

Designing a Serious Game for Chinese Idiom Acquisition: An LM-GM-Based Approach

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Abstract:

This research investigates the potential of a serious tabletop game to enhance the acquisition of Chinese idioms (chengyu) among adult learners of Chinese as a Foreign Language (CFL). Chengyu present particular challenges for second-language learners. To address this, a serious game was designed based on Learning Mechanic Game Mechanic framework. A small-scale evaluation was conducted with pre-, post-, and delayed-tests of idiom comprehension, Likert-scale surveys based on Keller's ARCS model of Motivational Design, and semi-structured interviews. Findings suggest that the game improved learners' comprehension of most idioms, with participants demonstrating stronger retention and deeper engagement compared to pre-test. Participants reported high levels of attention, confidence, and satisfaction, underscoring the motivational advantages of the game-based approach. Gameplay fostered memorable, embodied experiences likely to support long-term retention. This study highlights the promise of serious games in idiom pedagogy. It provides both empirical evidence and design recommendations for integrating serious tabletop games into CFL instruction, contributing to the broader field of game-based language learning.

Keywords: Game-based Language Learning (GBLL), Chengyu (Chinese idiom), Chinese as a Foreign Language (CFL), serious games, language pedagogy, game design

1. Introduction

Serious Games(SGs) is defined as “games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement”(Abt, 1970). Game-Based Language Learning (GBLL) is regarded as an innovative approach to language acquisition (Zou et al., 2021). Idioms are the ‘life and soul’ of a language (Zevgoli, 1998). However, learning Chinese idioms (chengyu) present unique challenges for second-language (L2) learners(Li & Hin Tat, 2014). Serious games have shown great potential for vocabulary acquisition (Chen & Hsu, 2020) but few prior research has been identified on the topic of serious game to enhance chengyu acquisition. This small-scale study addresses this gap by integrating serious game mechanics with the pedagogical goals of GBLL and by exploring the following research questions:

RQ1: To what extent can GBLL facilitate figurative meaning acquisition for adult chengyu learners?

RQ2: How do learners perceive and experience the use of a GBLL approach in supporting Chinese idiom acquisition?



2. Research Context

Chengyu, also known as Chinese idioms, mostly consist of four characters. They are commonly derived from classic Chinese literary sources and play a crucial role in achieving a profound understanding of Chinese culture. However, their acquisition poses significant challenges (Li & Hin Tat, 2014). Semantic opacity may have played a crucial role in hindering the chengyu acquisition, as, when encountering unfamiliar idioms, L2 learners tend to interpret them literally whereas native speakers are more likely to access their figurative meanings directly (Gibbs, 1980). Furthermore, idiom comprehension is fundamental to idiom acquisition, as learners must first understand an idiom before they can internalize and use it effectively, so helping students understand idioms should be the main focus of idiom instruction (Liu, 2017).

The benefits of combining games with language learning is particularly effective. (Hwang et al., 2023). “The characteristics of learning and gameplay are closely interconnected: curiosity, persistence, risk-taking, reward-seeking, attention to detail, problem-solving, and interpretation” (Abbott, 2019), therefore, the novel interactivity inherent in games, along with their capacity for leveraging emotional affect can enhance language learning.

GBLL for idioms has been proved effective in different languages (Almusawi et al., 2024; Mokhtar et al., 2021). However, only a very limited number of studies have examined in depth the patterns of interaction and relationships between game mechanics and learning mechanics. Therefore, this paper contributes detailed insights into the pedagogical and gameplay design of educational games for chengyu learning.

3. Methodology

The Learning Mechanic Game Mechanic (LM-GM) framework facilitates the design and analysis of serious games for education and training. It incorporates categorized lists of LMs and GMs with guidance to assist educators and game developers in mapping them to create Serious Game Mechanics (SGMs) (Figure2). This increases the likelihood of strong and robust alignment of in-game activities with specific learning goals, and therefore pedagogical effectiveness (Arnab et al., 2015).



