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The Effect of Pinyin in Chinese Vocabulary Acquisition with English-Chinese Bilingual

learners

by

Yahui Shi

A Thesis

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree

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Thesis Committee:

Choonkyong Kim, Chairperson

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Abstract

This study investigates Chinese vocabulary acquisition of Chinese language learners in English-Chinese bilingual contexts; the 20 participants in this study were English native speakers, who were enrolled in a Chinese immersion program in central Minnesota. The study used a matching test, and the test contains seven sets of test items. In each set, there were six Chinese vocabulary words and the English translations of three of them. The six words are listed in one column on the left, and the three translations were in another column on the right. All six Chinese vocabulary words were from the vocabulary list. According to students' Chinese vocabulary accuracy, I hypothesized Pinyin, which means Chinese phonetic systems, could help English-Chinese bilingual learners acquire Chinese vocabulary. In addition, this study was conducted to investigate if there were correlations between their Chinese proficiency test scores (HSK, Hanyu Shuiping Kaoshi,), the immediate test scores, and the delayed test scores. Results were exported and analyzed with statistical tests. A paired-samples t-test was used to compare the scores with Pinyin condition and without Pinyin condition. The results showed that Pinyin did help in both the immediate test and the delayed test. A person correlation test was used to compare the HSK scores and vocabulary test scores; it showed only one correlation, between the HSK score and the test score of without Pinyin condition on the immediate test. Thus, Pinyin was possibly more helpful to the students who were at a lower level. Based on the study's results, Pinyin was helpful in Chinese acquisition, especially for beginning learners of Chinese.

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Chapter I: Introduction

In recent years, more and more attention has been paid to bilingual education; vocabulary knowledge plays a key role in reading and writing because the spoken and written use of words is the building blocks of comprehension and communication. Words and their meaning are the basis of literacy development, and a rich vocabulary is essential for a good ability in literacy. Forget-Dubois (2010) claims that the vocabulary development of bilingual children is not only related to literacy ability but also to the development of cognitive ability in the future (pp. 736-749). Therefore, the study of bilingual children's vocabulary acquisition can help improve bilingual education.

These days, more and more students who come from English-speaking countries study Mandarin-Chinese; teaching Chinese in an English-speaking country has become an important project. There is a strong relationship between the building of Chinese vocabulary and literacy. Chinese vocabulary words and their meanings support reading and writing achievements. Hence, vocabulary acquisition is an important component in English-Chinese bilingual education.

My experience teaching in a US Chinese immersion program led me to an interest in Chinese vocabulary acquisition in these types of contexts. There are two modes of immersive Chinese teaching in American primary schools; in one, the whole curriculum (including mathematics, science, social studies, etc.) is taught in Chinese, such as the Chinese immersion school Yinghua in Minnesota. The other mode is to provide students with opportunities to acquire and maintain language skills in both Chinese (Mandarin) and English. The proportion of Chinese and English courses in most schools is half and half, such as in the 28 public Chinese immersion

primary schools in the state of Utah (Zhang & Zhong, 2004). This paper focuses on the second mode: English-Chinese bilingual schools. There were two major goals in this study; the first goal was to determine if Chinese phonetic systems (Pinyin) positively or negatively affect Chinese vocabulary acquisition in the Chinese-English Bilingual contexts. The second goal was to know the relationship between the effect of Pinyin and the Chinese language level of students in the acquisition of Chinese characters. The 20 participants in the study were English native speakers and they were taught 20 Chinese vocabulary words with Pinyin or without Pinyin. After instruction, they had an immediate test and a delayed test that was created by following Schmitt's (1997) vocabulary levels test (VLT) format.

In the literature review section, I review the research on vocabulary acquisition, the instruction of Pinyin, and the role of Pinyin in both the teaching of Chinese as a first language condition and the teaching Chinese as a foreign language condition. In addition, I review the details of the HSK test, which letters stand for Chinese words, hanyu shuiping kaoshi; this is a Chinese proficiency test. In the methodology section, I present the participants, materials, and procedures of my study. Immediately following, the results section provides the findings in this research. In the discussion section, I give the answers to the research questions based on the results. Moreover, I present other interesting findings from the data analysis, the limitations of my study and the suggestions for further research. Finally, the references and appendices provide other information.

Chapter II: Literature Review

Second Language Vocabulary Acquisition

According to Verhallen and Schoonen (1998), people can express simple meaning without grammar while they can't express anything without words. They believe that the four basic skills (listening, speaking, reading, writing) cannot be carried out without vocabulary building. It can be said that vocabulary development is at the core of language acquisition (p. 452).

Richards (1976) points out that second language vocabulary acquisition refers to the quality of vocabulary knowledge or the degree of development of lexical ability. Based on his study, Nation (2003) proposes a classification of second language vocabulary acquisition. He claims that vocabulary can be receptive and productive, which can apply to the knowledge and use of a language (p. 94). Receptive knowledge can help learners recognize the words through listening or reading. Productive knowledge can help learners recall the words that they already learned, as well as be able to use those words in speech or writing.

According to Nation (2003), the knowledge of vocabulary includes three aspects, which are form, meaning, and usage (p. 97). The form of a word includes spoken form, written form, and word parts. Meaning covers form-meaning connection, the concept and the reference, and the associations that come to mind. Usage contains grammar, collocates, and constraints on use (pp. 138-142).

In order to state more about what it means to know a word, Schmitt (1997) supposed that vocabulary knowledge is also connected with the other two dimensions: vocabulary size and the

depth of vocabulary knowledge. According to Qian (2002), vocabulary size refers to the number of words a learner has, some superficial knowledge of meaning. The depth of vocabulary knowledge includes all lexical characteristics, such as phonemic, syntactic, and semantic. In other words, it depends on how well the words are known (pp. 82-83). According to the text from Neville Peat (2008), the relationship between size and depth of vocabulary knowledge depends on how each is measured based on frequency levels.

Based on frequency lists of word families, vocabulary is divided into three different frequency levels: high-frequency words (the most frequent 2000-word families), mid-frequency words (about 7000-word families), low-frequency words (around 50000-word families) (Nation, 2003). Laufer (1999) asserts that studying high-frequency words will help learners not only to become fluent in English much faster but also to improve the depth of vocabulary. For a native English speaker, the vocabulary size to read a newspaper, have a conversation, watch TV and so on is of at least 8000- to 9000-word families (Nation, 2003, pp.13-16). Considering this, it is also important to know how many Chinese words a Chinese learner should know to do the same activities.

Nowadays, according to the *Zhonghua Zihai* dictionary (2017), the Chinese language is made of more than 80,000 characters. This means if Chinese learners knew the 80,000 Chinese characters, they could be able to understand a good number of the words in a text, but not all of them. For instance, a single Chinese character “我” (me) could be combined with “们” (plural marker) to become “我们” (we). Hence, one character can be a single word; meanwhile, it can also be combined with another word. 8,848 high and medium frequency Chinese words and

characters are part of the frequency lists level one to five in the HSK (Chinese proficiency test) (Allanic, 2003).

In Chinese elementary schools, children are expected to learn about 2,500 characters, which are the most used. Then they assimilate about 1,000 more specific ones during middle school and high school. Having a vocabulary size of 1000 of the most frequent Chinese characters should provide them with an 89% understanding of what they read. Chinese students that have finished high school know about 4,500 characters. Meanwhile, according to the Chinese Confucius Institute, Chinese learners need to grasp 100 of the most common characters to have a 42% understanding of the characters they encounter in conversations. In addition, having a vocabulary size of 3,000 to 4,000 characters will allow them to understand about 99% of what's going on TV, on the radio or in the newspaper.

Chinese Vocabulary Acquisition

How do Chinese learners acquire Chinese vocabulary? Li and Wu claimed that Chinese vocabulary teaching and learning covers the integration of the “音” yin meaning sound, the “形” xing meaning form, and the “义” yi which stands for meaning (Li , 2005). According to Xiliang (2010), the primary mission of vocabulary in teaching Chinese as a foreign language is to explain the form-meaning connection. Teachers should both let students master the form (spoken form and written form) of vocabulary, and let students understand the meaning of target vocabulary.

