Designing an Application for Learning Chinese

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Abstract. The Chinese language is considered as an extremely difficult language to learn for non-native speakers. Mostly foreigner learners and even Chinese students feel writing part is the biggest challenge in learning Chinese process. This paper presents a mobile learning Chinese application, with consists of the combination of features like character writing, reading, listening, speaking with images, stories, and audios. The application will enhance the memory and make the process of learning Chinese easy and effective for user.

Keywords: Learning Chinese · Chinese character · Heuristic methodology
Application to learning Chinese characters

1 Introduction

Chinese writing is hieroglyphic, different from Latin word system. Chinese characters have more than 80,000, but the most commonly used Chinese characters are about only 3,500. It is easier to remember a Chinese character following certain steps. First, be familiar with the basic radicals of a Chinese character and its innate sense. It help you distinguish 王 (king) 壬 (ancient burden) and 玉 (jade) or 土 (ground) and 士 (knight). The majority of Chinese characters include two or more basic radicals. Radicals build a link to its meaning, a little story to help learner to memorize a character or even a best explanation. For example, the character 明 (i.e. bright) consists of sun (i.e. 日) and moon (i.e. 月). The character 休 (i.e. to rest) consists of a person (i.e. 人) and a tree (i.e. 木) - mentally fix the idea of an exhausted hiker resting against a tree. This rule applies to complex characters as well.

Besides, there are multiple ways to decompose a Chinese character into radicals. For example, 偷 (i.e. thief) can be decomposed as person (i.e. 人) + making a canoe (i.e. 俞) or as person (i.e. 人) + roof (i.e. 人) + moon(i.e. 月) + knife (i.e. 刂). In this case, it makes more sense in a story involving a thief on the roof of a house in moonlight, knife in hand, in order to climb into one of the windows and steal stuff. Stories can be colorful, absurd, racy, and non-sensual even, as long as learner personally find them memorable.

Information and communication technology applications have become an integral part of learning Chinese characters [1]. Smart phone and tablet devices as well as mobile apps for learning language have changed and enhanced foreign language studying in many aspects [2, 3]. These changes can be seen in the avenues in which foreign languages are studied (in the traditional classrooms vs. online). More importantly, these changes can be seen in how foreign languages are studied with integrating technology, which has been found to facilitate learning foreign languages in many efficient and effective ways. This is particularly true about the learning of Chinese characters. Chinese characters are writing scripts that are considered extremely difficult language elements for Chinese characters learners, especially for whose native language does not have Chinese characters or something similar. What has made Chinese characters difficult to learn? How can technology help? This paper tries to address these two questions through a substantial review of related literatures, beginning with identifying the difficulties that exist in learning Chinese characters, following with a discussion of the role that technology can play in learning Chinese characters based on theoretical frameworks. Furthermore, this paper introduces a technology-enhanced character learning model. Lastly, it mentions some popular websites and apps that can be used to help provide daily learning activities for learning Chinese characters, followed by suggestions for new practical application by our design.

2   Our Basic Application

2.1   Survey

In recent years, the number of people learning Chinese language has been increasing quickly. But we can have denied the reality Chinese still is one of the hardest language to learn in the world, both for people whose native language is alphabet-based and people whose native language is character-based.

In order to know the difficulty in learning Chinese process of foreigners, especially Chinese character and find the solution make it simply and easily, we do a small survey for international students in Beihang University, Beijing, China.

Firstly, we randomly select 10 students in class and ask them: "Do you think learning Chinese characters is difficult?" Then we make survey 200 foreigners with the questions "how difficult to learning Chinese characters?" "Which functions do you want for a Chinese learning application?" After collecting data and literature review we begin to establish our application.

2.2   Our Basic Application

Application Description
Our product is "Chinese Panda", shown in Fig. 1, an application to learn Chinese characters easily with English and multi-languages you can choose. Our app's logo use image of Panda, because Panda is the most famous animal in China, representing "Friendly". The size of app is a 65 MB, compatible with IOS and Android.

