Developing Chinese Matching Games: From Inception to Completion
(创建中文配对游戏)

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Abstract: There has been a growing interest in incorporating digital games into language instruction. Theoretical and empirical studies on gaming and language development have suggested some pedagogical advantages to using digital games in language teaching and learning. This article addresses the following questions: Can instructors learn to create games for their students? If so, what are the steps to develop digital games that are appealing and educational as well? The focus of this study will be on an experiment that the author recently conducted which resulted in a set of matching games for beginners of Chinese. In describing the process from the inception to the completion of a game, we hope to shed light on the role of gaming in teaching and learning the Chinese language.

摘要：语言教育者已逐渐将数码游戏纳入语言教学。这个方面的理论和实证研究表明，数码游戏因其特点有利于语言的教学。本文试图探讨中文教师能否参与以及如何研发教学游戏这两个问题，重点记录作者为初学者创建中文配对游戏的尝试过程。本文介绍作者的研究成果，意在引起中文教师对此领域的关注，起到抛砖引玉的作用。

Keywords: Developing digital games, matching games, Chinese language teaching

关键词：创建数码游戏、配对游戏、中文教学

1. Introduction

In action research conducted on the perception of classroom activities by college learners of Chinese, Chen (2007) found that most of her participants regarded games as more effective and enjoyable than quizzes and homework. This is not surprising because the current generation of students, known as “digital natives,” spends 5,000 to 10,000 hours (out of their total four years at college) playing video games but devote only 5,000

hours to reading books (Prensky, 2001).[1] In a survey of extramural English language-related activities among Swedish youth aged 11 to 12, Sylvén and Sundqvist (2012) found that those children spent more time playing digital games than watching TV or listening to music. No doubt, games consume a significant portion of time in students' daily life. Interestingly, researchers found that "gamers" play various types of games throughout different stages of their lives (e.g., Götzenbrucker & Eludamos, 2009; Quandt, Grueninger, & Wimmer, 2009; Chik, 2014). Takahashi (2015) projected that the video gaming industry will increase by 30% from 2010 to 2019, reaching $19.6 billion in revenue, suggesting that the popularity of these games will continue to increase.[2] While some games are "designed purely for fun and entertainment" (Whitton, 2010, p. 199), many have been utilized in education by professionals of various disciplines, including teaching and learning world languages (e.g., Caillois, 1961; Gee, 2007; Reinhardt, 2012; McGonigal, 2013; Sykes & Reinhardt, 2013; Sykes, 2018).

What is a game? Why is its appeal so powerful that serious educators have turned their attention to it as a potential instructional tool? Pearce (2002) states that a game is a structured framework that consists of: a goal; obstacles; resources; rewards; penalties, and; information. Khine (2011) defines the character of game playing as consisting of "rules, goals, engagement, challenge, feedback, fun, interactive, outcome, and immediate reward" (p. 121). In his book *Language Play*, *Language Learning,* Guy Cook, an applied linguist, distinguished "games" from "play," though he noted that these two words are interchangeable in many cases. According to Cook (2000), "game" has two different senses. In general, "'game' is used to describe a range of activities…" Specifically, a game "refers to intricate, rule-governed, and culturally variable competitive activities" (p. 127). While "play" is a "free activity" and "rule-governed," it is "not serious" (p. 112). As structured activities, both "game" and "play" can engage learners to study. A digital game is designed to be played on an electronic device, such as a computer, smart phone, iPad, or videogame console. As Khatibi and Cowie (2013) remarked that, "games, whether they are digital or not, embody some specific features that facilitate learning… Digital games also provide the learners with a platform that supports interaction..." (p. 35).

Given that learners in the 21st century are exposed to a wide variety of emerging and evolving technologies, the teaching approaches, methods, and strategies that performed well for students of former generations might not be as effective for this generation. Hence, some researchers suggest a change of pedagogy. For example, Prensky (2007) proposed incorporating technology into the classroom to accommodate learners with different backgrounds and needs. Khatibi and Cowie (2013) pointed out that to help today's students learn, educators must connect to them by acknowledging that digital games are a significant part of their lives. Godwin-Jones (2014) remarked that integrating gaming into language learning is a "winning situation for both students and educator" (p. 9). Based on the research in the field, Sykes (2018) concluded that the

[1] They spend 10,000 hours speaking on cell phones, 20,000 hours watching TV, and 250,000 hours sending messages.

