Development of tutorial materials for learning Chinese focusing on pronunciation practice

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Abstract

China is Japan's largest trading partner, and China ranks first in the number of overseas offices of Japanese companies. The economic relationship between China and Japan is getting closer. Japan's direct investment in China has been rising steadily every year. [1] Under these circumstances, it would be beneficial for Japanese university students to study Chinese. In addition, the Japanese have been learning Chinese characters since they were in elementary school, so the ability to read and write Chinese sentences can be improved without difficulty. Many people think that the difficulty in learning Chinese is the pronunciation. However, there are currently few self-study applications that emphasize pronunciation and dialogue practice. Therefore, this paper aims to make an application that emphasizes pronunciation practice.

1. Introduction

The purpose of this research is to develop Chinese learning materials for university students at the beginner's level, mainly focusing on pronunciation practice, so that they can study daily topics and acquire basic communication skills. Its effectiveness will be tested using controlled experiments and so on.

2. Previous Research

2.1 Pinyin and Chinese syllables

Pinyin is a phonetic symbol used in mainland China. It refers to a system of phonetic notation in which syllables are divided into phonetic characters and written in Latin characters. On the other hand, the Chinese syllables are mainly used in Taiwan. It is represented by 37 characters, including ㄅ ㄆ ㄇ ㄈ (Bopomofo). Some of the characters are similar to Japanese kana, but unlike kana, they are not syllabic characters. In addition, while kana is created by using the cursive script and kanji radicals, the Chinese syllables are based on ancient scripts. Pinyin, which uses Latin characters, is thought to be easier to learn for foreigners than the Chinese syllables.

2.2 Difficulties in Chinese Learning

The first is the difficulty of Chinese pronunciation itself. Chinese syllables are made up of 21 initials, 35 vowels, and 5 tones (including the soft tone). There are many combinations, and some of them do not exist in Japanese, so how to master them is a big problem for beginners. Secondly, there are a large number of homophones with different characters and the same characters with different sounds in Chinese, and the correspondence between Chinese characters and pinyin is also a big problem. In addition, unlike English and Japanese, the pronunciation rules of Pinyin itself are also a major difficulty in Chinese learning. [2]

For the Japanese, it is well known that the most difficult part of learning Chinese is generally considered to be to master the tones. In Japanese, the pronunciation difference between homophones is generally distinguished by the difference in the degree of highness or lowness between syllables. [3] In Chinese, every syllable has a tone, and the change of tone has a great influence on the meaning of words. Take an example of a sentence explaining tones that often appears in Chinese textbooks, “妈妈骂马”, pronounced as “Māma mà mǎ”. Every character has the same initial “m” and the same vowel “a”, the only difference between them is the tone. However, this sentence means “Mother scolds a horse.” From this example, we can also find another difficulty in Chinese tones. “妈妈” is a word with the same character, but pronounced as “Māma”. The character behind changes its tone to a soft tone. In Chinese, many characters change tones in sentences.

3. Methods

Among the Chinese textbooks, there are three methods of teaching pronunciation. First, at the beginning of the textbook, focus on teaching Pinyin. This method is thought to be too abstract to dampen students' interest in learning. The other two methods are text writing for learning a specific pronunciation and learning pronunciation in texts on a certain topic. [4] The former method can focus on learning difficult pronunciations, but at the same time, it lacks practicality, and it is easy to bring frustration and reduce learning interest in the early stage. Today's Chinese education researchers prefer to let learners learn common pronunciations by using frequently used words. This method is also used in this textbook.

The textbook will focus on pronunciation practice and will include the following content to help students study basic Chinese communication skills.

First, listen to and study the conversation text. Then, study the words related to the conversation text and practice pronunciation. At this point, we import the iFLYTEK pronunciation evaluation system to evaluate the students' pronunciation. All recorded data is going to be created by Google's Text to Speech.

The content of the course is based on the HSK introductory vocabulary list. To acquire a basic level of Chinese proficiency, students need to learn basic pronouns, nouns, verbs, and learn how to express time, age, money, and numbers. The materials consist of 10 chapters, and about 150 words will be studied.

3.1 Google Text to Speech

Google Text to Speech technology can be deployed to produce natural human-like speech, and an API built on DeepMind's expertise in text-to-speech can produce speech that is very close to human-like. There are over 220 voices to choose from in more than 40 languages and language variants, including Chinese, Japanese, Spanish, and Russian. Without the hassle of recording a new phrase, users can define and select the voice profile that best suits their needs, and quickly adjust it to suit the voice changes they need. [5]

3.2 iFLYTEK Pronunciation Evaluation System

iFLYTEK pronunciation evaluation system can measure the correctness and fluency of the initials, vowels, and tone. With this system, it is possible to evaluate pronunciation objectively based on certain criteria for many users. [6] At the same time, the iFLYTEK pronunciation evaluation system is also used in the HSK test. So it is good for users to get a high score on the HSK test by using the iFLYTEK System in the application.