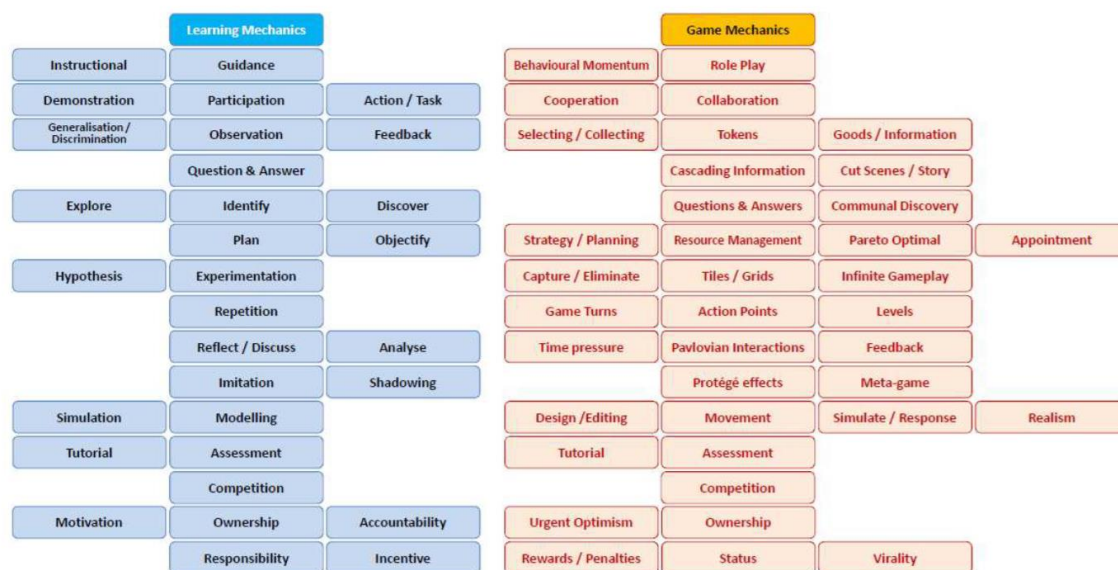


Figure 1. Original Learning Mechanic and Game Mechanics Mapping Framework (Arnab et al., 2015)

Recent research (Ferguson et al., 2023) note that there is a research gap for domain-specific Learning Mechanics in certain fields. The existing LM-GM framework is not intended to be exhaustive, as it is designed to accommodate a broad spectrum of serious game designs. Notably, research applying this framework to language learning is still extremely rare, especially in the context of Chinese as a foreign language.