[2] In Duggan's (2015) survey of 2001 Americans, 49% of them reported about playing games and 10% considered themselves "gamers."

"incorporation of digital games into world language teaching and learning offers interesting and varied possibilities" (p. 220).

Over the past ten years, numerous theoretical and empirical studies have been conducted on digital gaming and language development (e.g., Pomerantz & Bell, 2007; Thorne, 2008; Thornet et al., 2009; Talak-Kiryk, 2010; Benson & Chik, 2011; Reinders, 2012; Peterson, 2013; Khatibi & Cowie, 2013; Godwin-Jones, 2014; Lan, Fang, Legault, & Li, 2015; Ketterlinus, 2017; Sykes, 2018). These studies have found many pedagogical advantages of digital games in language teaching and learning. Pomerantz and Bell (2007), for instance, observed that gaming introduces "fun" and "creativity" to the language classroom. Gameplay motivates learner autonomy which, in turn, leads to the retention of what is being learned. Prensky (2007) argued that the reasons why a digital game facilitates learning are its features of engagement, interactivity, and the combination of the two aspects. Sylvén and Sundqvist (2012), in the previously-mentioned study of the young Swedish subjects, discovered that frequent gamers (those playing games 5 or more hours a week) achieved the highest scores on English proficiency tests, followed by moderate gamers and non-gamers. The researchers concluded there was a positive correlation between L2 gaming and L2 learning. Godwin-Jones (2014) noted three benefits. First, gamers, while participating in a "massively multiplayer online game," are inspired to use the target language actively in a socially appropriate context. Secondly, as the gaming system provides continuous feedback, players are encouraged to repeat, revise, and reproduce constantly. Finally, players enjoy playing because of a sense of accomplishment.

Despite the extensive literature of gaming and world language education, few studies develop Chinese games for learners or examine the learning of Chinese in a gaming context. Yao and McGinnis (2002) and Chen and Fellows (2019) are two notable exceptions. They create games or game-like communicative activities for the Chinese classroom. Lan, Fang, Legault, & Li (2015) investigated how the Virtual Environment (VE) impacted the L2 acquisition of Chinese vocabulary and showed that the VE was able to accelerate the learning of vocabulary. As L2 gaming has been shown to facilitate L2 teaching and even enhance L2 learning in some aspects, it is appropriate that Chinese language teachers examine some questions in this regard. For example, are there any commercial digital games that are useful in the Chinese classroom? If so, what needs to be done to integrate them into the curriculum? Since instructors know their students better than anyone else, can they learn to create games for their students? If the answer is "yes," what kind of games should they create? What are the steps to develop digital games that are appealing and educational as well? This article attempts to address some of these questions. The focus will be on an experiment that the author recently conducted which resulted in a set of matching games for beginners of Chinese. In describing the process from the inception to the completion of a game, we hope to shed light on the role of gaming in teaching and learning Chinese.

2. Why Gaming for Learning Chinese?

Learning a language requires a strong commitment. However, it rarely yields an immediate satisfactory outcome or instant gratification. The process is time-consuming and challenging. The learners' motivation and responsibility are among the many factors that contribute to a successful experience. A good learner holds an enduring interest in the language, keeps practicing, endeavors to use the language whenever and wherever he or she can, and strives for communicative competency. Such an active attitude and responsible learning behaviors are valued by those who advocate communicative language teaching (CLT) (e.g., Hymes, 1972; Krashen, 1982; Howatt, 1984; K. Johnson & J. Johnson, 1998; Spada, 2014). Under the philosophy of CLT, the instructor is just a "facilitator" or "planner" who engages learners to study by offering them a supportive learning environment (Richards & Rodgers, 2001). Instead of feeding students knowledge about grammar, the instructor formulates meaningful tasks to maximize learners' use of the language. Students thus become active participants in the process by interacting with others. In this way, students learn to communicate in the target language. Student-centered learning and the meaningful use of instructional materials are the essence of CLT.

Games for language learning, as argued by Sykes and Reinhardt (2012), possess some inherently important features. First, games have a learner-directed goal orientation, which drives learners towards their own objectives. Secondly, games provide plenty of opportunities for learners to interact with games and with other gamers while playing. Third, individualized and timely feedback encourages learners to constantly improve. Fourth, games create a context that provides a meaningful experience for learners. Finally, learners are motivated to play and enjoy playing because it provides an engaging experience. Obviously, these characteristics resemble the attributes promoted by CLT and reflect best practices in second language teaching and learning. Lee (2016) described the benefits of some game-like learning principles related to gaming.[3] When one is involved in playing games, he or she is a participant. Learning happens by doing. Games provide ongoing challenges with constant and helpful feedback. If a student fails, the failure is reframed in a new iteration. In this process, learning feels like play, with no stress or struggle, hence reducing affective filters (Krashen, 1982).

