

# Using Gamification to Support Learning Chinese as A Foreign Language: A Systematic Review

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**Abstract**—Gamification has been proposed as a pleasant and entertaining way to encourage students to acquire Chinese as a foreign language (CFL) and to bridge the gap between their learning and teaching practice. This systematic review provides a summary of the current state of the art in CFL gamification. Furthermore, when learners cope with CFL through gamification, this review study maps their learning process and results. 11 publications from 2016 to 2021 were analyzed for this systematic review. Even though these studies found that gamification had a favorable impact on learners' learning experiences and achievements, none of the studies identified gamification elements linked with the learning experiences and outcomes. Gamified CFL offers good learning experiences by being engaging, fun, motivating, engaging, and interesting. Gamified CFL learning results included content language acquisition, beliefs, motivation, satisfaction, and confidence. The findings of this study offer suggestions on how to develop gamification for learners' CFL learning, as well as the learning experiences and outcomes that follow.

**Index Terms**—Gamification, systematic review, CFL, foreign language acquisition, gamification elements.

## I. INTRODUCTION

Currently, Learning Chinese as a foreign language (CFL) is becoming increasingly popular throughout the world [1], [2]. China has an important prominence as a worldwide economic powerhouse, which has increased the huge demand for CFL learning around the world [3]. Mastering Chinese, for example, can help you gain additional work chances in the age of globalization because some companies require Chinese speakers [2]. In the twenty-first century, technology has become an integral aspect of teaching and classroom activities, particularly in foreign language acquisition [4], [5]. In this background, Chinese language teachers have a trend of employing technology to teach various parts of the language [4]. This tendency is crucial since many students say that CFL learning is tough and hard through traditional teaching methods, causing them and their teachers suffer from negative feelings [4], [6]; this has even resulted in high dropout rates in CFL classes [7].

According to previous studies, most Chinese learners find acquiring Chinese vocabulary difficult [4]. For instance, when someone says "tang", they can be referring to soup (tāng 汤/湯), sugar (táng 糖/糖), lying down (tǎng 躺/躺), or heated (tàng 烫/燙) [8]. This indicates that while learning a new word in Chinese, one needs learn four things: complex character shapes, the pronunciation, the tone linked with the

pronunciation, and the meaning [8]. Because of its character-based writing system and tonal tone, CFL is challenging for most learners, which may lead to high levels of anxiety [4]. Speaking has been identified as the most anxiety causing among the four skills (listening, speaking, reading, and writing) [6]. Anxiety levels were found to be adversely connected with CFL learners' perceptions of their language learning capacity and accomplishment, so teachers should encourage Chinese language learners and increase their confidence in lessons [6]. Once learners have gained self-confidence, they are more likely to engage in the learning process and make more efforts to improve their learning outcomes [9]. However, few research have looked at students' attitudes toward CFL and their confidence in their abilities to learn Chinese in a CFL classroom [4].

Gamification has been hailed as one of the most effective educational methods for motivating students and increasing their engagement and enthusiasm during their learning process [4], [10]-[13]. Scholars consider gamification to be one of the most motivating, engaging, and enjoyable methods for CFL [8], [14], [15]. According to one study, gamification can help beginners learn complicated Chinese characters more effectively and enjoyably [15]. The reason for this is that CFL is a complex activity with both affective and cognitive components, and gamification elements can influence both aspects of learning [16], [17], reduce learners' anxiety and fear of speaking a foreign language face to face with others [18], and help them achieve satisfactory learning results [4], [17]. In terms of CFL, several studies suggest that gamification learning methods outperform non-gamification learning methods [1], [19]. In summary, research shows that gamification for CFL can improve various language content acquisition, engagement, motivation, attitude, and satisfaction [1], [2], [4], [8], [19].

Serious games and educational games are not synonymous with gamification [20], [21]. Gamification is a relatively new phrase that refers to the use of game elements in non-game contexts to provide learners with engaging, interesting, and motivating learning experiences [20]-[25]. Gamified learning environments apply game mechanics and dynamics to non-game environments to improve learners' in-depth learning and dialectical thinking [20], as well as to lead them to perform specified behaviors [28], [29].