A study done by Liu, professor of bilingual education at Changchun Normal University in China, showed that some Chinese language learners access the spoken form of a Chinese word while they are not able to recognize the written form of that word; this is probably common in

any language when we consider language users who have not yet developed literacy skills in that language. English language learners acquire vocabulary similarly. For instance, if the learners have not yet learned to read in English when they hear words, they may know their meaning; however, when they see the written form of the same words, they may or may not know the meaning. Liu also insists that, in order to help learners build the connection between the meanings and written forms of the target words, teachers should help learners receive written forms of a new word efficiently.

Because of the nature of Chinese characters, most Chinese learners find it difficult to learn, since it is difficult to associate the written form and the meaning of Chinese characters. A study done by Ashworth (2013), showed that, namely, there are three types of language writing systems in the world, which are logographic (et. Chinese characters), syllabic (et. Japanese), and alphabetic (et. English). Syllabic uses symbols for vowel-consonant or consonant-vowel combinations, whereas logographic uses symbols directly to represent concepts. To demonstrate, the Chinese character “我” means “me”, and the Chinese character “你” means “you” in English. On the contrary, alphabetic languages like English use letters for single speech sounds, which are made by consonant and vowel letters. However, even languages using the same type of writing system could have many differences and therefore represent challenges for learners.

For instance, according to Amine (2006), even though both Arabic and English use the alphabetic writing system, it is not easy for English native speakers to learn Arabic; teaching Arabic to English speakers starts from learning the written system, the biggest difference between both systems is that Arabic is written from right to left, whereas English is written from

left to right. Moreover, Arabic does not have upper-and lower-case letters, and this written system is considered as cursive style, which is made by the cursive script. There are 28 letters in the Arabic alphabet, and different letters have their own names. All these differences make it difficult for English native speakers to learn Arabic regardless of both languages using the alphabetic written system. Needless to say, if the written system of the target language is different from the one used in the learners' first language, difficulties would be presented.

As it was noted earlier, there is a radical difference between Chinese and English writing; this issue seems to be relevant to the written form of Chinese and English. The written form can be misleading for learners because there is a big difference between phonological and orthographic vocabulary. Milton (2009) assumes that Chinese characters look like a bunch of unfamiliar lines, on the other hand, the amount of Chinese language one encounters in America is limited since Chinese immersion programs are to some extent new (Brown, 2010).

There is relatively little research on Chinese acquisition in Chinese immersion programs. Lu (2011) conducted a study of Chinese vocabulary acquisition of students in Chinese immersion programs, focusing on the way in which teachers provided vocabulary classes. In her study, Lu shows that Chinese teachers generally use slide shows to introduce and explain new vocabulary. They also use short videos to show the meaning of words, besides, teachers will show examples to let students guess the meaning of new vocabulary. Moreover, Lu mentions that it is possible to use body language to express a word's meaning and increase students' enthusiasm to learn new vocabulary. Based on the results of the HSK test scores, Lu found that the Pinyin (Chinese phonetic system) increased the accuracy of recognizing Chinese characters

in Chinese immersion programs, whether the Chinese learner is at the primary level, intermediate level, or the advanced level. Considering this, we need to know what Pinyin is and the role it plays in Chinese vocabulary acquisition.

Introduction of Pinyin

As we mentioned earlier, English uses an alphabetic system, while the Chinese use the logographic system. Pinyin uses an alphabetic writing system, just like English. According to Chen and Lee (2000), Pinyin is the official phonetic system for standard Chinese (pronunciation) in China, Malaysia, Singapore, and Taiwan. Pinyin was developed in the 1950s based on earlier phonetic forms of Chinese. The Chinese government published it in 1958, and it has been revised several times. The International Organization for Standardization (ISO) adopted Pinyin as an international standard in 1982. This system was adopted as the official standard in Taiwan in 2009. It is often used to teach standard Chinese to both Chinese native speakers and second language learners, and it is helpful for vocabulary learning. It uses the Roman alphabet, presenting the phonetic symbol in Chinese, and it includes four tones, which are high-level tone, rising tone, falling-rising tone, and falling tone. There are four tones in Mandarin Chinese, which are shown as follows:

First tone	a level and higher pitch mā
Second tone	rising, start from a lower pitch and end at a slightly higher pitch má
Third tone	falling rising, start at a neutral tone then dip to a lower pitch before ending at a higher pitch mǎ
Fourth tone	falling, start the syllable at a slightly higher than neutral pitch then go quickly and strongly downwards mà

Chart 1. Four tones in Mandarin Chinese.

The chart shows the tones with special marks above the letters. However, Pinyin without tone marks also can be used in spelling (pp. 241-247). Pinyin is represented by consonants and vowels. The consonants are: b, p, m, f, d, t, n, l, g, k, h, j, q, x, z, c, s, r, zh, ch, sh. The vowels are: a, o, e, i, u. The syllables (zhi, chi, shi, ri, zi, ci, si, er) in Chinese Pinyin is difficult for most foreign learners to pronounce since they do not have the similar sounds in their native languages (Ming, 2009). Pinyin was created to help improve literacy ability and promote correct pronunciation. Pinyin is very different from traditional characters and cannot carry the same kind of information.

Consequently, English native speakers who are Chinese learners can use Pinyin to figure out the pronunciation of Chinese words. Although, they should be aware that Chinese pronunciation and spelling of Pinyin are different from English. Sometimes, Pinyin pronunciation would not correspond exactly to the sounds that each English letter represents. Due to this, in some cases, they may or may not pronounce Pinyin following the English phonetic system.

Equally important, one Chinese character might have four different Pinyin depending on the contexts in which it is used. For instance, the character “长” in the word “成长” means “grow up”, the Pinyin version of it is “zhāng”; this character also means “long” in the word “长度” and the Pinyin version of it is “cháng” (Yu, Zheng, Zhao, & Li, 2006). One Chinese sound is associated with one syllable, and each Chinese character has at least one own Pinyin syllable. There are three parts in a Pinyin syllable, which are the initial, Final and Tone. Initial and final represent the segmental phonetic portion of the Chinese, rather than letter by letter. There are only about 400 Chinese phonetic syllables that cover thousands of Chinese characters. A few examples are shown below:

Initial	Final	Tone	Syllable	Chinese Characters	English Meaning
n	i	ˇ	nǐ	你	you
h	ao	ˇ	hǎo	好	good
t	a	¯	tā	他	he

Chart 2. Three parts in a Pinyin syllable.

The Role of Pinyin in Chinese Vocabulary Acquisition

According to Zhang and Zhong (2004), it is inefficient to learn spoken and written Chinese at the same time when learning Chinese as a first language. Teaching Chinese as a first language in China begins with Pinyin teaching; according to the linguistic principles, Pinyin was based on a scientific and effective analysis of Chinese phonetics. Pinyin helps you pronounce all

of the Mandarin sounds and tones correctly. Pinyin makes vocabulary learning easier and can improve the efficiency of form learning. For example, the Chinese word “繁”, which means “numerous” in English, even though having a complex structure, it can be remembered by the Pinyin “fan”. Therefore, Pinyin makes the distinction between each Chinese phonetic sound clearer, lessening the learning burden of the written and spoken form of the word. The Chinese learners at the beginning level can use Pinyin to recognize vocabulary rather than relying on mechanical memory. According to Chen and Yuen (2011), Pinyin is used for assisting Chinese children in their early vocabulary learning.