Researchers in the field distinguish game-enhanced learning from the game-based learning (e.g., Godwin-Jones, 2014; Sykes, 2018).[4] The former refers to the use of commercial, off-the-shelf games for learning while the latter includes the use of digital games designed explicitly for the teaching and learning of world languages. Even though the international Edutainment (i.e., *education* and *entertainment*) Conference was initiated in China in 2006, and has been held there a few times since, almost nothing has been published on game-supported learning with respect to teaching Chinese as a second

[3] Gee (2007) identified 36 learning principles present in many of the games.

[4] Sigurðardóttir (2010) classified 11 educational games: games for dividing larger groups into smaller groups, introduction-games, group games, physical games, scavenger hunt games, educational games, theoretical expression games, drawing and coloring games, educational card games, word games, story games, and question games.

language.[5] This is puzzling. But if we take into consideration Chinese views of the word "game," we might understand this situation. When the sense of "game" in the context of learning is translated into Chinese, it is *yóuxì* 游戏, meaning "play." Chinese renditions for "play," "pastime," and "play games" are all *yóuxì* 游戏. In the 6th edition of *Modern Chinese Dictionary* (Institute of Linguistics, 2012), *yóuxì* 游戏, when used as a noun, means *entertainment*, and refers to *play* when it is a verb. The English phrase "play games" is translated as "*wán yóuxì* 玩游戏." To many Chinese, parents in particular, *xuéxí* 学习 [learn] or yánjiū 研究 [study] is serious and painstaking work, while *yóuxì* 游戏 is not. Furthermore, the word *yóuxì* 游戏 has some derogative connotations. Playing games in kindergarten is fine, but pupils would be discouraged or criticized for doing so in elementary school. In fact, buried among much homework and assignments in preparation for numerous tests, Chinese students are deprived of opportunities for play. Students are expected to work diligently on school subjects, while instructors are supposed to teach wholeheartedly. As such, serious teachers would require students to spend all their school time and beyond "working" on subjects rather than "playing" educational games. These cultural assumptions were captured in Chik's (2012) study, which examined the perspectives of students and teachers in Hong Kong about digital gameplay for autonomous foreign language learning. Chik (2012) found that teachers considered gameplay as an independent activity, but not connected with language learning and use in gamers' personal and social worlds. Most of the teachers in the study thought that English learning through gaming was not possible for most gamers. Some teachers disapproved of online gaming, considering it a waste of time.

Further research should be conducted to explore attitudes towards the use of games in education.[6] This article examines how digital games can help meet the pedagogical needs of learning Chinese. As is commonly known, Chinese is one of the most difficult languages for English speaking learners due to tones or the writing system or both (e.g., DeFrancis, 1984). The difficulty with tones is self-explanatory because of tonal features. From learning perspectives, learners must first perceive the subtle nuance of each of the four different pitch patterns. The level tone (or the 1st tone), the rising tone (or the 2nd tone), the dipping tone (or the 3rd tone), and the falling tone (or the 4th tone) take time to get used to for most beginners, particularly so for those who are not "musical." When reading *pinyin*, a Chinese Romanization system, learners must identify the four tonal representations, and determine which diacritic stands for which tone. Marked by the four diacritics, ˉ, ˊ, ˇ, ˋ, placed on the top of the primary final (i.e., vowel), these tone graphs which look simple may appear counter-intuitive to learners, as argued by Bar-Lev (1991). According to Bar-Lev (1991, p. 8), "Most Americans can no more easily remember diacritics than numbers of the tones themselves." This suggests that the conventional method to represent Chinese tones is as confusing and perplexing. Not only does it fail to alert the learner that each of the tone accents is an essential part of a sound unit, the tone graph is not meaningful enough to remind the learner that each syllable carries a unique tone. In other words, what learners see does not match what they

[5] See Zhang et al.'s (2010) *Proceedings of the 5th International Conference on E-learning and Games*.