Abt coined the phrase "serious games", which are games that are primarily focused on learning rather than enjoyment and give several chances for connecting education to students' daily lives [30]-[33]. The educational game follows game mechanics that might pique the attention of participants [32]. Serious games and instructive games may both be used to help players improve their abilities and knowledge through gameplay [34]. Serious games' educational material might be

expressed indirectly in gameplay, whereas educational games' educational information is provided clearly in gameplay [35]. Game elements are utilized in gamification to engage learners with material and help them advance toward a goal. For example, when a student properly registers into a computer program, the learner is awarded a badge. Receiving a badge is a game element, although it is unrelated to other game actions such as progressing to the next level, completing a puzzle, or matching two or more things [20].

Researchers have developed a formal methodology for studying game use called the Mechanics, Dynamics and Aesthetics (MDA) framework [26]. It formalizes game consumption by dissecting it into its constituent pieces and constructing design counterparts [26]. Game mechanics and game dynamics are key components of gamification [28]. Game mechanics, according to Bunchball, are the essential control mechanisms used to 'gamify' an activity and generate interesting learning experiences [28]. Points, levels, badges, leaderboards, charity and presents, difficulty, space, storytelling, and virtual items are some of the game mechanics [28], [36]. As for game dynamics, the learners' emotions are triggered, stimulated, and driven by it. For example, status, achievement, reward, competition, benevolence, challenge, enjoyment, and satisfaction are only some of the game dynamics [28].

Gamification has a variety of benefits on learning processes and results [37]-[40], engagement [41], motivation [42], [43], and CFL learning [4], [8], [14], [15], [44]. There are many systematic review studies on gamification and general education [38,45], but no conclusive proof in the form of a systematic study on gamification for CFL learning. The landscape is considerably vaguer when it comes to the effectiveness of specific gamification elements in relation to learners' progress and achievement in CFL learning. The link is crucial since gamification element is designed to motivate learners to participate in the learning processes and, therefore, achieve the targeted learning goals [37].

In conclusion, there is no conclusive evidence about the use of gamification and its effects on learning processes and results for CFL learning. To fill the gap, the first goal of this systematic review is to summarize the current research status on gamification in CFL learning. Research status includes gamification application, education level, and research methods; quantitative statistics of the study duration, participants and P-value; and keywords that record the gamification elements as well as learning processes and results of learners. The second goal is to see how different gamification elements are employed for CFL learning and count the frequency of each gamification element. According to the application methods and frequency of gamification elements in CFL learning, the conditions are summarized and suggestions for future research are put forward. This third goal is to investigate learners' learning processes (attitudes and feelings) as well as various learning outcomes (listening, speaking, reading, writing, pronunciation, vocabulary, grammar, beliefs, motivation, satisfaction and confidence) in gamified CFL learning conditions. In addition, this study carries out quantitative statistics on these key words to conclude learners' attitude, feelings and learning outcomes in CFL learning.

## II. MATERIALS AND METHODS

### A. Organizing Searches of Databases

The selection of scholarly papers for this systematic review is depicted in Fig. 1. A systematic search technique was used to find relevant papers in different databases such as Scopus, ERIC, and Web of Science. 'Gamification and Chinese Language', 'Gamification and Mandarin', 'Gamified Chinese Language learning', and 'Gamified Mandarin learning' were among the search keywords utilized in this study. These keywords were chosen from relevant CFL and gamification research.

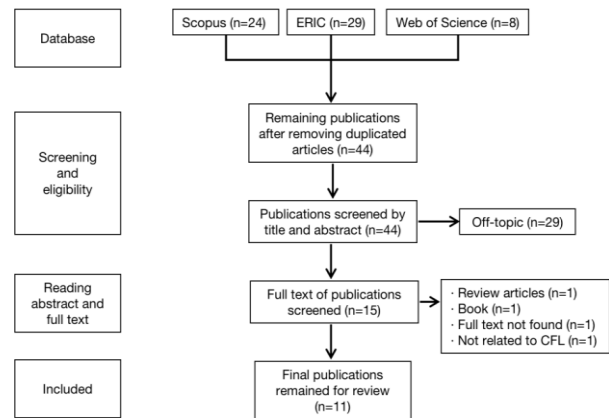


Fig. 1. Flowchart of publications selection.

### B. Criteria for Studies Selection

Our key terms yielded 44 publications in the first search. Because seventeen of the publications looked to be duplicated, they were eliminated from further scrutiny. Then, based on the focus of this study, we studied the abstracts and the full papers to further exclude publications that were not relevant to this subject. The following criteria were used to ensure the quality of the papers featured (see Table I).