Fig. 1. Application logo

Features of Application

Chinese Dictionary (Fig. 2)

- User can choose which languages they use.
- User can input Chinese character or pinyin also to get the meaning of the word.
- User can find example to a word and each word is with a HSK level (HSK -汉语水平考试 is the standardized test of Standard Chinese language proficiency for non-native speakers. The higher level of HSK, the more difficulty, so depend on user's level, they should focus more on which words suit for their level.

Fig. 2. Chinese dictionary

Lesson (Table 1)

Table 1. Lesson

Lesson 1	Greeting
Lesson 2	Foods
Lesson 3	Animals
Lesson 4	Games
Lesson 5	Education
Lesson 6	Transportation

- 20 lessons with 500+ characters about different topic, each lesson consists of an average 20 characters. The characters learned in previous lessons are used to build new words in later lessons.

Writing: Animation Demo (Fig. 3)

- Writing system guide how to write a word step by step

Fig. 3. Writing

Listening and Speaking (Fig. 4)

- User can hear chosen words or phrases. After listening the words or phrases user can practice and repeat and compare with original sound

Fig. 4. Listening and speaking

Gaming Features (Fig. 5)

- Use their fingers to draw a line horizontally or vertically over the characters that form the correct word/phrase. Or Matches the word/phrase along with the pictures.

Fig. 5. Game

3   Heuristic Evaluation Method

Evaluation is criteria of Application or Website developing process of design. An evaluation examines usability problems of the application by users or experts. A heuristic evaluation is a usability examination manner, particularly involves evaluators testing user interface and judging its acquiescence with recognized usability rules (the "heuristics").

3.1   User Design (UD) and Future Implementation

We have taken our application for three users to evaluate. Table 2 is the list of evaluator of mobile application.

Table 2. Evaluators

	Sunil Mishra Country: Bangalore, India Language: English, Hindu
	David Logan Country: Warsaw, Masovian District, Poland Language: English, Polish
	Nisarg Shah Country: Ahmedabad Area, India Language: Hindu, English

User evaluate the functions and features of the Application:

- **Visibility of Application:** The App system always giving information to users about running action, by exclusive feedback within reasonable time.
- **User control:** Users want to leave the function at middle, after it will start when the user leaves the function.
- **Help to users, recognize errors, solutions to correct errors:** Application system should be expressed Error messages in simple language mainly shows the problem, and productive methods for problems solving.
- **Consistency and standards:** Obey the Application platform arrangements, Users wish to do different type of words, situations, or actions the reaction same as per function standards.

3.2   User Interface

- **Images:** attractive colors.
- **Layout:** simple.
- **Sound:** high quality.
- **Reaction time:** 145 ms.

4   The Results of the Heuristic Evaluation

After Heuristic Evaluation of the Application, we sum up recommendations from the evaluators: improve writing system, colorful pictures with characters to memory, more interesting games, more interaction among learners. Evaluation results are shown in Tables 3, 4 and 5.

5   Modified the Learning Chinese Application

Throughout the above recommendations from the experts, we have realized that modifying the application plays essential role to improve memory's learners effectively, and to learn Chinese easily.

Table 3. Sunil Mishra's evaluation

Functions of the application	Very bad	Bad	Good	Very good	Excellent
Writing	✓				
Reading			✓		
Listening		✓			
Game		✓			
Memory		✓			

Table 4. David Logan's evaluation

Functions of the application	Very bad	Bad	Good	Very good	Excellent
Writing	✓				
Reading			✓		
Listening		✓			
Game	✓				
Memory		✓			

The application needs be diverse, intuitive, beautiful, and easier to use which will cause learning Chinese effective, and stimulate their interest in studying.

Table 5. Nisarg Shah's evaluation

Functions of the application	Very bad	Bad	Good	Very good	Excellent
Writing		✓			
Reading		✓			
Listening			✓		
Game		✓			
Memory	✓				

From the advantages and disadvantages of the specialist, we have still remained the process and solved the cons such as upgrading more lessons along with four skills (reading, listening, writing, speaking), the memory and more interesting games, additionally social functions.