[6] Whitton (2012) reported some problems of the acceptability of games in formal educational contexts. Also see Duggan (2015) for public debates about "gaming and gamers."

hear. Furthermore, unlike English, which seems to have "tone" or rather "intonation" at the sentence level, for example, a rising tone for posing a question or a falling tone for making a statement, Chinese tones are lexically localized. Thus, when it comes to the production of tones, someone speaking English only needs to raise or lower one's pitch at the end of a sentence. However, to speak Chinese one must twist his or her tongue for almost each word.

In terms of the difficulty with the Chinese writing system, Chinese characters are composed of radicals rather than an alphabet. A radical is a basic element that has its unique image, sound, and meaning. In most cases, a radical is a character itself. Sometimes a radical may have a variant. In that case, it cannot appear alone as a character, as shown by "亻"—a form of the radical rén 人 [people]. Most Chinese characters are made of two or more radicals. Thus, the journey of learning to read and write Chinese starts with each individual radical. In addition, being logographic in nature, Chinese writing does not carry any association between how a syllable is pronounced (i.e., the *pinyin* form) and how it is written (i.e., character). Thus, to learn each radical or character, one must memorize three elements simultaneously: image, pronunciation, and meaning.

Most beginners find Chinese tones and characters difficult. Requiring students to learn both at the same time is not effective. DeFrancis (1966) once proposed diagraphia to deal with such an issue. That is, at the beginning stage, the instructor only focuses on pronunciation and speaking. Only when the learners feel comfortable about sounds and tones, does the instructor start to introduce the Chinese writing. This proposal addresses one objective at a time, allocating a period of time to learning the *pinyin* system before students start to learn characters. To strengthen the learner's aural and oral skills, DeFrancis compiled his textbooks in two different versions: one in the form of *pinyin* and one in the form of characters. This solution has proved helpful to learners, as his 12-volume "DeFrancis Series" became the most widely used teaching resources in the 1970s and 1980s (e.g., Chen, 2013). Packard (1990) compared the learning outcome of a "lag group" (i.e., studying *pinyin* exclusively for three weeks before the introduction of character) with that of the "no-lag group" (i.e., studying *pinyin* and character at the same time in the first week). The findings showed that the students in the lag group were significantly better than those in the no-lag group in phonetic discrimination, and they were significantly more fluent in oral production.

Regardless of the length of time devoted to the learning of *pinyin* before the introduction of characters, the two elements are challenging for beginners. It is also obvious that the rote learning of these forms is absolutely required. For learners of Chinese to reach an ultimate proficiency in the language, they must experience numerous repetitions of different tones, various characters, new words, special collections, linguistic patterns, etc. The question then is whether the current "digital natives" or "game generations" (Prensky, 2001; Prensky, 2007) can endure such a long and tedious process. It would be difficult to retain their enthusiasm because of boring repetition unless they are extremely motivated or disciplined learners. Digital games address these learning issues. This is because when playing games, learners are fully engaged in achieving the goals without consciously realizing all the manual and mental repetitions,

thereby not only reducing boredom and tediousness, but increasing effectiveness and efficiency. Along the lines of remark by Godwin-Jones (2014) "gameplay should not be introduced in a language classroom without an awareness of the practical, pedagogical, and personal issues involved" (p. 14), we argue that the learning issues of Chinese tones and characters are rationales for the incorporation of games into the teaching process. If there are no such digital games to be found that address the issues, then let us create one.

3. What Games Are Appropriate?

As illustrated above, whether it is to learn tones or characters, beginners must be able to identify an oral or visual form and produce them. Assuming that learning Chinese implies a transformation from not knowing how to pronounce a word to being able to produce sentences, from struggling with tones and characters to being able to use them comfortably, we believe that the fundamental activity is memorization. Bilbrough (2011) claimed, "There is no learning without remembering. And language learning—perhaps more than most forms of learning—places huge demands on memory" (p. 1). The memory skill, argued by Bilbrough to be the fifth skill of language learning, is vital for the development of the skills of listening, speaking, reading, and writing. Remembering language involves encoding, storage, and retrieval, supported by certain parts of the brain. In their research that examined the neuroscientific mechanisms involved in language learning and gaming, Khatibi and Cowie (2013) found that both share certain aspects of the same processes. They deduced that "the memory of previously encountered situations would facilitate both processes since what we remember serves as a foundation for learning new information simultaneously" (p. 26). This implies that a game for building memory would benefit the learning of tones and characters. Therefore, we decided to create a means for learners to perform matching exercises to reinforce the associations among different elements of a given character, including its pronunciation with a correct tone, its meaning, and its image. Based on such an understanding, eight matching pairs were conceived, as shown in Table 1.