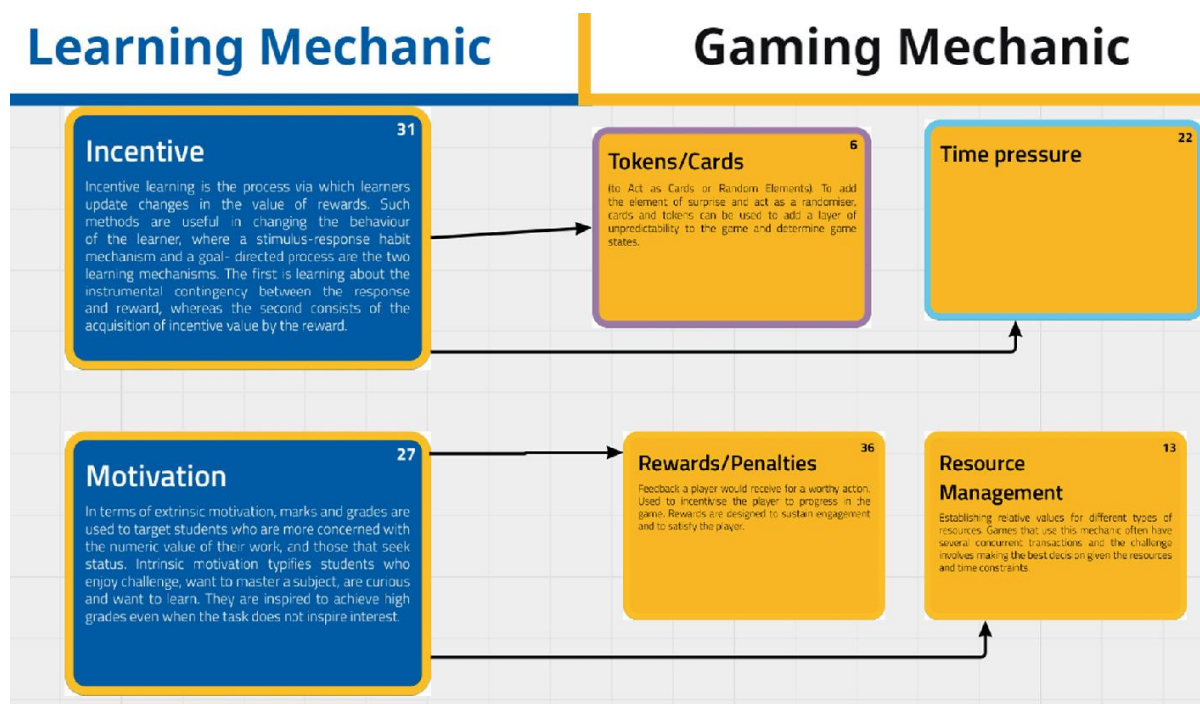


Figure 2. An Example of a SGM (SECRIOUS Slow Game Jam Toolkit, 2023)

4. Game Design

This paper focusses on a game called *The Thirty-Six Stratagems* which was designed by the authors specifically for teaching chengyu. It is a turn-based, two-player strategy game that combines tactical board play with card mechanics. The game places players in a virtual battlefield scenario. Each player takes on the role of a commanding general in a face-off between two armies, manoeuvring soldiers while making optimal use of stratagem cards to influence the course of battle.

Note that the audience for chengyu learning is adult CFL learners with intermediate existing skills (e.g., HSK3 or above). Complex linguistic forms (and therefore the learning outcomes of this game) are not suitable for beginners. Learning context is likely to be in a classroom and this allowed for an analysis of how tutor support could be built into gameplay and specific SGMs. Through an iterative design process, we analysed how the existing GMs could support the LMs required and adapted them through a prototyping process to reinforce and add further learning behaviours. Gameplay loops analysis (Guardiola, 2016) identifying LMs and GMs and their interactions are shown in Figure , Figure , and Figure .

At the start of the game, both players receive the same set of stratagem cards, soldiers, and cities. Each stratagem card contains a chengyu and has a game effect that is closely tied with the figurative meaning of the chengyu. For example, the game effect of “顺手牵羊” (lit: "to casually lead a sheep") is "Swap this card with a card from your opponent's deck", while the figurative of the original chengyu is " Taking something that belongs to someone else ".