Only when gamification was employed for CFL were publications included. This means that serious games, educational games, and video games were all omitted since, as previously mentioned, they are all different terms.

Publications were only considered where gamification was used to CFL, not any other language.

The technique of the articles was not an exclusion factor in this study, which meant that research might be qualitative, quantitative, or mixed approaches. But literature reviews, books and meta-analysis are excluded.

Studies that did not meet one or more of the aforementioned criteria were not included in the analysis. After applying the criteria for studies selection, the systematic review was limited to 11 publications.

TABLE I: INCLUSION AND EXCLUSION CRITERIA

Inclusion Criteria	Exclusion Criteria
Using gamification	Using serious games, educational games, and video games
Gamification was used to CFL learning	Gamification was used to other languages
Research articles or conference proceedings	Reviews, books, Meta-analysis
Written in English	Written in other languages

III. RESULTS

A. An Overview of the Current State of Gamified CFL Learning Research

For the publications included Table II lists the authors, year of publication, gamified learning applications, educational background, research method, data collection technique, duration of the project, number of participants, gamification elements, learning experiences (feelings and attitude), learning outcomes (content language learning, beliefs, motivation, satisfaction, confidence), and statistical information (p-value).

With just 11 papers matching our search criteria, Table II shows that the usage of gamification for CFL learning is currently restricted. The use of gamification for CFL learning was a relatively new subject of study, with peer-reviewed articles published from 2016 to 2021. Higher education

employed the most gamified CFL learning with five frequencies, followed by high schools (3 publications), elementary schools (2 publications), and pre-schools (1 publication). Gamification for CFL has been studied using quantitative (7 publications), qualitative (1 publication), and mixed (1 publication) methodologies. The most widely utilized data gathering methods for gamifying CFL were questionnaire (8 publications), interview (1 publication), and observation (2 publications), respectively.

The intervention length of the examined publications ranged from 40 minutes to 16 weeks, as shown in Table II. Most of the papers (7 out of 11) were experimental. The remaining four papers that were assessed did not have an experimental design. The papers included varied in number of participants, ranging from 8 to 65.

TABLE II: QUANTITATIVE DESCRIPTION OF THE INCLUDED PUBLICATIONS ABOUT GAMIFICATION FOR CFL LEARNING

Authors	Learning applications	Educational Level	Methodology	Data collection method	Duration	N	Gamification elements	Learning processes		Learning results		Statistical information
								Feelings	Attitude	Various learning results	Content language learning	P-Value
[4]	Quizlet	High School	Quantitative	Questionnaire	53min	28	Flashcard, activity, question, assessment, task	Interactive, engaging	Positive	Beliefs Confidence	Reading Listening Speaking Vocabulary	Beliefs=< 0.001*** Reading= 0.233 Listening= 0.003** Speaking=< 0.001*** Vocabulary=< 0.001***
[46]	Newby Chinese	Primary school High school	-	-	-	-	Narrative scene, game character, sound, audio, icon, task, color, goal, story, adventure. Illustration, animation, point, time-limit, reward, aid, target, unlocking	Motivating, engaging, challenging	-	-	Reading Listening Vocabulary	-
[8]	Speed Mandarin	High school	Quantitative	Questionnaire	16 weeks	30	Illustration, link, rhyme, monitoring, record	-	Positive	Beliefs Strategy Motivation Confidence	Reading Listening Speaking Vocabulary	Reading= 0.532 Listening=0.124 Speaking= 0.040 Vocabulary= 0.074 Strategies= 0.084 Motivation= 0.733
[1]	Mandarin M-learning	Higher education	Quantitative	Questionnaire	-	10	Audio, online help, topic, question, level, score, timer, unlocking, leaderboard, feedback	Concentration, Challenging, Immersion	Positive	Learning skills	Reading Listening Speaking Vocabulary	-
[19]	Virtual Avatar	Higher education	Quantitative	Questionnaire Observation	40min	12	Feedback, card, record, mode, monitoring, activity, reward, virtual avatar, help, animation, exploration, collaboration, level	Interactive	Positive	Satisfaction; memory retention; attention	Vocabulary Writing Pronunciation	Satisfaction: Traditional touch=0.007 Traditional-AR=0.000 Touch-AR=0.016
[17]	MOOC	-	-	-	-	-	Point, unlocking, quiz, comment, task, activity, virtual currency, badge, level, help, leaderboard, notification, topic, progress bar, social network, rank, assessment, record, feedback, report	Enjoyable Motivating Fun	Positive	Motivation Lower drop-out rate	Listening Speaking Reading Writing	-
[47]	Digital Citizenship Playground (DCP)	Preschool children	Qualitative	Case study Observation	-	-	Selection, surfing the net, clip, song, TV series, movie	Enjoyable Interactive	-	Confidence Motivation Skill acquisition	-	-