We will describe in detail as follows:

5.1   Function 1: Dictionary

With varying frequency, participants used all functions of the application. Specifically, they used the dictionary functions heavily because translation feature plays very important role for beginners to understand meanings and remember words. We have used flashcard with each character, pinyin, audio native speakers of pronunciation, and meanings by multi- languages instead of the traditional way of having a text book, dictionary, audio CD player and a notebook to write characters.

And dictionary will be divided into the different subjects such as: fruits, animals, transportations, clothes etc… in order that learners find the easiest. For example, when you want to buy fruits, you are able to open the fruits subject of the dictionary to find a kind of fruit you need to buy such as 苹果–Píngguǒ – apple, or 西瓜–Xīguā – watermelon. Moreover, dictionary will be added functions about taking pictures and scanning images of characters. While you are shopping, and running into a new character you don't know, you could scan its image, the app will take the right character with pinyin and meanings (Figs. 6 and 7).

In additional, many researchers expressed that the human brain is sensitive to the images and sounds, therefore learning Chinese characters with colorful pictures will be

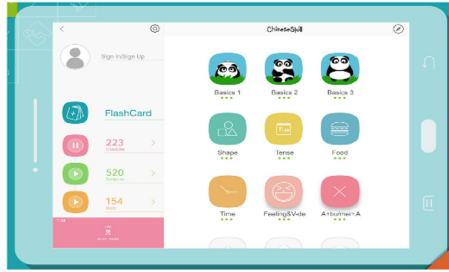
Fig. 6. Dictionary-1

Fig. 7. Dictionary-2

attractive and help to remember more. Three examples are reported by Joseph et al., Hasegawa et al. and Looi et al., who showed that to create vocabulary learning contents in the form of vocabulary-captioned photos or videos to illustrate individual words will help learners remember fast. Also, Chinese scholars have found that identifying the origin of character configurations helps students to recognize and write characters more accurately. Therefore, we have designed Chinese characters related to the colorful images of themselves so that learners are able to reminiscent easily, and besides stories of characters have been brought out by flash or videos to affect their brain deeply. Each word has historical views related the image of characters in order that the students have understood why the Chinese characters have their existing sharpness as now. The below picture shows the process of characters from the beginning period of the Chinese words to the official writing system. For instant, the sun is a round with small inside point at first, after it was changed into a rectangle with an inside straight (Figs. 8 and 9).
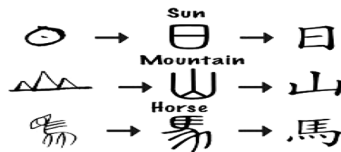

Fig. 8. Dictionary-3

Fig. 9. Dictionary-4

Chinese scholars have found that identifying the origin of character configurations helps students to recognize and write characters more accurately. The application show their students how characters have been formed and changed from their original pictograph over time. However, some characters in modern simplified format may not completely connect with the original characters. The learners are able to study phonetic radicals and remember the changes into the different pictographs. For example, with the "person" word, it has two strokes in one character "人". But if this "person" character is double into the characters "从" with the meanings "follow". If the "following" characters is added a above roof, which is changed "众" by meaning "crowd" (Figs. 10 and 11).
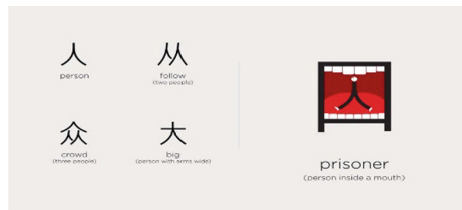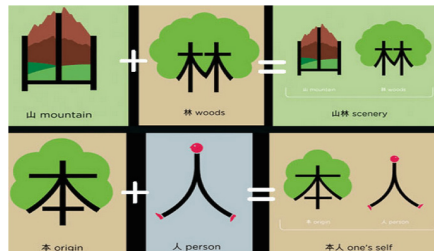

Fig. 10. Dictionary-5

Fig. 11. Dictionary-6

5.2 Function 2: Lessons

In the start-up application, the programmers had established the lessons system with +1000 characters in 20 lessons. After examining, we decided to upgrade +2500 words with more than 40 lessons. In addition, the lessons will be divided into new words following HSK test from low level to high level at 6. This expressed that students have a chance to practice gradually to take part in the HSK exams and receive Chinese certifications.