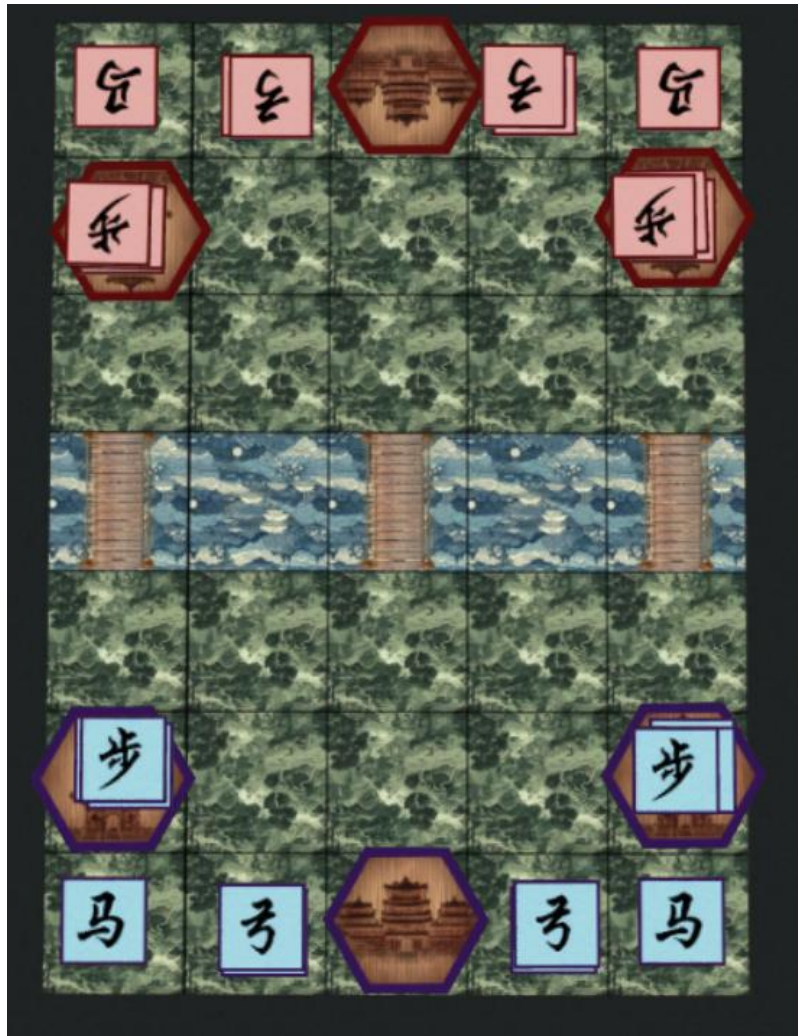


Figure 3. Game Map, Soldiers and Cities



Figure 4. A Stratagem Card Example, is Closely Tied with the Figurative Meaning of the Chengyu

