+	Word-matching, casual puzzle, visual memory game	Chinese

[1] Search-result position reflects the order in which apps were displayed in the Apple App Store at the time of data collection and does not imply pedagogical quality or effectiveness.

	4	益智早教汉语拼音字母-教育游戏	4+	Phonics-based, early literacy, pronunciation drills	Chinese
Chinese system, China Mainland App Store, Search in English	1	EWA	12+	Flashcards, interactive lessons, pronunciation practice	English
	2	Drops 点滴学语言	4+	Visual vocabulary learning, swipe-based input, daily word practice	English
	3	Study cat	4+	Interactive animation, vocabulary drills, mini-games	English
	4	博树 Busuu	12+	AI-driven feedback, structured lessons, pronunciation evaluation	English
	1	博树 Busuu	12+	AI-driven feedback, structured lessons, pronunciation evaluation	Chinese
	2	HelloChinese	4+	Sentence-building, interactive grammar exercises, speech recognition	Chinese
	3	Learn Chinese-Chinese Skills	4+	Picture-word association, grammar challenges, topic-based exercises	Chinese
	4	恐龙识字	4+	Early literacy, character recognition, animation-based learning	Chinese
English system, US. App Store, Search in Chinese	1	Learning English With Momo	4+	Matching game, puzzle-style learning, interactive exercises	English
	2	Study Cat	4+	Interactive animation, vocabulary drills, mini-games	English
	3	Johnny Grammar Word Challenge	17+	Timed grammar challenges, vocabulary tests, real-time competition	English
	4	懒人英语	12+	Creative dubbing, pronunciation practice, speech mimicry	English
	1	Learn Chinese-Study cat	4+	Gamified exercises, character recognition, pronunciation drills	Chinese

	2	iHuman Chinese	4+	Character writing, phonetic guidance, interactive stroke order	Chinese
	3	Powder Game	4+	Physics-based puzzle, interactive learning through gameplay mechanics	Chinese
	4	Words of Wonders		Crossword-style vocabulary building, word puzzle game	Chinese
English system, US. App Store, Search in English	1	Learn English US for beginners	4+	Multiple-choice quizzes, progressive difficulty, grammar exercises	English
	2	English Sentence Builder Game	4+	Sentence construction, word-order learning, level-based play	English
	3	Johnny Grammar Word Challenge	17+	Timed grammar challenges, vocabulary tests, real-time competition	English
	4	Duolingual	4+	Adaptive learning, sentence matching, gamified progression	English
	1	Hello Chinese	4+	Sentence-building, interactive grammar exercises, speech recognition	Chinese
	2	Learn Chinese-Chinese Skills	4+	Picture-word association, grammar challenges, topic-based exercises	Chinese
	3	WordMatch	4+	Word association, memory-based matching, spelling reinforcement	Chinese
	4	Study Cat	4+	Interactive animation, vocabulary drills, mini-games	Chinese

5.2 Lack of DGBL apps for adult learners

Building on the findings presented in Section 5.1, this study further reveals a significant gap in the availability of game-based language learning applications tailored specifically for adult learners, particularly university students. Although the Apple App Store requires developers to assign an age specification (e.g., 4+, 12+, 17+) when uploading an app, this designation alone does not necessarily reflect the pedagogical design or intended audience. To address this, the learning content and game mechanics of each application were examined. The analysis confirmed that the vast majority of apps marked

"4+" employ features clearly oriented toward young children. Although English language learning games demonstrated a slightly broader age range, they similarly focused on beginner-level skills such as basic vocabulary acquisition, simple grammar drills, and repetitive task-based exercises—features not well-suited for more advanced or adult learners, who require more context-rich and cognitively demanding tasks. This dual consideration—both the default age ratings and the actual instructional content—strengthens the conclusion that most commercially available Chinese language learning games are not designed with adult learners in mind.

From a theoretical perspective, this lack of suitable adult-focused applications can be explained by the nature of existing game-based learning models. Research on GBL (Gee, 2007; Prensky, 2007; Squire, 2011) emphasizes the effectiveness of games in enhancing engagement and motivation, particularly through scaffolding, interaction, and reward-based learning. However, most commercially available language learning games simplify their mechanics to fit child-friendly, casual learning environments, where repetitive matching exercises, flashcards, and animated rewards serve as the primary learning mechanisms. While these features may be effective for young learners, they fail to address the cognitive and linguistic needs of adult learners, who often require more complex, context-driven, and goal-oriented language acquisition strategies (Ellis, 2003).