The literacy experiment carried out by the government in China in 1982 presented L2 Chinese learners the pronunciation of target words in Pinyin, as well as Chinese characters. The results showed that the combination of Pinyin and Chinese character aided literacy development in the lower grades of primary school (Chung, 2003). Yu, Zhao, and Li performed research on Chinese Pinyin in 2006. They presented a comparative test of an input method using both Pinyin and characters versus the character-based input method. The test showed us that Pinyin could help the students who are in Chinese immersion programs to learn Chinese vocabulary more effectively. In addition, the test results showed that the most popular and conventional way to teach a new Chinese character is to present Pinyin together with it. Based on those findings, Chung suggested that teaching Chinese vocabulary should present learners with the target words with both Pinyin and Chinese characters. (Chung, 2003; Hanley & Huang, 1995; Lee, 1993).

Several studies show the role of Pinyin among Chinese learners to acquire Chinese characters. Yu, Zheng, Zhao, and Li (2006) found a common phenomenon in teaching Chinese in

a second language context. Chinese students can basically master Pinyin in a short period of time, but learning with the written character forms of Chinese needs more time. For example, the word "son" in Chinese is a single character "子". The Pinyin of "son" in Chinese is "zi". When the learner is already familiar with the Roman alphabets and the sounds that are represented, it is easier to learn "zi" than "子". For either a beginner or a high-level student, Pinyin always is helpful in Chinese learning. Zheng and Zhong (2004) suppose that the first thing for foreign students in learning Chinese is learning Pinyin because the phonological forms of Chinese vocabulary are very different from the phonetic system of many languages that use the Roman alphabet. The beginning learners of Chinese cannot pronounce Chinese characters correctly by just looking at the words. According to Gao and Anderson (2001), Chinese is part of the Sino-Tibetan language family, and there is no clear relationship between the languages inside this family. He claimed that Chinese is a unique language and its roots are different from other languages. Even for people who speak other Sino-Tibetan languages in Asian countries, learning Chinese is still challenging.

Pinyin is especially useful as a tool in Chinese vocabulary teaching for any learner who is already familiar with the Roman alphabetic system. Pinyin uses the international Roman alphabet, and English speakers use the same letters in their native language. In brief, when the beginning learners of Chinese are learning the Pinyin system, they will not feel overwhelmed. This reduces the psychological stress in beginners; the internal factors of second language vocabulary acquisition refer to the factors related to learners themselves, such as mother tongue, age, learning ability, motivation, learning strategies and so on. Ransdell, Arecco, and Levy (2001)

conducted a study showing that the more similarities between two languages, the more positive connections there are between them, and the easier it is to learn the target language. In the process of learning Chinese characters, English speakers tend to use Pinyin as a familiar set of phonetic characters. When teachers explain a new word, the most common method for them is to write down the pronunciation in Pinyin, and then teach the meaning of the word. Ransdell et al. (2001) found that when second language Chinese learners encounter Chinese words that they have not learned, they use Pinyin to stand for the Chinese characters that they do not know how to write. Zhang and Zhong (2004) found that the traditional method of teaching Chinese words requires students to learn Pinyin first. They also pointed out that many beginning learners, when hearing Chinese words, think that the pronunciation is completely different from what they commonly hear, so they have enough motivation to learn Chinese words and practice through imitation.

According to Liu (2011), the Chinese textbook in the United States, which is used for teaching Chinese language learners, begins with the Pinyin system, in order to help English native speakers learn new Chinese characters on the vocabulary list. However, a few studies show that Pinyin does not affect Chinese vocabulary acquisition for second language learners. Those studies claim that some intermediate and high-level learners just use English translation to memorize the corresponding Chinese characters and ignore the Pinyin in the textbook (Hanley & Huang, 1995; Yu, Zheng, Zhao, & Li, 2006). To exemplify, Hanley and Huang (1995) asserted that if a student has already mastered a number of basic Chinese characters, and he wants to read a more difficult text such as a newspaper, Pinyin would not be necessary. Besides, there is a lot

of homophony in Chinese, for instance, “tou” could mean “头 (head)” or “偷 (steal)” in English. As a result, sometimes Pinyin could mislead learners in the recognition of Chinese characters. This means that some learners may use English translation to memorize new Chinese words instead of using Pinyin. Homophony is also common in English and many other languages, and at some point, all learners will need to become aware of that. In other words, it is not a problem specifically associated with the use of Pinyin.

The role of Pinyin in English-Chinese bilingual contexts is worth researching further because there are conflicting findings in the academic literature. Yu, Zheng, Zhao, and Li (2006) claimed Pinyin is easier than Chinese characters and found some Chinese learners prefer to learn Pinyin rather than Chinese characters. In contrast, the longer the beginning learners of Chinese stay with Pinyin, the less improvement they will make. They also supposed that teachers should pay less attention to Pinyin and that Pinyin is not necessary for systematic teaching. After all, Pinyin is a learning device and not the real object of learning. Besides, Jiang (2017) stated that Chinese characters are an image of the meaning, and Pinyin is a tool to help learners read Chinese characters. Therefore, Pinyin and Chinese characters are not the same. Chinese learners should pay more attention to Chinese characters. McBrides, Bialystok, Chong, & Li stated (2005) that Chinese learners use Pinyin more than Chinese characters during the process of learning the Chinese vocabulary. While this is true, Chinese native speakers also learn Chinese characters with Pinyin. Chinese native speakers already knew the spoken form of Chinese vocabulary, so the main role of Pinyin is to help them learn the Chinese written characters. The teacher just shows the Pinyin of the target Chinese words to primary school students, while fifth-grade

students begin to learn Chinese characters. This demonstrates that Pinyin is also used in China and it is beneficial for native Chinese speakers.

On the other hand, overusing Pinyin can result in Chinese characters being replaced by Pinyin in teaching Chinese as a foreign language. According to Chisoni (2016), overusing Pinyin negatively affects Chinese vocabulary acquisition. For instance, some Chinese learners are able to pronounce the Chinese characters, but they are not able to recognize them. Consequently, Pinyin is helpful for students to acquire the spoken form of Chinese vocabulary rather than the Chinese characters.

To sum up, some researches show that the combination of Pinyin and Chinese characters may have negative or positive effects on Chinese vocabulary acquisition. Nevertheless, research also shows that Pinyin is still used to acquire Chinese vocabulary in both learning Chinese as a first language and learning Chinese as a second language. Due to this, for this study, I focus on the impact of Pinyin in Chinese-English bilingual contexts to determine if its use has a positive or negative effect on Chinese vocabulary acquisition.

HSK as an Assessment for Vocabulary

The high priority of vocabulary in second language learning and teaching makes it become an object to assess learners' language ability (Read, 2012). As mentioned before, the three aspects of vocabulary knowledge are form, meaning, and usage (p. 97). In English, the researchers of second language vocabulary acquisition have developed many methods to examine these three aspects of vocabulary knowledge. Among these methods, Johnson (2004) claims that the most compelling are vocabulary level tests (VLT) and the depth of

vocabulary-knowledge test (DVK). Vocabulary Levels Test (VLT) (Nation, 2003) measuring the learner's size of vocabulary knowledge, and word-Associate Test (WAT) (Read, 2012) is used for measuring the learner's depth of vocabulary knowledge (DVK). The test is closely related to semantic and collocation relationships.

Comparing to these tests in teaching English as a second language, the Chinese vocabulary test also is valued for Chinese proficiency testing. According to Joiner and Kaczmarek (1997), a Chinese proficiency test for foreign learners, which is called HSK in China. HSK (Hanyu Shuiping Kaoshi, translated as the Chinese Proficiency Test) is the most standard Chinese language exam for foreigners and overseas Chinese. It is well known all over the world and uses simplified characters and it includes level one to level six. HSK test includes three parts, which are listening section, reading section, and writing section. Listening and reading questions are mostly worth 2 points each; meanwhile, the writing questions are worth up to 6 points each. The listening and reading section has 50 items whereas the writing section only has 15 questions. HSK test total score is 300 points, listening is out of 100, reading is out of 100, and writing is out of 100. A pass is 180 points. HSK can also be used for assessing Chinese vocabulary knowledge. The HSK vocabulary list is designed for learners who can understand and use some simple Chinese characters and sentences to communicate, and prepares them for continuing their Chinese studies. In HSK 1 all characters are provided along with Pinyin. The HSK 1 vocabulary is for learners who can communicate and read Chinese at a basic level. HSK 2 vocabulary is for advanced beginners who can use Chinese to talk about everyday tasks. HSK 3 vocabulary is for learners who can use some Chinese in daily, academic and professional contexts. HSK 4

vocabulary is for learners who can converse fluently about a wide variety of topics in Chinese.