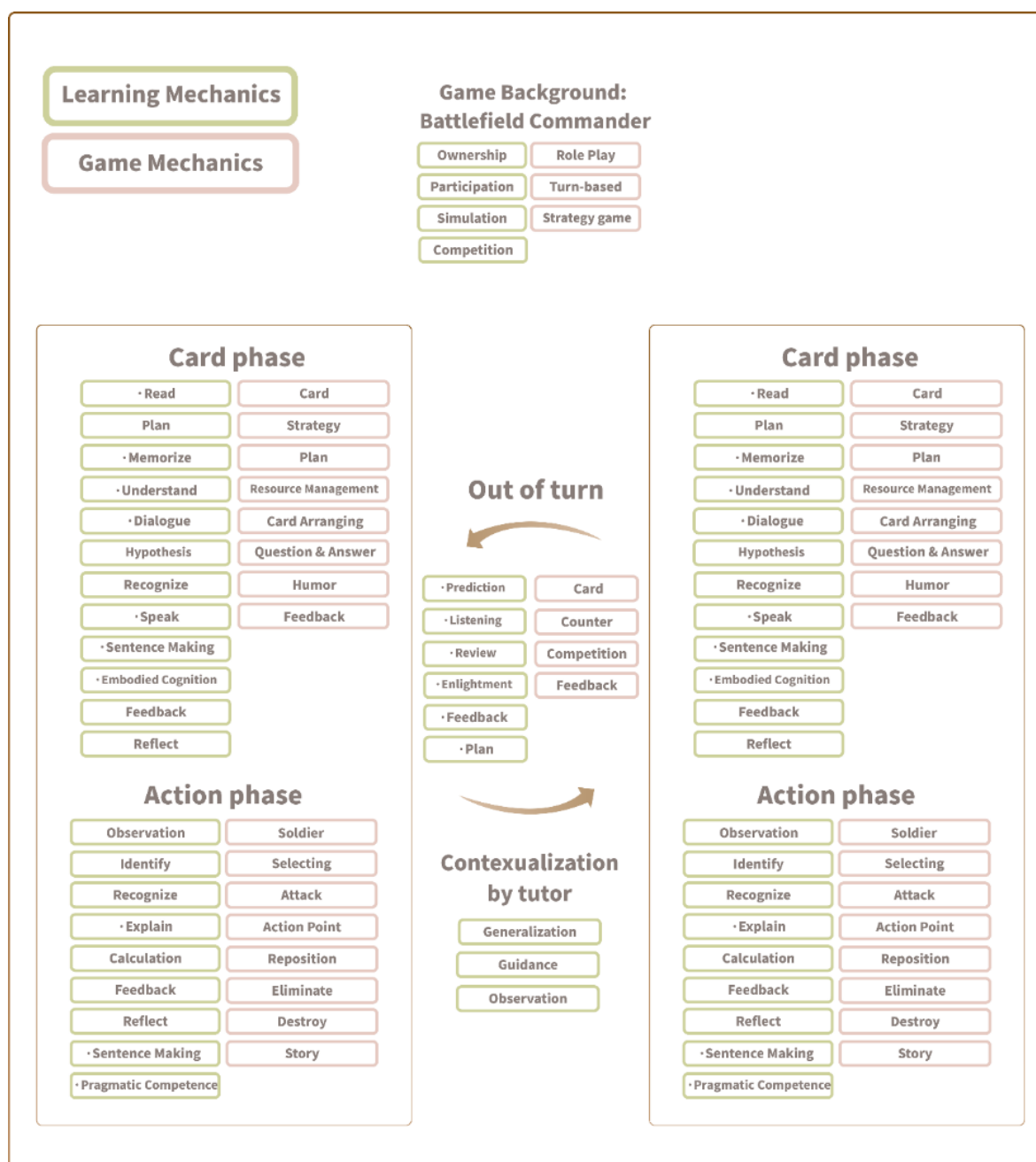


Figure 5. LM-GM Interactions for the Game. Note the Newly Emphasized LMs Specific to Language Learning including ‘Speak’. ‘Sentence Making’, and ‘Pragmatic Competence’

Then players take turns, with each turn consisting of two phases: the Card Phase and the Action Phase. During the Card Phase (Figure), players must decide (based on their current situation) whether to play a card and, if so, which one. This process encourages players to understand the meaning of each card. When a player plays a card, they must clearly announce its name aloud, an active learning strategy which reinforces understanding of pronunciation through embodied cognition (cf. Schilhab & Groth, 2024) and adds a humorous element to the game. After a card is played, its effects are resolved. Linking the figurative meaning of a stratagem directly with a game action that is likely to have high emotional

affect (whether success or failure) is proposed to increase the memorability of the chengyu by association. Rather than playing a stratagem, players may choose to instead exchange one card with a card from the deck. If so, they must explain (in Chinese) to their opponent why the stratagem was not worth playing. Note that multiple players can be assigned to the same side and are encouraged to talk with each other, allowing discussion of meaning and planning strategy whilst simultaneously providing a low-stakes context for conversational practice (cf. Wong & Yunus, 2021).

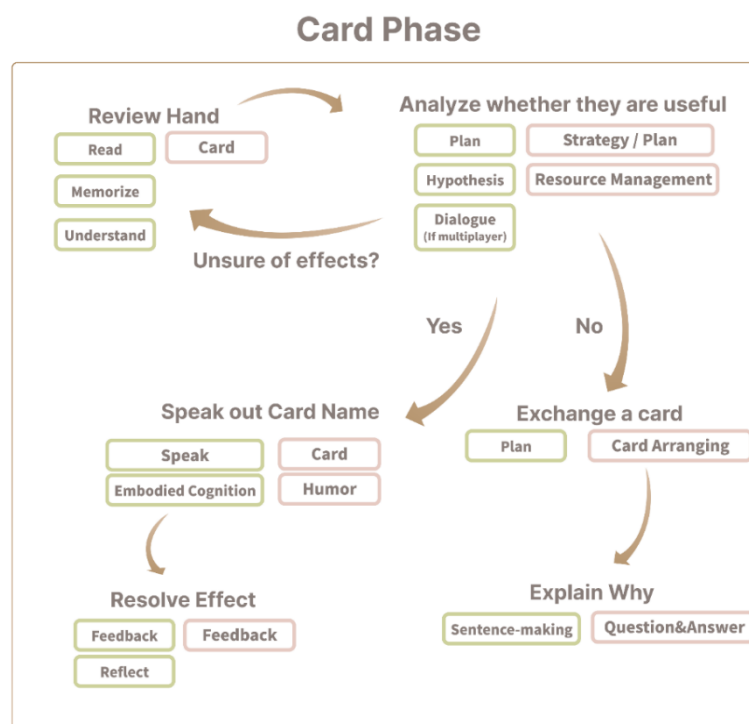


Figure 6. LM-GM Interactions within the Card Phase

During the Action Phase (Figure), the player chooses one of their armies to carry out actions such as moving or attacking. Players may consider not only the effects of their own cards and the opponent's likely actions in the next turn, but also the potential effects of cards the opponent might play. This adds an extra layer of strategic depth and gives players a strong incentive to remember card effects. If a card was used during the turn, then at the end of the Action Phase the player must explain (in Chinese) what happened in that turn. For instance, they may make a sentence or tell a short story to help articulate figurative meanings in other forms and reinforce memory.