5.3 Function 3: Listening Skill

With the developing application, it is not only feature that learners can hear chosen words or phrases in the basic app, but people also hear Chinese words, see the meaning of the words, then choose the suitable picture with characters of the words.

Beyond, in the life, students of noncharacter-writing systems feel that the tone of Chinese is very difficult to pick up which makes them met difficulties and misunderstands when hearing conversations with Chinese people. We have built more conversation audios and videos about the daily life such as introduction yourself, going shopping, going to restaurant, etc… which makes learners, especially foreigners feel convenient to communicate to others. Additionally, music the system has various famous Chinese songs participants can practice the listening skill of themselves by hearing, seeing lyrics and singing (Fig. 12).

Fig. 12. Listening

5.4   Function 4: Speaking and Reading Skill

These functions have been evaluated well by the professional experts. However, we have still taken some solutions to complete the reading and speaking skill the best. About speaking skills, beside to the high-quality sound, the programmers have also taken the recording in the application in order to improve the learner's pronunciation. In the start-up, the speakers will record their reading voice after the system will compare to their voice and the native sound in order to check their pronunciations effectively.

About reading skills, the developers have added some small paragraphs or stories by Chinese characters and pinyin so that readers find easy to remind the handwritings and train this skill fluently (Fig. 13).

Fig. 13. Speaking and reading

5.5   Function 5: Writing Skill

The issue increasing difficulties in learning Chinese characters is the under-emphasis of writing characters when teaching in the beginning stages of Chinese language learning. Huo found that stroke order is still relevant when learning Chinese with the use of technology, and claimed that stroke order helped memories characters. Based on the research she carried out with learners of Chinese at a our university, Chung claimed that practicing Chinese characters with a mobile phone had led to the students learning basic stroke order, familiarizing themselves with structural components of the characters, and gaining knowledge of the history and culture behind the words. Therefore, the developer has built a function in order that people know the correct positions of the strokes. The writers will use their fingers to draw again the step-by step strokes indicated on the screen after they can also hear how to their pronunciation. The application has also given ten characters which the writers will practice every day. We create some writing games is mentioned in the below paragraph, the younger can join to practice and entertainment (Fig. 14).

Fig. 14. Writing

5.6   Function 6: Games

A multimodal mobile learning game that aims to help children and young adults remember and increase their Chinese Hanzi vocabularies by engaging them in a collaborative game-like group activity and challenging their creativity and imagination through drawing, taking pictures, and audio recording. Feedback from the experts of the mobile softwares have realized that the basic app's designers had known the uses of the game to make learning and remembering Hanzi characters easier, more fun, and more interesting. However, they have commented that there is a lack of exciting multiform games which makes itself not be attractive to youngers, hence, the researchers should built the high applicability games system and competitive network among joiners.

Beside to the games had been set in the initial basic applications we mentioned the above, the designers have built more three new games with a default list for the three difficulty levels, namely "Easy", "Medium", and "Hard", will be created to help remember characters easier and funnier.

Furthermore, the players can send their challenge to their friends or the other joiners in the social networking. The system will count the scores of each competitor and show the results which help them competitive and practice more to have high scores.

- Game 1:
  Identify the character along pictures. This game show has three stages.

In the first stage, as the below image, the system will take the meaning of word and four pictures with character and pinyin. The players would have to choose the right picture and character which is suitable for the starting means.

In the second stage, based on the crossword puzzle game, the screen has a picture being described with few blank square and Chinese characters. Then, the players will find the right characters to fill the blank.