Additionally, motivation factors for adult learners differ significantly from those of children. While young learners often respond well to extrinsic motivation, such as point systems, badges, and colorful animations, adult learners tend to be more driven by intrinsic motivation, including practical language application, career-related skills, and real-world fluency (Reinders & Wattana, 2015). Most available games fail to integrate realistic, immersive scenarios that would make learning relevant for adult users, further reducing their effectiveness in a university setting. This gap highlights a critical need for the development of more sophisticated, adult-focused game-based applications that incorporate complex linguistic tasks, real-life communicative contexts, and higher-order thinking skills. Without such tools, university-level learners may be underserved by the current app ecosystem despite the growing body of research supporting the benefits of game-based learning in second language acquisition.

5.3 Case study: *懒人英语* (*Lazy English)*

Among the applications analyzed, *懒人英语 (Lazy English)* stands out as a rare exception to the dominant trend of child-oriented language-learning games. Unlike most applications categorized as "learning games," which primarily target young learners (ages 4+), 懒人英语 (Lazy English) is designed for users aged 12 and above, making it one of the few gamified language-learning tools explicitly catering to older learners. This distinction makes it a strong model for future DBGL applications in Chinese language acquisition.

From a GBL perspective, *懒人英语 (Lazy English)* effectively incorporates key pedagogical elements such as interactive engagement, scaffolding, and motivation, which are widely emphasized in GBL research (Gee, 2007; Prensky, 2007; Squire, 2011). For

instance, the application features listening exercises, sentence-building challenges, and vocabulary drills, but its most distinctive feature is its creative dubbing function. This feature allows users to perform voice-over activities for short video clips, a process that aligns with communicative language teaching (CLT) theory (Hymes, 1971) by encouraging learners to produce spoken language in meaningful and authentic contexts actively. By engaging in dubbing, learners refine their fluency and pronunciation while receiving immediate feedback—an approach that aligns with Peterson's (2009) principles of game-based second-language acquisition.

Unlike standard pronunciation drills or passive listening exercises, dubbing requires learners to actively engage with spoken language, adjusting their pronunciation and tone to match the original dialogue. This process reinforces Swain's (1985) output hypothesis, which posits that language learners benefit most when they are required to produce language rather than merely receive input. The dubbing activities also facilitate noticing gaps in learners' pronunciation and intonation, promoting self-correction and refinement (Schmidt, 1990). Additionally, these exercises develop intonation awareness and fluency, aspects often overlooked in traditional classroom settings. Since adult learners typically seek practical, real-world language applications, this feature makes *懒人英语 (Lazy English)* a more engaging and effective alternative to memorization-based learning tools.

By creating an immersive learning environment, *懒人英语 (Lazy English)* supports Reinders and Wattana' (2015) findings that games can lower communication anxiety, allowing learners to practice speech in a low-risk, engaging setting. The app offers clips of varying difficulty levels, enabling a self-paced and adaptable learning experience. Additionally, its gamified elements, such as score tracking and progression incentives, align with Prensky's (2007) theory that interactive, goal-oriented tasks enhance learner motivation.

The dubbing feature also introduces a challenge-reward system, where learners engage in authentic language production while implicitly comparing their speech to native pronunciation. This approach aligns with Squire's (2011) concept of scaffolding in digital game-based learning, wherein learners progressively build their skills through structured gameplay mechanics. The interactive nature of dubbing ensures that learners are not passive recipients of language input but active participants, enhancing cognitive engagement and retention (Shaffer, 2006). Moreover, Ishak and Aziz (2022) argues that role-playing and decision-making tasks in games improve oral communication skills—an aspect directly reinforced by the dubbing exercises in *懒人英语 (Lazy English).*

Another key strength of *懒人英语 (Lazy English)* is its potential for incidental vocabulary acquisition, as highlighted by Yudintseva (2015) and Choo (2015). Through dubbing tasks, learners are exposed to contextually rich, meaningful input, facilitating implicit learning of collocations, expressions, and pronunciation patterns. This supports the argument that game-based approaches enhance long-term vocabulary retention by providing repeated exposure in interactive, meaningful contexts.

In summary, *懒人英语 (Lazy English)* exemplifies how DGBL can be leveraged to create engaging, interactive, and effective language-learning experiences for older learners. Its dubbing feature, in particular, fosters active language production, fluency development, and pronunciation improvement, making it a valuable model for future Chinese language-learning applications.

6. Discussion

A key issue in the integration of Digital Game-Based Learning (DGBL) in Chinese language instruction is the widespread assumption that educational games are primarily designed for children. For instance, Apps like *HelloChinese* and *Study Cat* are primarily designed for beginners and casual learners, integrating interactive exercises with gamified elements. Despite their effectiveness, most of these applications are designed for younger learners or self-paced casual learners rather than formal academic settings. Notably, very few Chinese language learning apps explicitly target adult learners, particularly university students who require more in-depth, context-based instruction.

A search across different regional versions of the App Store reveals that when searching for English learning applications, well-known platforms like *Duolingo, Kahoot*, and *LingQ* dominate the results, catering to users aged 12 and above. However, searching for language learning games, whether for English or Chinese, overwhelmingly returns apps aimed at young children, typically rated 4+. This discrepancy suggests that game-based language learning is widely perceived as a tool for early-stage learners rather than advanced students or adults seeking proficiency.