[2]	Mandamonik	Primary school	Quantitative	Questionnaire _	30	Measurement, score, selection, unlocking, picture, mode, image, background, cartoon, theme, option, button, jigsaw, aim, tool, record	Interesting Motivating	-	Higher test results	Reading Vocabulary	Learning result= 0.000
[48]	SLIONS	Higher education	Mixed method	Questionnaire One week Interview	8	Feedback, instruction, music, lyric, video, rhyme, song, point, encouragement, evaluation, record, score, error rate, level, option, mode, assistance, color, choice, melody	Fun Motivating Interactive Easy Enjoyable Entertaining Engaging	Positive	Speaking loudly Recalling words Gaining interests	Speaking Pronunciation Vocabulary	Pronunciation=0.00026 Vocabulary=0.343
[49]	Memorise app	Higher education	Quantitative	Questionnaire 2 months	65	Point, Flower growth, badge, rank, progress report, Leaderboard, mode, story, community, level, social media, feedback	Interesting Feeling of success Belonging Motivating	Positive	Autonomy Competence Relatedness Motivation	Vocabulary	-
[50]	E-learning game software	Higher education	Quantitative	Questionnaire _	31	Option, failure attempt, instruction, tutorial, icon, button, audio, restart, sound, background, writing board, record, score, reward	Interesting Happy Satisfied	Positive	Significant experience Critical thinking skills Satisfaction	Writing Vocabulary Grammar	-

**B. Gamification Elements for CFL Learning**

For CFL learning in digital settings, the evaluated articles employed a range of gamification elements (dynamics and mechanics). Audio, sound, record, point, score, level, and rank were the most used elements for gamifying CFL learning. Adventure, surfing the web, notification, restart, error rate, and so on were the least often employed game elements for gamifying CFL learning settings. Table III shows the statistical information of the gamification elements and the frequency with which every game element is employed in the examined articles.

TABLE III: THE FREQUENCY OF GAMIFICATION ELEMENTS USED FOR CFL LEARNING

Gamification elements	Frequency (N)
Audio/sound	8
Point/score	7
Record	7
Level/rank	7
Target/aim/task/goal	6
TV series/movie/clip/video	5
Feedback	5
Selection/option/choice	5
Aid/ help/assistance	5
Song/music/melody	4
Unlocking	4
Assessment/measurement/evaluation	4
Mode	4
Illustration/picture/image	4
Lyric/rhyme	3
Animation/cartoon	3
Topic/theme	3
Question/quiz	3
Leader board	3
Reward	3
Instruction/tutorial	3
Activity	3
Time-limit	2
Background	2
Social network/social media	2

Monitoring	2
Color	2
Story	2
Progress bar/flower growth	2
Report	2
Badge	2
Icon/button	2
Flashcard/ card	2
Encouragement	1
Community	1
Failure attempt	1
Writing board	1
Link	1
Exploration	1
Virtual currency	1
Notification	1
Surfing the net	1
Narrative scene	1
Game character	1
Virtual avatar	1
Collaboration	1
Comment	1
Tool	1
Jigsaw	1
Error rate	1
Restart	1
Adventure	1

**C. Students' Learning Processes of Gamification for CFL Learning**

Almost all the studies that were analyzed found that using gamification for CFL improved learners' experiences (see Table II). 'Enjoyable', 'Fun', 'Motivating', 'Engaging,' and 'Interesting' were the most widely used characterizing adjectives for gamified CFL learning settings. In total, eight publications stated that learners' experiences with gamified CFL learning were 'positive.' Other studies found no use of words like 'positive,' 'neutral,' or 'negative.' In terms of learning processes, no study showed any disadvantages to adopting gamification for CFL learning so far.