Table 1 8 Pairs of Matchings

Category	**Example**
Matching *Pinyin* to English	rén ⟷ person
Matching Character to English	人 ⟷ person
Matching *Pinyin* to Character	rén ⟷ 人
Matching *Pinyin* to Sound	rén ⟷ 🔊
Matching Character to Sound	人 ⟷ 🔊
Matching *Pinyin* to Tone Graph	rén ⟷ ↑(35)
Matching Character to Tone Graph	人 ⟷ ↑(35)
Matching Radical to Radical	人 ⟷ 人

Except for the last one, all the above seven categories have one thing in common: enabling learners to build an association between the two components. The repeated exposure to these elements throughout the matching game will help learners to retain

these connections, which eventually become a part of their own mental repertories. The last pair is a combination of two radicals forming a single, new character of which there are two models. The models can be either a semantic-semantic compound or a semantic-phonetic compound, representing two productive ways to form Chinese characters (e.g., Sun, 2006). These eight matchings encourage and push learners to develop their memory skills, which will help them recognize, store, retrieve, and produce tones and characters.

4. How to Develop Games?

With the general principles of the matching game outlined in the above section, the next question is: how to implement the design? Another immediate and more crucial question is: which tool to use for creating the matching game? The criteria of such a tool should be simplicity and ease of use. That is, the tool must be free, easy to learn, but have a wide range of practical features. Along these guidelines, UNITY was selected as the tool.[7] As an open-source tool, UNITY is a leader in the global game industry. While it is claimed to be easy, UNITY involves coding in C#, which is a daunting task for language teachers who are not trained in programing and do not have time to do so. After taking three tutorials about the basics of UNITY, the author concluded that it would be unrealistic to learn how to code in C# first and then to implement the matching game. In order to produce a game-like effect for the anticipated game design while maintaining the pedagogical goal, the author decided to adopt a practical approach—to purchase a commercial product instead of creating one and then to modify it by inserting instructional material. Such a short-cut, providing it is legally permissible and technically feasible, would greatly facilitate the development of the game.[8]

After many searches in the UNITY Asset Store, the author located the Matching Game Template created by Puppeteer (Abdulqadir, 2017) and purchased it. This template is an action-packed game that offers attractive features: 1) it supports different operating systems, like PC/Mac, iOS, and Android; 2) it is easy to customize, and; 3) it includes all the key assets, such as graphics, sounds, and the source code. The template also includes user-friendly documentation. Above all, as a certified UNITY developer specializing in creating game templates, the builder "aims to produce high-quality packages with complete functionality to give other developers a head-start" (Abdulqadir, 2017). Online support is also available.

In developing the Chinese matching game using this template, it was important that the basic mechanism of the template be understood. By playing the game and studying the documentation, the author came to understand the logic of the game. However, as a novice to UNITY and game creation, the author could not determine how to insert Chinese characters into the gaming system. Without resolving this problem the

[7] c.f. http:// www.unity.com. The author is most grateful for Veronica Armour's recommendation of this tool.

[8] See Reinders and Wattana (2012) for modifying an existing game, *Ragnarok Online*, the most popular massively multiplayer online role-playing game in Thailand, for educational purposes. Also, see Vandercruysse et al. (2013). Again, I thank Veronica Armour for her help.

gaming development could not proceed. The author thus contacted the owner of the template for help. Amazingly, the owner immediately provided the help that was needed. With that initial assistance and considerable consequent support, and with many hours of hard labor, the author was able to produce the first version of a set of three matchings, followed by a second version of four matchings. Eventually, a third version of all the eight matchings was completed. The first and the third versions of the games are available for play on the site http://tltc.shu.edu/chinese/Game/. They work with either FireFox or Chrome browsers. The second version of the game was created for Android-based mobile phones.[9] The interface of the game is shown in Fig. 1. Table 2 and Table 3 list the screenshots of the eight possible matchings.