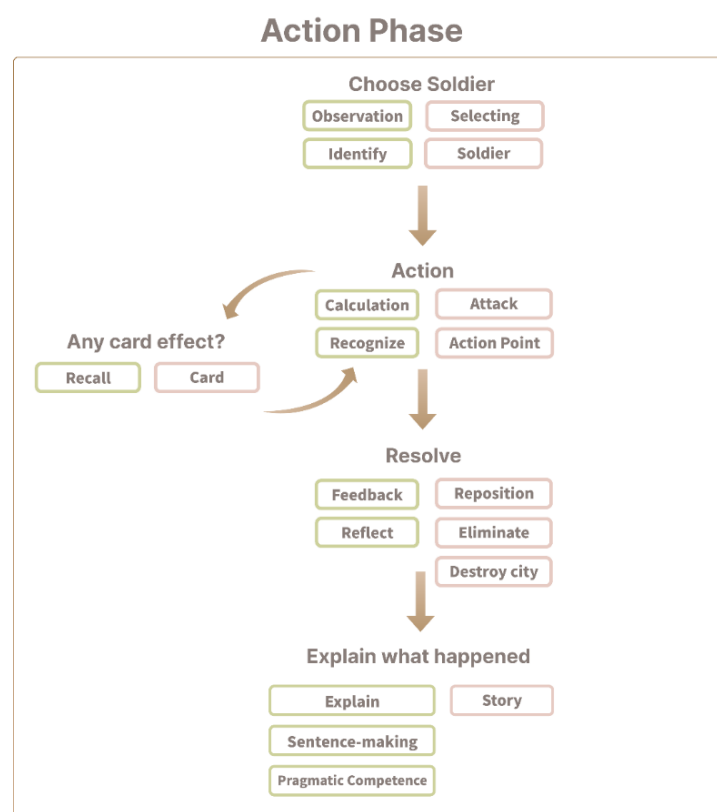


Figure 7. LM-GM Interactions within Action Phase

Vicarious learning was also designed into the game. Some cards give players the ability to counter their opponent's moves allowing the opportunity for language learning and practice even outside their own game turn. Players are also encouraged to pay close attention to the opponent's use of language in explanations and stories, acting as peer support for learning. At the end of each round, the instructor or tutor reflects on what happened and can offer feedback, explaining the origins and meanings of the idioms used. Any mispronunciations or errors in sentence construction are also corrected.

5. Evaluation

The following section presents a preliminary evaluation of two research questions.

Quantitative data in chengyu acquisition was collected by a series of questions that test understanding of the figurative meaning of idioms. Each question included 4 choices, the correct answer taken from the definition in the Dictionary of Chinese Idioms (2025). Distractors (wrong answers) were created following advice from experienced Chinese teachers.

Quantitative data on learning experience was collected using a Likert 5-point scale based on Keller's Attention, Relevance, Confidence, Satisfaction ARCS framework, a tool used to gain insight in motivational instructional design (Keller, 2010)

Finally, semi-structured interviews were conducted to gain rich qualitative insights that were not covered by other methods to provide further insight. Ethical approval was granted for this research study.