HSK 5 vocabulary is for learners who can understand Chinese printed and visual media and

converse about academic topics with ease. HSK 6 vocabulary is for learners with a

comprehensive command of the Chinese language and an ability to express abstract thoughts. (pp.

11013-11018).

Table 1

Chinese Proficiency Level and Vocabulary Size

HSK Level	Chinese Proficiency Level	Vocabulary Size
1-2	beginner	150-300
3-4	intermediate	600-1200
5-6	advanced	2500-5000

Chapter III: Methodology

Research Questions

This study focuses on Chinese vocabulary acquisition by English-Chinese bilingual learners. The research questions of this study are: Does Pinyin affects the acquisition of Chinese vocabulary by English-Chinese bilingual learners? And what is the relationship between the impact and the learners at different levels?

Participants

The elementary Chinese immersion program (English-Chinese bilingual school) in central Minnesota initially started in 2008 for grades K-12. Children whose home language is English are encouraged to join the program. The participants in this study were 20 fifth grade students ($N = 20$) of this Chinese Immersion program. All of them are English speakers and have studied Chinese for 4 to 5 years. And a Chinese teacher and a teaching assistant instruct all of them. Generally, the teachers are native Mandarin speakers who come from the Chinese Confucius Institute. These participants spend 15 hours a week learning math and science in Chinese. Meanwhile, they spend another 15 hours a week learning P.E., arts, and literature in English. All of them have already passed the HSK level-one test. Namely, they are approximately the beginning level in Chinese. Meanwhile, all of them are familiar with the Chinese phonetic system (Pinyin). For the purpose of this study, the 20 participants ($N = 20$) completed the tasks in Chinese. Following the IRB regulations, I met those 20 students face-to-face firstly, so the students could know the person who was the researcher. Then, the consent form that contained an outline of the research proposal was given to them. Since my participants were under 18, the consent form was for their parents in order

to know if they agreed with their children to be the respondent. Those who signed the form were invited to participate in the study. All of the participants took part in the present study voluntarily.

Materials

Target words. According to the HSK (Level Two) exam requirement (2018), "HSK (Level Two) is mainly for candidates who learn Chinese at least 2-3 hours a day, with 300 of the most commonly used words and related grammatical knowledge." Since my participants approximately spend 3 hours a day learning Chinese, the HSK level two vocabulary words were used in my study. HSK vocabulary in level two has 300 vocabulary words. In order to test for meaningful correlations between Pinyin and vocabulary test scores, the test words should not be easy or familiar for participants. As we know, Chinese characters' symbols are made by strokes. According to the International Curriculum for Chinese Language Education (Scrimagour & Wilson, 2009), a low-frequency stroke list of Chinese characters was provided by Chinese Confucius Institute Headquarters (Hanban). By comparing the HSK list to a low-frequency stroke list, 20 Chinese words that occur very infrequently in teaching Chinese as a foreign language were chosen. Those 20 Chinese words are not common in the Chinese spoken system. According to China's State Language and Letter Committee, one single Chinese character (or morpheme) is the smallest semantic unit. As it is the standard written form for Chinese words, one word is made up of two characters. For example, the word "newspaper" is "报纸" in Chinese. Due to this, I had 40 Chinese characters (20 words) in my study. According to the high frequency list (1-1000), 8 of these 40 Chinese characters belong to the list while the other 32 characters are

out of it. Therefore, it is unlikely that participants have learned those 40 Chinese characters.

Those 20 vocabulary words are presented in Table 2.

Table 2

Target Language

Word	Pinyin	English
1.报 纸	bao zhi	newspaper
2.电 脑	dian nao	computer
3.房 间	fang jian	room
4.饭 店	fan dian	restaurant
5.公 司	gong si	company
6.工 作	gong zuo	job
7.机 场	ji chang	airport
8.教 室	jiao shi	classroom
9.考 试	kao shi	test
10.名 字	ming zi	name
11.米 饭	mi fan	rice
12.牛 奶	niu nai	milk
13.星 期	xing qi	week
14.同 学	tong xue	classmates
15.商 场	shang dian	store
16.身 体	shen ti	body
17.水 果	shui guo	fruit
18.颜 色	yan se	color
19.衣 服	yi fu	clothes
20.眼 睛	yan jing	eye

Slide show. Visual input can be direct and fast. Therefore, using the slide show to teach Chinese vocabulary is effective. English translation can explain the meaning of each vocabulary word directly. These 20 Chinese words were put into a slide show in the process of teaching. Each slide showed one Chinese word (character), and the English translation of the word. Two types of slides were prepared as follows:

- 1) Slide A type: The first 10 words (1~10 in the list) were shown with Pinyin and the last ten words (11~20 in the list) were shown without Pinyin in their corresponding slide. The order was random; that is, maybe two slides with Pinyin followed a slide without Pinyin, or two slides without Pinyin followed a slide with Pinyin.
- 2) Slide B type: The use of Pinyin was switched for each slide in type B. Hence, the words are shown with Pinyin in slide A were shown without Pinyin in slide B type, and the words are shown without Pinyin in slide A were shown with Pinyin in slide B type. The slide order was random. Figure 1 and Figure 2 show examples of slides with and without Pinyin.



Figure 1. A slide show with Pinyin.



Figure 2. A slide show without Pinyin.

Test sheet (see Appendix C). A matching test was designed to measure vocabulary accuracy in order to answer the Research Questions. Each student was given a sheet that had 20 target Chinese characters and 20 English words; those 20 Chinese characters they already learned in a slide show. The left side of the sheet showed the Chinese characters and the right side of the sheet showed the English meanings. Test takers are required to match the Chinese characters and English translation. By following the vocabulary levels test (VLT) test format designed by Schmitt (1997), the test had seven sections and each section included 6 items in Chinese characters to be matched with 3 items in English. From the six Chinese characters, only three Chinese characters were to be matched with three English translations. Figure 3 shows an example section of the test.

A.报纸	
B.报道	1.newspaper
C.电脑	2.computer
D.电视	3.room
E.房间	
F.房屋	

Figure 3. Chinese vocabulary test. (This figure illustrates one test section.)

HSK level-one scores. In order to suppose the impact of the use of Pinyin in the acquisition of vocabulary for students at different proficiency levels, each individual participant's HSK level-1 score was used to reference their Chinese proficiency level. As mentioned before, the HSK total score is 300 points.

Procedure

Grouping. The 20 participants were fifth grade and they were randomly assigned to either Group A or Group B. This allows for teaching students with slide show A and slide show B. To counterbalance sequence effect, the 20 Chinese words were randomly arranged into Slide show A and slide show B. As shown in Table 3, slide show A presented the words in the following randomized order. Based on that order, slide Show B was created by reversing the first 10 words and the second 10 words.

Table 3

Slide Show A and Slide Show B Design

Group A (N = 10) Slide Show A 20 Chinese Characters	Group B (N = 10) Slide Show B 20 Chinese Characters
<p>With Pinyin</p> <ol style="list-style-type: none"> 1.报 纸 2.电 脑 3.房 间 4.饭 店 5.公 司 6.工 作 7.机 场 8.教 室 9.考 试 10.名 字 	<p>With Pinyin</p> <ol style="list-style-type: none"> 11.米 饭 12.牛 奶 13.星 期 14.同 学 15.商 场 16.身 体 17.水 果 18.颜 色 19.衣 服 20.眼 睛
<p>Without Pinyin</p> <ol style="list-style-type: none"> 11.米 饭 12.牛 奶 13.星 期 14.同 学 15.商 场 16.身 体 17.水 果 18.颜 色 19.衣 服 20.眼 睛 	<p>Without Pinyin</p> <ol style="list-style-type: none"> 1.报 纸 2.电 脑 3.房 间 4.饭 店 5.公 司 6.工 作 7.机 场 8.教 室 9.考 试 10.名 字

Teaching words. All of the participants learned the same 20 new Chinese vocabulary words. I taught group A and group B twenty Chinese words by using the slide show. Slide type A was used with group A and slide type B was used with group B. I chose a classroom to teach, when I taught group A, group B was doing their homework in another classroom with their lead teacher. It was a 10-minute class for each group.