In the third stage, In Multimedia Word, the players write the correct Chinese character based on hints such as a sketch, a photo, or an audio recording of the pronunciation. The game is said to have been primarily inspired by two popular Chinese games, specifically the String game and Pictionary (Figs. 15, 16 and 17).

Fig. 15. Game 1

- Game 2:
  The players will see 6 strokes of a word, and then they would have to match the strokes of this word together. If they are right, they will take score and hear again.
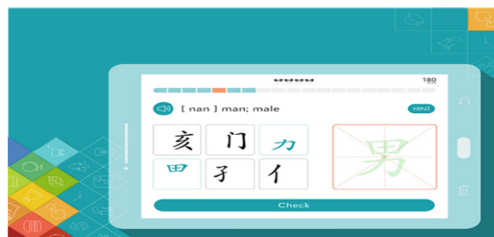

Fig. 16. Game 2

- Game 3:

  Drumming Strokes was based on a famous traditional game where the children form a circle and pass a flower to each other as the drum beats. When the drum beat stops, the person holding the flower is chosen. In the mobile game adaptation, instead of using a flower, a mobile device is used and is passed around. However, before passing the device, the player has to hear the voice of the characters and correctly kick the right characters being flight in the screen, then write one stroke of a given Chinese character. The stroke order also has to be correct; otherwise, the voice of the character sound stops and on the contrary, the person is asked to correct the stroke and must receive a penalty. For the penalty, the player has to again write another character in the correct stroke order. This is done until the joiner writes the correct answer. In the case where the player has difficulty providing the correct answer, the game offers a highlighted clue of the stroke. After successful completion, the sound restarts and everyone passes the device again.

Fig. 17. Game 3

5.7   Function 7: Another Feature

Based on the remind feature in the mobile phone, the designer have created the systems which the users are able to install five characters each day in time you have chosen. Every day in the time, the system will choose five characters randomly with pinyin and the meanings to appear in order that you practice and remember deeply.

5.8   Function 8: Social Networking

The participant has created their accounts in the app to practice and make scores after learning, then evaluate your learning and skills every day. The system connects to the social networking site, Facebook, Twitters, etc… Posting results motivates students to do their best in the different components because parents, teachers, and fellow classmates can view what they have done and evaluate their skills.

Additionally, the environment is shared there are common visual points of reference for everyone. The members of groups can easily collaborate, communicate, and work on group projects. The joiners could connect chat group with the other learners, Chinese teachers, and Chinese friends to discuss each other (Fig. 18).
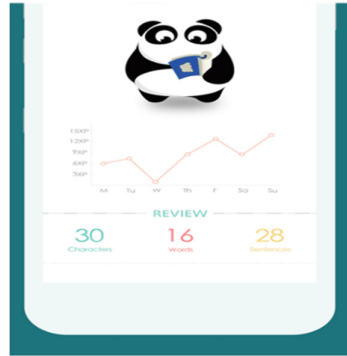
Fig. 18. Social networking

6   Conclusion

With the purpose to support foreigners learning Chinese characters more easily, this report discussed the design, development and use of a mobile application, called Chinese Panda.

Chinese is in the system of hieroglyphs with more than 8000+ characters, so it is difficult for learners to remember them. Therefore, in this application we describe the life history of characters, create the games with images and vivid colors, created miniature social network for exchanging spatial learning, share experiences … to arouse excitement for learners, helping them to learn and remember better.

Preliminary results from research using the survey from learners and assessment of expert shows that Chinese learning with this application help learners feel funny and enjoyable. From there, they learn more effective.

However, the research study time is quite short, so it has a few limitations. Example: The number of participants this research was small, so it would be better to assess the effectiveness of this activity with a delayed test and number of participants larger.

In the future work, we will precise and add measurements should be introduced to explore the effects of Chinese seamless learning activity.

Besides, nowadays modern mobile technologies with new system versions (phone, tablet, PC…) have been developing. We have upgraded suitable reproductions of the application to the technological devices. This will help learners updated the improvement, progress and create attractive for application.

We hope Chinese Panda application would help foreigners easy to learn Chinese, especially Chinese characters.

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