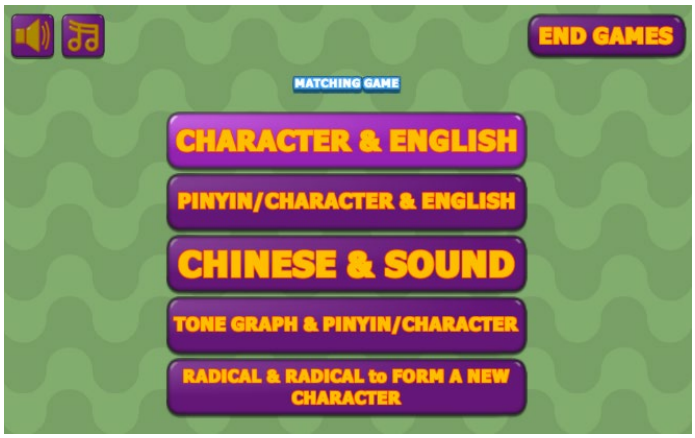


Figure 1 Interface of the Matching Game

As shown in Fig. 1, a player can click any of the five categories to start the game. The function of each object is self-explanatory.

Table 2: The Screenshots of the Matching Pairs:
Chinese to English; Tone to *Pinyin*/Character; Character to Character

Categories	Examples
Matching *Pinyin* to English	
Matching Character to English	

[9] The author is willing to provide the APK for users of Android phones upon request.

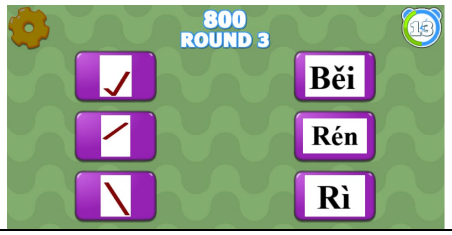
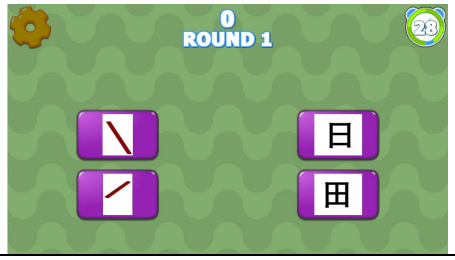
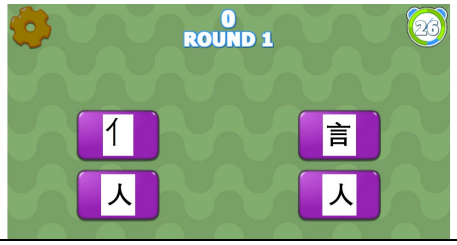
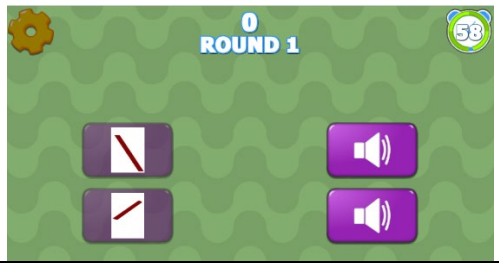
Matching *Pinyin* to Character	
Matching Tone Graph to *Pinyin*	
Matching Tone Graph to Character	
Matching Radical to Radical	

Table 3: The Screenshots of Matching Pairs: Tone Graph to Sound; Character to Sound

Categories	Examples
Matching Tone Graph to Sound	
Matching Character to Sound	

A few words are in order to describe how the game works. Clicking "Character & English," for example, the user will be presented with two pairs of characters and English words. If the matching of the first pair is correct, that pair will disappear, and 100 points will be awarded, shown on the top middle. If not correct, the two items remain on the screen. When the two pairs are finally matched, the player advances to the second level, which has three pairs. For each following level, one more pair is added, while the time is reduced, as shown by the timer icon on the top right. As the level of difficulty increases with more pairs popping up to be matched, creating complexity and confusion, so do the award credits, with 100 more points added for each matched pair in the higher level. When the player matches all the pairs within the given time, he or she wins the game! This makes the task challenging and fun.

This matching game, simple as it may be, fully reflects the major characteristics that a game should have, as defined by Pearce (2002). Winning the game is the goal. Each extra pair added with less time creates obstacles, preventing the player from reaching the goal. When a pair is matched, the reward is a score of 100 points. This further stimulates and motivates the player to work harder so as to achieve ultimate victory. When time runs out and there are still pairs to match, the game is over, resulting in penalties. Most players will likely repeat the game in hopes of performing better. Through repeated trials with feedback, fun and interactive engagement leads to learning. Each matching, correct or wrong, is an informative and meaningful experience, helping the player to build and strengthen the association between two related items.