I started with a slide show. Each slide was presented for 10 seconds. They knew the meaning of each word by seeing the English translation on the slide. At the same time, I let them read the word after me three to five times. The interval between each slide show was 10 seconds, in order to allow time to remember the word. The entire slide show was presented three times. In other words, the participants were exposed to the target words three times. At this point, they used any memory strategies to remember the target words while they did not write the words down. This same procedure was followed with Group A and Group B.

Test. Two tests were given after teaching. The first one was given immediately, and another one was given one week later. There was a one-week gap, during which no review happened. Each student was given the same test sheet both times and they had 10 minutes to finish the test sheet. They were asked to match the Chinese characters and English meanings. The main purpose was to assess the accuracy of recognition rather than speed. The goal was to know if Pinyin could help them acquire the target words.

Scoring After testing the 20 new Chinese characters to the 20 participants, the scoring for the test was calculated. I assigned 1 point for each two-character target vocabulary, and the total score is 20 points. Since there are two types of words in the test (with Pinyin and without Pinyin),

the students had two scores— one for each type. Each word worth one point, and the full score of each type (with Pinyin or without Pinyin) was 10 points (Max = 10).

Chapter IV: Data Analysis and Results

Data Analysis

The students' vocabulary achievement scores were collected. Along with this data, a quantitative statistical analysis was used. I compared both the scores with Pinyin condition and the ones without Pinyin condition. The test scores of immediate test and delayed test are shown in Figure 4 and Figure 5.

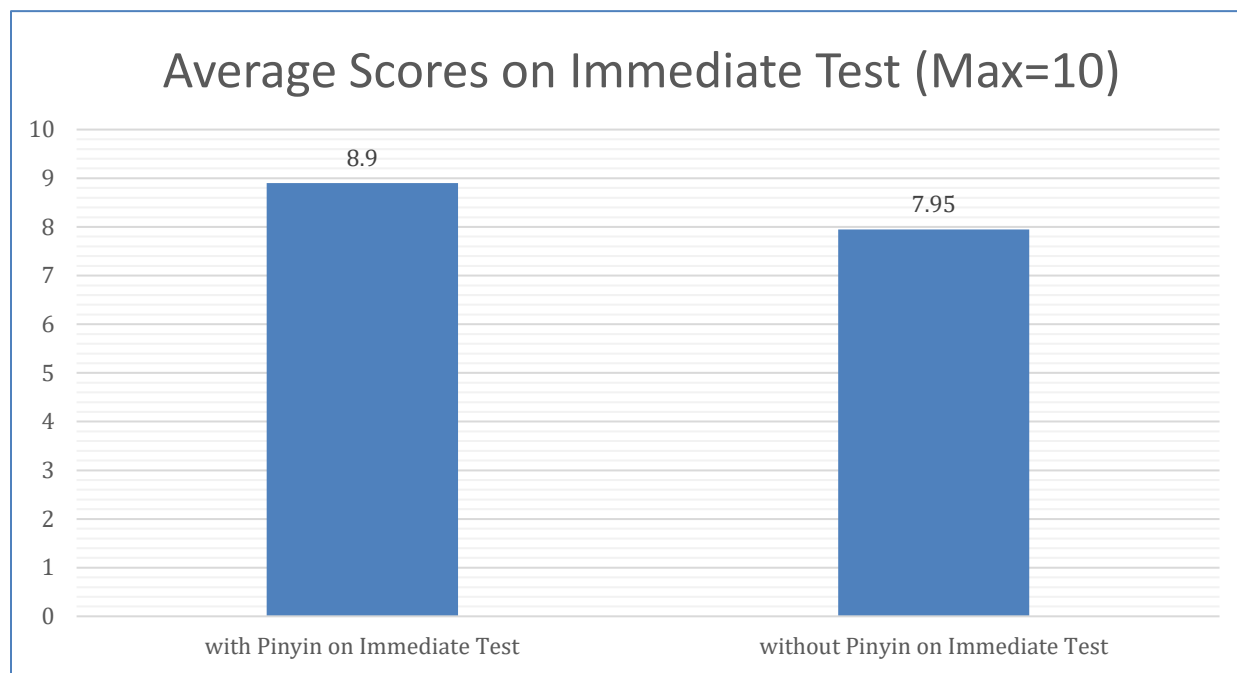


Figure 4. The average scores on the immediate test.

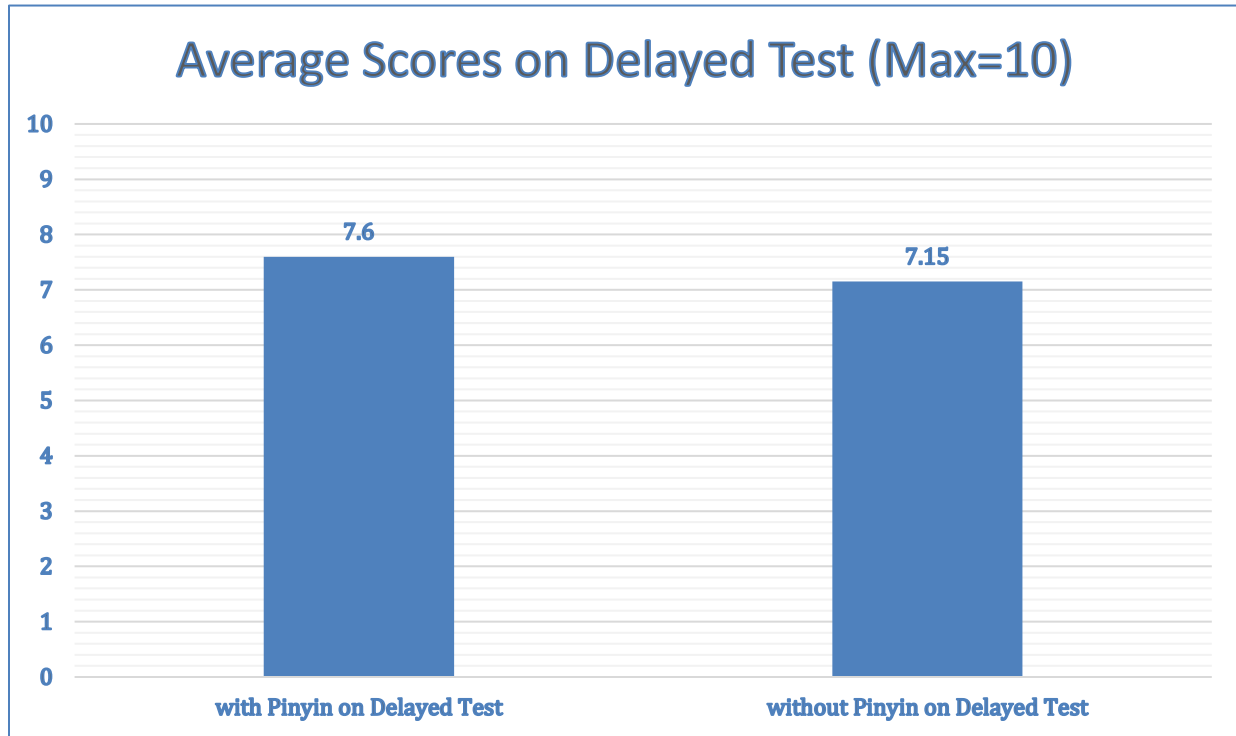


Figure 5. The average scores on the delayed test.