#### *D. Students' Learning Outcomes of Gamified CFL Learning*

Content language acquisition was the most reported positive learning outcome of gamified CFL learning (see Table II). The most-reported beneficial learning results for gamified CFL learning contexts were acquiring vocabulary (9 publications), speaking (5 publications), listening (4 publications), writing (3 publications), pronunciation (2 publications), and grammar (1 publication). Other learning outcomes were reported in 10 papers in addition to subject language learning (beliefs, motivation, satisfaction, confidence). The most typically reported positive learning outcomes of the gamified CFL learning were motivation (4 publications), confidence (3 publications), beliefs (2 publications), and satisfaction (2 publications).

#### IV. DISCUSSION

This systematic review aimed to present readers with the most up-to-date information on the usage of gamification in CFL learning. To accomplish it, a particular search technique was used with relevant core terms from several databases, resulting in the inclusion of 11 papers. This study then examined these papers from a variety of perspectives and generated quantitative descriptions of scientific research on this subject. Although gamification has been employed in educational settings for a variety of reasons with excellent learning outcomes, the application of gamification for CFL learning is a relatively new subject of research. This also explains why there were so few papers that met the inclusion criteria for this systematic review. Since 2016, most studies on this topic have been published, and the number is growing. The current increase can be linked to the increased popularity of this field and the potential benefits it might offer to CFL learning.

Gamified CFL learning has been used at all levels of education, from pre-school to higher education, with a slight preference for higher education. This demonstrates the expanding popularity of this method at all levels of schooling. Gamification has also been utilized to create a variety of learning environments in the form of applications for CFL learning. Phones, tablets, computers, and virtual reality headsets are examples of gadgets. Because of this diversity, future study in this domain, as well as the application of gamification for CFL learning, is anticipated to be successful.

Following that, this study concentrated on the kind of gamification components employed in CFL learning. Although several game elements have been employed in CFL learning, there was no clear pattern as to which game elements are best for specific aspects of learning processes and outcomes. The inclusion of audio/sound was the most widely employed element for gamifying CFL learning. This is not unexpected, given that audio/sound is a strong instrument that is commonly employed in the field of gamified CFL learning to lessen the difficulty of Chinese language learning, challenge students' ingenuity, provide instructions, and prepare students for verbal communication [2,48].

This study also investigated the perspectives of learners and the varied learning outcomes of gamified CFL learning. Learners generally have a good experience when engaging in

gamified CFL learning. Gamified CFL learning settings are generally described as entertaining, fun, motivating, interactive, and interesting by students. The reason for this is that creative learning techniques like gamification may match the requirements and desires of 21st-century students while also providing novel answers to contemporary CFL pedagogical issues [17], [24], [27].

The most often mentioned positive learning effects of gamification for CFL learning were vocabulary. Almost all the papers examined focused on content language acquisition in terms of vocabulary. Other language skills (e.g., writing, speaking, listening, and reading) and components were also targeted through gamified CFL learning (pronunciation and grammar). In addition, most peer-reviewed papers tended to reflect good effects in terms of students' views, motivation, satisfaction, and confidence). Such a wide range of specified effects highlights the potential benefits of gamified CFL learning.

#### V. CONCLUSION

This systematic study provides a summary of the current state-of-the-art in gamified CFL learning. Because gamified CFL learning settings have begun to emerge as a potential subject, such a thorough study is required. This review aims to contribute to how research on gamified CFL learning can be conducted. It explains how to take use of gamification's potential advantages for CFL learning and how to improve students' motivation.

Furthermore, difficulties with the technique, design, process, and measures of the most widely cited papers cause researchers to be wary about the outcomes of these studies. Lack of a control group, lack of a pre-and post-test design, short research duration, and small sample size of the examined articles, are only a few examples. All these shortcomings and limitations in the examined papers suggest that additional clear empirical investigations are required in this subject. Future study should address these issues and perform empirical research in the field of gamification for CFL learning under more strict settings to offer solid results that can be applied to other learning contexts.

The most of studies on the use of gamification for CFL are descriptive according to the reviewed study. For example, none of the publications have stated which game elements may be used primarily to improve certain learning outcomes. It's unclear which game elements are most beneficial in boosting certain facets of CFL learning experiences and results. Because the reviewed papers could not show obvious relationships, this might be interpreted as one of their primary flaws. To address this issue, the future study may investigate how each single game element contributes to each part of the learning outcomes on a micro-level.

#### CONFLICT OF INTEREST

The author declares no conflict of interest.

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