5. Discussion and Conclusion

Creating a digital game is a major undertaking for language teachers, but it is achievable. Throughout this experiment, the author learned valuable lessons. Building a game involves three steps. First, determine the pedagogical goals, because they justify the needs of introducing games to the classroom. What are the linguistic phenomena that usually cause problems for learners of the language? Why are those elements difficult? Are they related to each other? What can a game do to support learning? Identifying these learning issues is the first step. By clarifying these concerns, consider the most appropriate format of the game for different learning targets. When designing games, focus on the user's experience. Endeavor to make the game stick to the learning goal, not just for the sake of fun, because gaming, like technology, should be a means to help achieve what could not be achieved as effectively by other methods (e.g., Oxford & Oxford, 2009). Having designed the game, proceed with its implementation. A good developing team should consist of: 1) a savvy developer who specializes in game creation; 2) a well-informed instructional designer who knows educational technologies, and; 3) an experienced language teacher who understands pedagogical requirements. Joint efforts from these experts are ideal but not always feasible. A practical recommendation from the author is to purchase a game and adapt it for educational purposes. During the process of gaming development, work closely with the builder of the game template and discuss issues with the instructional designer regularly for feedback and suggestions. The current experiment is in accordance with the spirit of approaches that Whitton (2012) proposed to

solve the problem of cost related to the purchase of commercial games and to the time needed for educators to attain the skills to develop games. One approach involves educators trying out free or inexpensive game development toolkits and techniques to create games. For educators who are interested in developing matching games, the author recommends the template as described in this article.

Through the experience gained undertaking this experiment, the author plans to develop more games. There are two directions in this regard. One is to engage the students of Chinese to create more matching games based on the current template. A pilot study of this will be reported in another article.[10] The other is to create new games of different types. To that end, Chinese characters remain one of the primary focuses. For example, one possible game might require users to search for a correct character from a pile of characters based on a given pronunciation, visual image, meaning, or a combination of the three. This kind of identification game will help reinforce learners' familiarity with characters. Another potential game would involve Chinese grammatical points that are confusing to learners. For instance, prepositional phrases such as "shàngkè yǐqián" 上课以前 [before class], "xiàkè yǐhòu"下课以后 [after class] always pose learning problems. It is common to see learners' utterances like "yǐqián shàngkè" 以前上课, and "yǐhòu xiàkè"以后下课. This is because these prepositions, yǐqián 以前 [before] and yǐhòu 以后 [after], are head finals in Chinese, which is the opposite word order of their English counterparts. Related to this phenomenon is the Chinese structure where the locative phrase usually occurs before the verb, such as "zài túshū guǎn gōngzuò" 在图书馆工作 [work at the library], whereas for certain verbs the locative may appear post-verbally, e.g., "tǎng zài chuángshàng" 躺在床上 [lie in bed]. Chinese relative clauses require the modifier preceding the nominal, different from English, which has a reverse word order regarding the two elements. All these challenges would make good material for a game on word order. Chinese idioms would be another interesting candidate, as they have a rigid word order and wording, which learners often find difficult.

Having succeeded in creating Chinese matching games, the author observed that these games have three major benefits for the teaching and learning of Chinese. First, students can play the games to learn and review material. Available online, players can access the games anywhere and at any time. Second, the instructor can use the games as teaching resources in the classroom to engage student learning. The third benefit is that the games can be recycled with different content. For example, the author initiated a pilot study in the spring of 2018 in which students enrolled in the second part of Introductory Chinese were able to use a template to create additional matching games.

[10] The author initiated a pilot study in the spring of 2018 in which students enrolled in the second part of Introductory Chinese created more matching games. Working in teams of two, each group was required to produce a set of matching games for the vocabulary of one chapter of *Integrated Chinese, Level 1, Part 1*. The students were provided with the game's template and step-by-step instructions. The students ultimately produced six sets of matching games covering six chapters of the textbook.

To conclude, the author anticipates conducting empirical studies in the future to compare the learning outcomes of Chinese tones and characters via the gamed-supported learning versus traditional learning. Findings of this type of research will provide insight to those who have been exploring the value of gaming in learning world languages and the teaching of Chinese in particular. Positive results of the effectiveness of game-assisted teaching may inspire Chinese language teachers either to seriously consider introducing games in their classroom or to undertake gaming development to empower their teaching.

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