T-tests also were conducted to compare the mean differences of with Pinyin and without Pinyin condition in both immediate test and delayed test. Based on the standard interpretation offered by Cohen (1988), the effect sizes of the t-test ($d = .65$) is slightly higher than the medium effect ($d = .5$). Data were analyzed by Statistical Package for the Social Sciences (SPSS). The results of the immediate test and delayed test as follows as Table 4.

Table 4

Results of T-test on Immediate Test and Delayed Test

Tests	Tasks	N	Mean	SD
Immediate Test	With Pinyin	20	8.9	1.119
	Without Pinyin	20	7.95	1.791
Delayed test	With Pinyin	20	7.6	1.465
	Without Pinyin	20	7.15	2.231

Immediate Test Results

The data showed that the immediate test with Pinyin condition resulted in higher scores than those of the immediate test without Pinyin condition. Equally important, a paired t-test was conducted to analyze the scores with Pinyin condition and without Pinyin condition. The t-test showed a statistically significant difference ($t[df] = 2.894, p = .009$) between the scores with Pinyin condition ($N = 20; M = 8.9; SD = 1.119$), and the scores without Pinyin condition ($N = 20; M = 7.95; SD = 1.791$). In other words, Pinyin affected the performance on the immediate test.

Delayed Test Results

In my data, the results showed that the scores with Pinyin condition were higher than the scores without Pinyin condition. After running the t-test, there was not a significant difference ($t[df] = 1.183, p = .251$) between the scores with Pinyin condition ($N = 20; M = 7.6; SD = 1.465$), and the ones without Pinyin condition ($N = 20; M = 7.15; SD = 2.231$). Even though the t-test

did not show a significant difference, the average score with Pinyin was slightly higher than the average score without Pinyin.

Benefit of Pinyin Comparison

Based on the results, the difference between the average score of both tests indicated that the benefit of Pinyin in the immediate test ($M = .95$) is greater than the benefit of Pinyin in the delayed test ($M = .45$). The direction hasn't changed, Pinyin still help the participants to remember the Chinese characters in both tests. On the other hand, the t-test did not show a significant difference ($t[df] = 1.365$, $p = .188$) between immediate test scores ($N = 20$; $M = .95$; $SD = 1.468$), and delayed test scores ($N = 20$; $M = .45$; $SD = 1.701$). Across the board, we can tell that the benefit of Pinyin in the immediate test is slightly better than the benefit of Pinyin in the delayed test.

Correlations Analysis

I compared the proficiency of participants at different levels to HSK scores so that I could verify the impact of the use of Pinyin in the acquisition of vocabulary for students at different proficiency levels.

Immediate test scores and delayed test scores were analyzed with HSK scores to see if there were any correlations between HSK scores and the Pinyin test scores. The result is shown in Table 5. Interestingly, only one strong, highly significant correlation was found. The test of Pearson correlation showed a statistically significant positive relationship ($r = .511$, $p = .021$) between the HSK scores and the scores on immediate test without Pinyin condition. The test of Pearson correlation did not show a statistically significant relationship between the HSK scores

and the scores on the other Pinyin tests. The results were ($r = .21$; $p = .375$) for the immediate test with Pinyin condition, ($r = .134$, $p = .575$) for delayed test with Pinyin condition, and ($r = .181$, $p = .445$) for the delayed test without Pinyin condition. Based on the standard interpretation offered by Cohen (1988), the effect sizes of the correlations ($r = .26$) is slightly lower than the medium effect ($r = .3$).

Table 5

Correlation with HSK Score

Categories	<i>r</i>	<i>p</i>
Immediate Test with Pinyin Condition	.210	.375
Immediate Test without Pinyin Condition*	.511	.021
Delayed Test with Pinyin Condition	.134	.575
Delayed Test without Pinyin Condition	.181	.445

* significant at the .05 level

** significant at the .01 level

Chapter V: Discussion

Immediate Test vs. Delayed Test

Based on the results in this study, using Pinyin always helps the immediate test and even helps the delayed test. Moreover, the benefit of using Pinyin in the immediate test is better than that of the delayed test. Even though the use of Pinyin in this study indicates a small beneficial difference in average scores, the benefit of using Pinyin can be larger through the Chinese vocabulary learning process. In addition, although this study only includes one immediate test and one delayed test, it allowed finding the benefit of Pinyin, which even though small may still affect the leaning of Chinese characters.

Only in the immediate test, the students who get higher HSK scores also can get higher scores in without Pinyin condition. And the test results showed that HSK scores only had a positive correlation with the immediate test without Pinyin condition. Thus, we can confirm that Pinyin was likely helpful to the students who were at a low level. And Pinyin is helpful for Chinese learners at a beginning level. Everson (1988) also found that Pinyin is important for low-level learners. She had a study at the University of Iowa, in which she asked 20 Chinese learners at the beginning level to read first and then explain 46 Chinese words in English. Her observation showed an interesting phenomenon; the spoken Chinese represented by Chinese characters is neither regular nor systematic, so the acquisition of Chinese characters depends on the level of students' spoken language. She suggested that Chinese non-native speakers should only learn Chinese phonetic system (Pinyin) at the primary stage, and develop a sense of

listening and speaking, and then they could start learning Chinese characters. This kind of use of Pinyin requires students to imitating repeatedly and spending lots of time to listen and to speak. It is similar to the process of an infant acquiring language. In vocabulary acquisition, a problem is that it can become a simple mechanical repetition and frustrate the students' enthusiasm for learning (p.194-204). But it is believed that Pinyin is still helpful at the initial stage of Chinese vocabulary acquisition. Therefore, the results of this study confirm those of Everson in that Pinyin is more beneficial for Chinese vocabulary acquisition in the low-levels.

The Challenge of Chinese Characters

Furthermore, the results also shed light on the challenges that Chinese learners face when Chinese characters look similar. These are presented on Table 6 and Table 7.

Table 6

Error Amount on the Immediate Test

Target Vocabulary and Its Similar Form	Error Amount	Target Vocabulary and Its Similar Form	Error Amount
公 司 (company)→ 公 共 (public)	5	电脑(computer) → 电视 (TV)	1
房 间 (room) → 房 屋 (building)	4	机场(airport) → 机会 (chance)	1
商 场 (store)→ 商 务 (business)	3	水果(fruit)→ 水晶(crystal)	1
考试(test)→ 考察(inspect)	3	身体(body)→ 身份(identity)	1
工 作 (work)→ 工 业 (industry)	3	星期(week)→ 星座 (constellation)	0
教 室 (classroom) → 教 书 (teach)	2	同学(classmates)→ 同事 (colleague)	0
报 纸 (newspaper)→ 报 道 (news)	2	牛奶 (milk)→ 牛肉(beef)	0
米饭(rice)→ 米粉 (noodle)	1	颜色(color)→ 颜料 (pigment)	0
名字(name)→ 名声 (fame)	1	衣服(clothes)→ 衣柜(chest)	0
饭 店 (restaurant)→ 饭 盒 (bowl)	1	眼睛(eye)→ 眼镜(glasses)	0

Table 7

Error Amount on the Delayed Test

Target Vocabulary and Its Similar Form	Error Amount	Target Vocabulary and Its Similar Form	Error Amount
房间(room) → 房屋(building)	4	机场(airport) → 机会 (chance)	2
商场(store) → 商务(business)	4	电脑(computer) → 电视 (TV)	1
工作(work) → 工业(industry)	3	水果(fruit) → 水晶(crystal)	1
报 纸 (newspaper) → 报 道 (news)	3	饭店(restaurant) → 饭盒 (bowel)	0
公 司 (company) → 公 共 (public)	3	星期(week) → 星座 (constellation)	0
教 室 (classroom) → 教 书 (teach)	2	同学(classmates) → 同事 (colleague)	0
牛奶 (milk) → 牛肉(beef)	2	身体(body) → 身份(identity)	0
米饭(rice) → 米粉 (noodle)	2	颜色(color) → 颜料 (pigment)	0
名字(name) → 名声 (fame)	2	衣服(clothes) → 衣柜(chest)	0
考试(test) → 考察(inspect)	2	眼睛(eye) → 眼镜(glasses)	0

Based on the test scores, in Table 6 and Table 7, I summarized the mistakes that the participants made on both immediate test and delayed test. I found that the confusion was caused by the Chinese characters with similar forms, such as: the word “newspaper” written as "报纸"

and the word “news” written as “报道”. As can be seen, the written form of these two words is alike; besides, they also have a similar meaning because the first word of both is the same. If the Chinese learners ignore the detailed features of Chinese characters, then a similar written form will negatively affect the recognition of Chinese characters. Consistent with the findings of earlier studies, Brown stated (2010), in the process of Chinese character recognition of English-Chinese bilingual students, the more strokes a Chinese character has, the less the benefit of Pinyin. Chinese characters with complicated strokes are learned at higher levels, and for their learning, Pinyin is not enough. Based on the results of this study, the benefit of Pinyin is more likely to help the Chinese learners at the beginning level, who are learning simple characters.