The case of *懒人英语 (Lazy English)* illustrates how specific game-based features—such as dubbing—can be designed to align with communicative language teaching principles. While this study did not evaluate learner outcomes, the app serves as an illustrative example of how game-based strategies might be adapted to address challenges in adult Chinese language learning, particularly tonal accuracy. Game-based approaches in Chinese learning applications would need to incorporate specific phonetic scaffolding, AI-driven tone correction, and structured feedback mechanisms to support learners' mastery of tones. Additionally, as supported by Peterson (2009) and Reinders & Wattana (2015), the effectiveness of interactive pronunciation tasks in language acquisition suggests that similar methods could be integrated into Chinese learning apps to provide real-time, immersive pronunciation training. While challenges remain, particularly in adapting voice-based tasks to the unique phonetic demands of Chinese, the fundamental principles of game-based immersion, repetition, and situated learning suggest that such an approach has strong potential for adult CFL learners.

7. Pedagogical implications

Only a few applications, such as *懒人英语 (Lazy Englis*h), offer gamified learning experiences suitable for adults. The creative dubbing game in *懒人英语 (Laze English)*

could also be effectively utilized in Chinese language learning, particularly for pronunciation practice and contextual speaking exercises. However, such applications remain rare, highlighting a major gap in the availability of game-based learning tools designed specifically for adult learners.

This raises a fundamental question: Is game-based learning truly effective in an adult Chinese language classroom? Given that most language learning games are tailored toward younger learners, their instructional design may not align with the cognitive and linguistic needs of adult learners, particularly those pursuing professional or academic language proficiency. While some English-learning games could be adapted for Chinese instruction, the lack of comprehensive, age-appropriate game-based programs tailored to adult CFL learners suggests an urgent need for further development in this area.

To make game-based learning a viable approach in adult-level CFL education, future advancements should prioritize the development of more sophisticated games incorporating real-world simulations, immersive role-playing, and AI-driven feedback tailored to the needs of adult learners. By addressing this gap, educators and developers can create more effective game-based language learning tools that cater not only to children and beginners but also to advanced learners seeking meaningful and engaging ways to master Chinese.

8. Limitations

This study has several limitations, primarily due to the numerous variables affecting search results in the app store. One key limitation is that the researcher conducting the searches is a woman in her twenties, which may have influenced the individualized search results due to AI and big data algorithms that personalize app recommendations. As search algorithms become increasingly tailored to individual users, different people may see different rankings and app suggestions, making it difficult to generalize findings across all users. Additionally, we found inconsistencies between search results on Mac computers and iPhones. The Mac App Store includes filtering options, allowing users to refine their search results, whereas the iPhone App Store does not. This discrepancy suggests that search conditions may significantly impact the visibility and ranking of language-learning applications. Another major limitation is the influence of advertisements on mobile app rankings. Many search results were directly affected by paid promotions, meaning that certain apps appeared at the top due to advertising rather than user engagement or pedagogical effectiveness. This highlights a challenge in evaluating app popularity and effectiveness solely based on search rankings. Given these limitations, future researchers should further explore how individualized search algorithms, device-based variations, and advertisement-driven rankings influence app store search results. A broader, multi-device, and multi-user study could provide more generalizable insights into the availability and effectiveness of GBL applications for CFL learners.

9. Conclusion

This study explored the role of Digital Game-Based Learning (DGBL) in Chinese as a Foreign Language (CFL) instruction, particularly for adult learners, and identified a gap in the availability of suitable applications for this demographic. Through a comparative analysis of language-learning applications, it became evident that most existing DGBL tools cater primarily to children and beginner learners, offering limited support for the advanced linguistic and cognitive needs of adult learners. The findings highlight that current game-based language learning applications emphasize basic language skills, such as vocabulary recognition and grammar drills, while lacking elements crucial for adult learners, including task-based interactions, pronunciation refinement, and real-world application scenarios. Moreover, factors such as app store ranking mechanisms, algorithmic personalization, and the influence of advertisements further limit the accessibility of effective CFL learning applications.

Despite these challenges, DGBL remains a promising approach to enhancing engagement and retention in language learning. This study underscores the need for more adaptive, interactive, and context-rich applications tailored to adult CFL learners. Future research should focus on the development of AI-driven feedback, immersive role-playing, and adaptive learning models to bridge this gap. By addressing these limitations, educators, developers, and researchers can work together to create more effective DGBL tools that align with the learning objectives of university students. The evolution of technological advancements in educational gaming presents an opportunity to refine and expand the potential of game-based CFL learning for adult learners, ensuring that DGBL is not just engaging but also pedagogically effective.

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