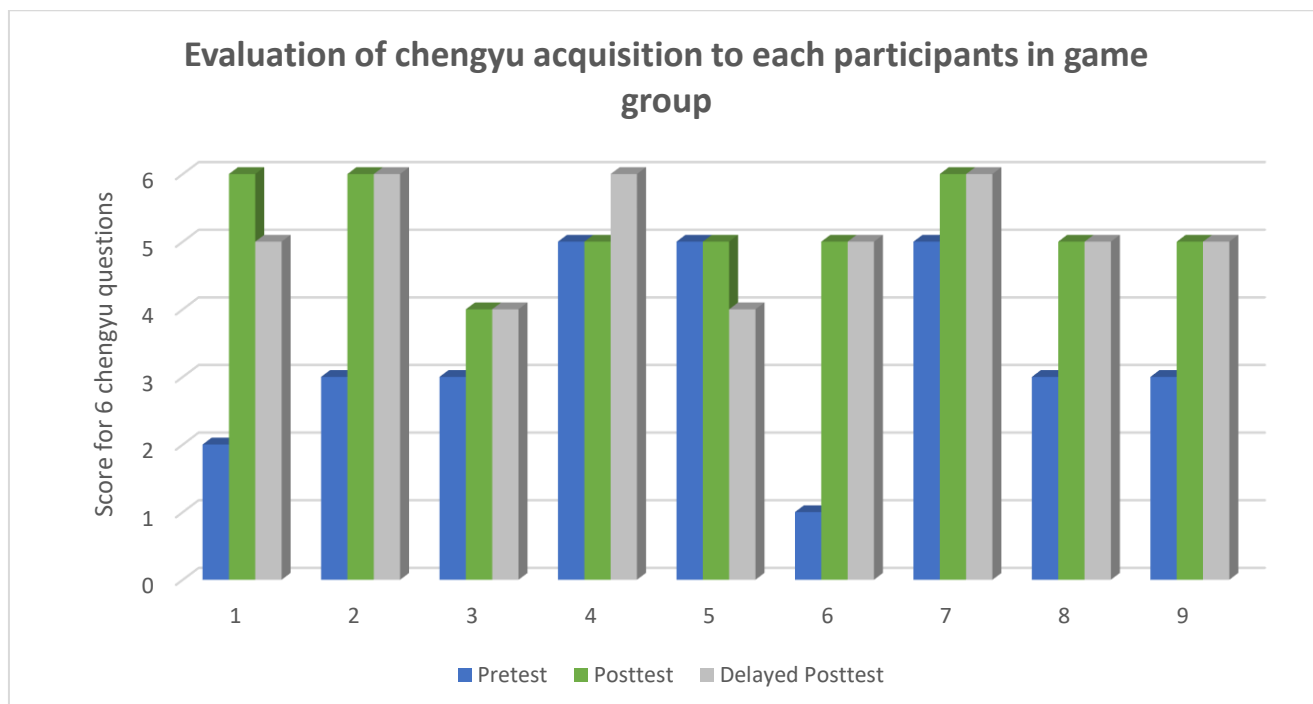


Figure 8. Total Numbers of Correct Answers for Each Participant in the Game Group

Effect of Game-assisted idiom learning is shown by the results of the pre-test, post-test and delayed test of each participant in the clustered bar chart at Figure . In general, the game has a positive impact on participants' acquisition of the figurative meanings of idioms. 77% of players improved their score after the game and there was a 1.89 increase in mean test scores from the pre-test ($M = 3.33$, $SD = 1.41$) to the post-test ($M = 5.22$, $SD = 0.67$) across the cohort. On average, the participants' scores improved by 1.89 (or 56%) on the 6 questions.