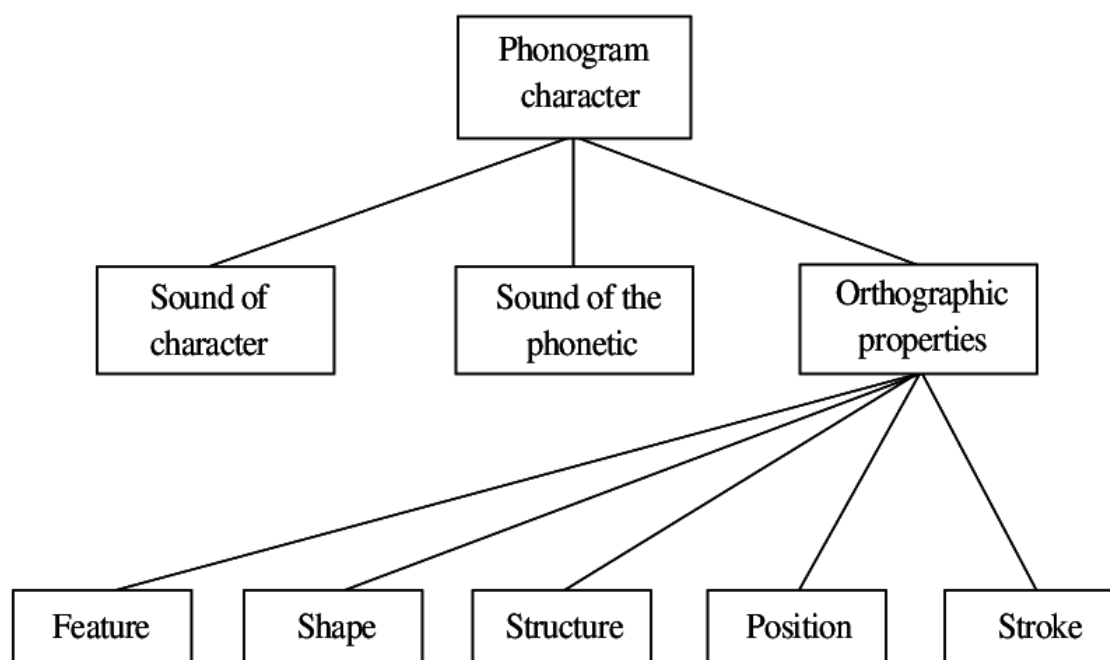


Figure 6. Orthographic representation scheme for Chinese characters.

Another theory that helps to understand the complexity of Chinese characters is known as the orthographic properties of Chinese characters (see Figure 3), which was created by Brown

(2010). Their assumption is that Chinese characters are complex in terms of the shape, the structure, and the strokes that make them up. The strokes of Chinese characters, which are flat and cross-stacked, are complicated. Without the concepts and knowledge of strokes and structure, Chinese learners cannot understand the interrelationship between strokes, which makes them unable to distinguish Chinese characters. All English words are composed of 26 letters. If English learners want to learn English words, they must first recognize the 26 letters and then obtain the rules for the grouping of English letters, such as the order rules of the alphabet. Therefore, letters play an important role in the English vocabulary learning process. However, the smallest unit of Chinese words is stroked. Strokes often connect and cross each other, so it is difficult to see the individual strokes at a glance when facing a Chinese character. These concepts are learned as students moved forward through the learning stages of Chinese. At the beginning stage, Pinyin is helpful for Chinese learners to learn Chinese characters with simple strokes, and it becomes the foundation for them to develop a more complete understanding of these concepts in the following stages of the learning process.

Limitations

Even though this study explored that Pinyin is helpful in Chinese vocabulary acquisition, it still has some limitations. Under the two conditions of Pinyin, the participants had a good performance on both the immediate test and the delayed test after one week. The words that were tested in this study hadn't been taught to fifth-grade students before, so that means students might have had other chances to learn those new words through other means such as: book, newspaper, or magazine. Moreover, a pre-test was not conducted before the research in order to verify that

the participants did not know the words. Thus, we are not sure if learning Chinese characters with Pinyin helps learners to actually understand the meaningfulness of Chinese vocabulary or just helps them to remember the structure of Chinese characters. In addition, in the matching test in the study, two Chinese vocabulary words shared the same first character; for example: the word “newspaper” written as “报纸” and the word “news” written as “报道”. Hence, both Chinese words having the correct target character at the beginning, may have led the students to overlook at the following character and not read each word completely, choosing either one and effecting the error rate. Therefore, it is unclear if Pinyin could help students based on the error rate, since Pinyin affected this by the characters themselves rather than by Pinyin. The use of Pinyin may or may not be beneficial when combined with other effects related to Chinese characters learning. Furthermore, Lin et al.’s (2010) study of Chinese L1 kindergartners indicated that Pinyin isn’t enough to acquire the Chinese characters. The use of Pinyin helps learners with the spoken form of Chinese vocabulary rather than with the written form of Chinese characters. Students should know Pinyin is a tool rather than a goal of learning Chinese vocabulary. The Chinese phonetic system (Pinyin) can help foreign students learn Chinese characters easier, but the teaching of Chinese characters with a presentation of Pinyin may or may not depress the rate at which Chinese words can be learned. That means, the learning rate could be lowered when the Chinese characters are paired with their Pinyin representation. On the other hand, there are only 500 Pinyin syllables while they are not enough for ten thousand of the commonest Chinese characters. One Pinyin could correspond to more than ten Chinese characters. According to Chung (2003), the most popular way of teaching new Chinese characters is to show the Pinyin

and its L1 equivalent, because it's helpful to pronounce and understand the meaning of the new Chinese characters without assistance from teachers (p. 208). This basically means learning to speak the Chinese language and not learning to read the Chinese language. There are two examples that show us one Pinyin could have at least five corresponding Chinese characters.

Table 8

Chinese Characters

Pinyin	bei	jing
Chinese characters	北	京
	被	镜
	杯	静
	贝	经
	背	景

In addition, to understand the results, it is important to look back at the results of the test. According to Carr (2011), the context and purpose specifications should be summarized. Also, according to Bachman and Palmer (1996), the qualities of usefulness should be considered. The main aim of the test in this study is to confirm if Pinyin is helpful for Chinese vocabulary acquisition. The test takers are Chinese-English bilingual students who already learned the Chinese phonetic system (Pinyin). We can assume if Pinyin helps them to acquire Chinese vocabulary according to their scores. Accordingly, it has high reliability. Besides, the test focuses on vocabulary accuracy. Hence, it has high construct validity because the test matches the

measurement. It measures what it is supposed to measure, and it could distinguish between learners at different levels. According to the results, we can know the effect of Pinyin on teaching and learning. Thus, it has a high impact on Chinese vocabulary teaching and learning. However, students could guess the answer to the test, or they use other memory strategies for vocabulary learning, so it has low authenticity. Hu (2010) supported that learning L2 Chinese language may not only involve the use of Pinyin, but also involve other general strategies for memorizing characters. By solving this problem, we need the test if Chinese learners just use Pinyin to help them acquire Chinese vocabulary.