Table 1 Explanation on iFLYTEK XML output table[7]

Attributes	Annotation
fluency score	Fluency score
accuracy score	Accuracy score
standard score	Feelings express score
integrity score	Sentence perfection score
phone score	Score about initials and vowels
tone score	Score about tones

Among the outputs of the iFLYTEK system, there are four related to scores. The standard score is a score that displays emotion. The integrity score and fluency score are related to the completeness of the sentence, which are considered unnecessary for this application. Therefore, only the tone score and the phone score are used in this application.

Since the iFLYTEK speech evaluation system has no fixed scoring criteria, in this application the score is calculated using this formula:

$$Score = phone\_score * 0.7 + tone\_score * 0.3$$

The score is out of 10 points, 8 points or more will be shown in green, 6 points or more but less than 8 points will be shown in yellow, and 6 points or less will be shown in red.

4. Application Development

4.1 Development environment

In this study, the target device is an Android smartphone, which is developed in Android Studio using the JavaScript language.

4.2 Application usage flow

The following is an example of the screen display when learning Chapter 1. The text of Chapter 1 is about greeting, so users will learn vocabulary related to personal pronouns. Each chapter has a topic and learning the pronunciation of the vocabulary related to this topic after the text is the method of this teaching application.

When you open the application, the main menu

appears. From the main menu, select the chapter you want to study, and the text content will be displayed (Figure 1).

Figure 1 Home page

Press the "VOICE" button to play the audio data (Figure 2).

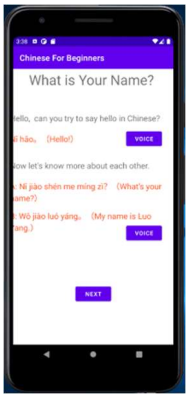

Figure 2 Chapter 1 text

Figure 3 Studying words

Press the "NEXT" button to proceed to the word study (Figure 3). Press the "VOICE" button to listen to the recording, then press "RECORD" to enter your pronunciation, and the iFLYTEK evaluation score will be displayed (Figure 4).

Figure 4 Pronunciation scores

5. Deficiencies

This application is still in development, so there are still some deficiencies that need to be addressed in the future.

First of all, there is no pronunciation method in the textbook. Due to the difficulty of Chinese pronunciation, especially the distinction between some front and rear nasal sounds, and the position of the tongue when aspirating air, it is impossible to accurately convey the pronunciation method only by sound. So when users learn these syllables, it may be difficult to grasp the essentials and increase the difficulty of learning.

Secondly, as described above, Chinese syllables consist of initials, vowels, and tones. However, iFLYTEK's score can only be specific to one word and cannot be subdivided, so users can't understand where their pronunciation is wrong.

Thirdly, the characteristics of language learning require the conversion of short-term memory into long-term memory, but there is a lack of relevant means in this stage. In addition, this application lacks the means to enhance the interest in learning and also lacks the method of review. These issues need to be resolved in the next development stage.

6. Future Work

Regarding the deficiencies mentioned above, the next development has the following plans.

Firstly, to extract syllables that are difficult for users to

master, and to add relevant chapters to learn pronunciations that do not exist in Japanese. This is in order to study the hard part of initials and vowels alone for users. For example, the character “耳”, which has the same mean in Chinese and Japanese, means an ear. The pronunciation in Chinese is Ěr, which does not exist in Japanese. The character “耳” should be the focus of learning.[8]

Secondly, due to the defects of iFLYTEK, there is no good solution at this stage. The application is going to show details about the pronunciations which are under 8 points. So at least, users can know if they were wrong at the initials and vowels or tones. However, as mentioned earlier, Japanese generally have the weakest awareness of pitch, while iLFYTEK has tone scores. In the next stage, it is possible to adjust the weighting of the tone score and the content of the application after confirming the subject's weakness through preliminary experiments. It is also possible to increase the content related to tones and the change of tones.

To convert short-term memory into long-term memory, a common method is to link abstract Chinese characters with pronunciations and real things. [9] In the future, if possible, illustrations will be added to the application to strengthen the user's memory. On the other hand, quizzes after chapters are also necessary as a means of reviewing and enhancing memory. It allows users to understand their own learning situation and enhance their learning motivation. Reinforcing tone-related memory in quizzes could be effective.

This study proposes an application for learning Chinese for university students with a general education level of beginner. In the current application, the contents of Chapter 10 have not been completed yet. In the future, a plan to enrich the contents of the teaching materials by including these chapters is being thought of. In addition, adding functions such as a word book to improve learning efficiency is in the plan. A user-friendly UI/UX is also considered to be designed to increase the motivation of learners to learn. How to design experiments to verify the effectiveness of this application is also planned in the future.

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