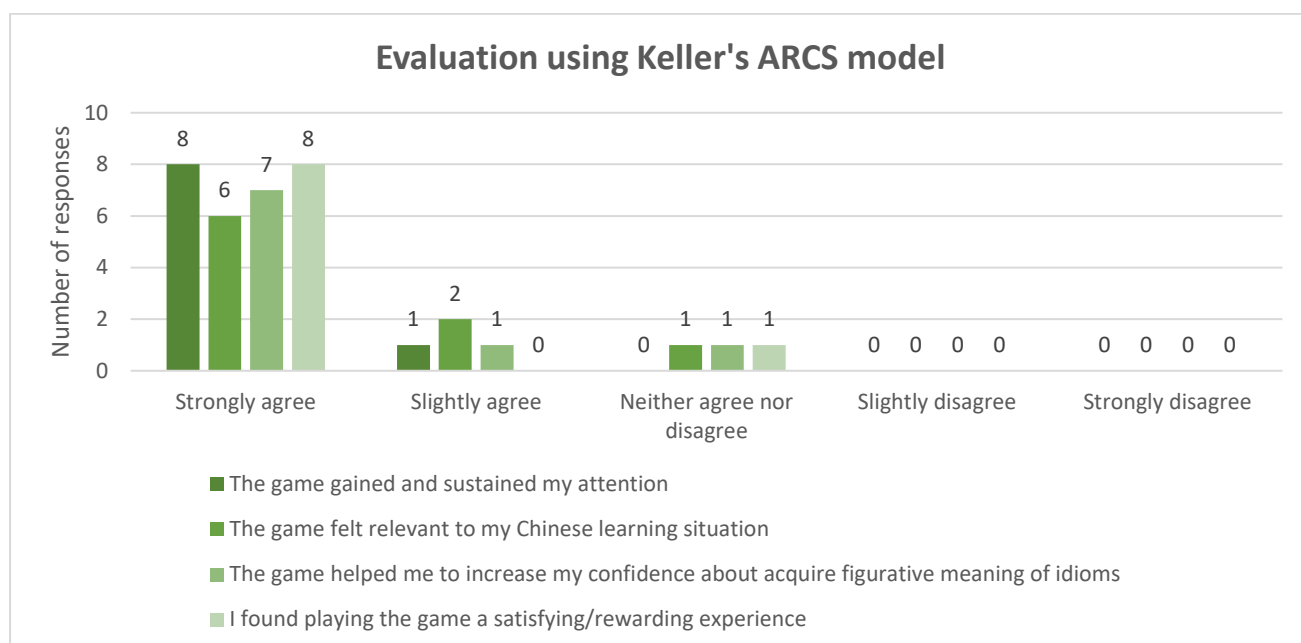


Figure 9. Results of Game Experience Survey

All the participants agreed that the game sustained their attention. Among them, 89% of participants strongly agreed. This indicates that the game can naturally immerse players in its process and keep them actively engaged. Qualitative responses about attention included: *"I was so into the game."*(PID2)/ *"I keep thinking about my cards and my opponent's."*(PID4)/ *"My brain just didn't stop for a second."* (PID9)

67% of the participants strongly agreed that the intended learning outcome of game was relevant to their learning situation. This might be because chengyu themselves are advanced knowledge. Qualitative data included: *"I learn some authentic expressions!"* (PID7) / *"Some of them might be a bit beyond to me, but I'm really happy I got to learn new words."* (PID4)

89% of the participants agreed that the game increased their confidence in acquiring chengyu, 78% strongly. Qualitative data includes: *"When you act out the idiom in the game, its meaning becomes really easy to understand."*(PID8) / *"Even though I lost, I still felt good because I managed to use some idioms."* (PID2)

89% of the participants strongly agreed that playing this game was a satisfying experience. *"It felt amazing to play the card and shout it out loud!"*(PID7) / *"Would like to play it again, with more idiom cards!"*(PID6).

6. Discussion

Whilst results are small-scale, they indicate that Thirty-Six Stratagems was successful in facilitating the acquisition of Chinese idioms. For the idioms that were successfully learned, several participants reported that acting out the chengyu during gameplay played a crucial role. The pedagogical value of performing in language teaching has been mentioned (Yannacanedo, 2024). This may be because the

acting of chengyu within the game provided learners with mental imagery that supported their comprehension, a strategy commonly recognized as a method of dealing with unfamiliar idiomatic expressions (Gibbs & O'Brien, 1990). Moreover, game mechanics which amplified the emotional impact (e.g., competition, identification) may have contributed to the formation of memory. For future iterations, it may be beneficial to incorporate explanations of idiom etymology into the reflective stage, as this has also been recommended as an effective practice for idiom instruction (Boers et al., 2008).

Given that learners of Chinese face different challenges depending on their different first languages and cultural backgrounds, future research could more carefully consider the specific characteristics and usage patterns of learners' first languages when constructing common distractors for such games.

For novice learners, understanding how to use the cards strategically to gain an advantage can be challenging: "At first I didn't really understand “金蝉脱壳,” but when I saw how my opponent used it, it clicked for me." (PID9) / "I thought it was a useless card, so I never used it." (PID3). This adds an additional layer of cognitive load and may even discourage players from attempting to use certain cards. A potential improvement would be to provide illustrative examples of card usage at the beginning of the game. As York (2021) notes, offering guidance prior to gameplay has been shown to enhance learning outcomes.

7. Conclusion

Overall, this paper demonstrates that serious tabletop games can serve as a powerful pedagogical tool for Chinese idiom learning. By connecting game mechanics with cognitive and cultural aspects of language acquisition, this research contributes to both the design of educational games and the advancement of innovative approaches in teaching Chinese as a Foreign Language.

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