According to Paivio's (1991) Dual Coding Theory (DCT), vocabulary learning is closely related to human memory. There are two primary forms of representation in the human mind, which are verbal and nonverbal. Chinese vocabulary words consist of Chinese characters (visual) and the Pinyin system (auditory). Also, Pinyin representation and its written form (Chinese characters) in Chinese vocabulary is a separate unit. Because the delayed test in my study was 1 week after the immediate test; there was a one-week gap, during which no review happened. It was hard to determine the process of memorizing in one week. Moreover, recall the Pinyin of the target words might influence the vocabulary acquisition. Wong and Chung (2008) set up a control experiment on 21 American students to explore the effect of repeated memory on the learning Chinese characters. It is found that the recollection method is very effective in the memory of Chinese characters. Liu (2011) said, because of the deeper processing level of glyphs and the adoption of the meta-recognition strategy, the memory is stronger. Therefore, they suggest that Chinese teachers should encourage students to memorize Chinese characters

repeatedly in the process of teaching Chinese characters, so as to be more conducive to the acquisition of Chinese characters. In order to know that, in future studies, we will continue the study of Chinese vocabulary acquisition in recall performance. Overall, this research is based on the positive benefit of Pinyin in the immediate test; repetitions and sustained review in an actual class setting can help even more.

Suggestions in Pedagogy Practice

According to Wang, Perfetti, and Liu's (2005) research, in the second and third grades of primary school, students have a certain interest in Chinese with their small vocabulary. However, in the fourth and fifth grades, with the increasing of vocabulary and the learning tasks, it is difficult to cope with a mechanical hardback. It is very difficult to actually apply the Chinese vocabulary. In addition, Chinese vocabulary teaching in the Chinese immersion program, teachers generally use explanations and exercises, teachers not often use Pinyin to help students learning vocabulary. Some teachers believe it is not necessary to let students remember that vocabulary by repeating reading (pp. 24-35). This might not be in line with children's cognitive development concepts and do not take advantage of the Pinyin.

The results of this study show that Pinyin is more likely has a positive benefit in the learning of new Chinese vocabulary words. While this is true, it is important to distinguish between the areas in which Pinyin works and the conditions under which it can be used effectively. The role of Pinyin in literacy development is still worth exploring. From the perspective of early literacy, the main contradiction faced by primary school children is that they have an exuberant desire to acquire a great deal of oral vocabulary. However, they just have a

small amount of character recognition and a great limit in reading. This contradiction can be solved in several ways. For instance, use all the words learned by the child in the reading materials or teach them all the raw words they encounter in reading. The significance of using Pinyin to expand the recognition of Chinese vocabulary is that it makes it possible for children to deal independently with some of the things they have not learned.

Chapter VI: Conclusion

There were two major goals in my study. The first goal was to determine if Pinyin positively or negatively affects Chinese vocabulary acquisition in the Chinese-English Bilingual contexts. As discussed in the results part, the test scores showed that the benefits of Pinyin are presented on both immediate and delayed tests, yet the effect is stronger for the immediate test. Based on this view, Pinyin plays a useful role in acquiring Chinese characters. The second goal of this study was to know the relationship between the effect of Pinyin and the Chinese language level of students in the acquisition of Chinese characters. By comparing the HSK scores and the Pinyin test scores in the four conditions, the results indicated that the higher the scores that learners got on the HSK, the higher the scores they got on the immediate test without Pinyin condition. Moreover, the learner who is a good student may also get higher test scores even without Pinyin. Thus, without the help of Pinyin, students' vocabulary scores on the immediate test largely reflected their existing HSK levels.

Interestingly, there was a significant negative correlation between the HSK scores and the benefit of Pinyin ($r = -.463$, $p = .040$). In other words, the higher the HSK scores, the lower the benefits of Pinyin on the immediate test. That means, Pinyin was more likely to benefit the students who were at a low level. Hence, according to this result, Pinyin seems to be more helpful for Chinese learners at the beginning level.

A significant positive correlation was found between the benefit of Pinyin for the immediate test and for the delayed test. A logical conclusion is that Chinese learners at the

beginning level who get more benefit from Pinyin in the immediate test, also get more benefit from Pinyin in the delayed test.

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Appendix A: Consent Form to Participants

Introduction

My name is Yahui Shi. You are being asked to be in a research study of the Chinese vocabulary acquisition in English-Chinese bilingual contexts. You are selected as a possible participant because this research needs English-Chinese bilingual learners.

Purpose of Study

The purpose of the study is to know if the Chinese phonetic system (Pinyin) affects the acquisition of Chinese vocabulary by English-Chinese bilingual learners.

Description of the Study Procedures

If you agree to be in this study, you will be asked to do the following things: learning new 20 Chinese vocabulary words (10 with Pinyin and 10 without Pinyin), and have a matching test after learning.

Risks/Discomforts of Being in this Study

There are no reasonable foreseeable (or expected) risks.

Benefits of Being in the Study

The benefit of participation is: you will know if the Chinese phonetic system (Pinyin) can help you acquire the Chinese vocabulary words.

Confidentiality

Throughout the course of this study and in the final paper your name will be kept private and will not be shared.

Right to Refuse or Withdraw

Please talk this over with your parents before you decide whether or not to participate. I will also ask your parents to give their permission for you to take part in this study. If you don't want to be in this study, you don't have to participate. Your participation is voluntary.

Right to Ask Questions and Report Concerns

You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have any additional questions please contact me at [REDACTED] or y [REDACTED]. You may also contact the advisor, Choonkyong Kim, at [REDACTED] or [REDACTED].

Acceptance to Participate

When you sign your name on the line, it means you understand this information and have agreed to be a part of the study.

Subject's Name (print): _____

Subject's Signature: _____ Date: _____

Appendix B: Consent Form to Parents

Parental Permission for Children Participation in Research

Introduction

My name is Yahui Shi, and I am a graduate student at St. Cloud State University. This form is being sent to ask your permission to allow your child to participate in a study being conducted for my Master's Degree. Two consent forms—one for you, the parents/guardians, and the other for your child—are included with this memo. Both of these forms must be signed and returned prior to the start of the study. If your child is unable to read the student consent form, please take a few moments to read it to him/her and explain it as needed. The purpose of this form is to provide you (as the parent of a prospective research study participant) information that may affect your decision as to whether or not to let your child participate in this research study. Read the information below and ask any questions you might have before deciding whether or not to give your permission for your child to take part. If you decide to let your child be involved in this study, this form will be used to record your permission.

Purpose of the Study

If you agree, your child will be asked to participate in a research study about Chinese vocabulary acquisition in English-Chinese bilingual contexts. The purpose of this study is to know if the Chinese phonetic system (Pinyin) affects the acquisition of Chinese vocabulary by English-Chinese bilingual learners.

What is my child going to be asked to do?

If you allow your child to participate in this study, they will be asked to learn 20 new Chinese vocabulary words (10 with Pinyin and 10 without Pinyin). After that, they will have a test. This study will take 30 minutes and the participants will be 20 fourth grade students and 20 fifth grade students.

What are the risks involved in this study?

There are no foreseeable risks to participating in this study.

What are the possible benefits of this study?

Participants will know if Pinyin can help them learn the written form of Chinese vocabulary words. Also, the findings will help Chinese teachers make informed pedagogical decisions.

Does my child have to participate?

No, your child's participation in this study is voluntary. Your child may decline to participate or to withdraw from participation at any time. This research study will take place during regular classroom activities; however, if you do not want your child to participate, he/she can do regular activities with the lead teacher.

What if my child does not want to participate?

In addition to your permission, your child must agree to participate in the study. If your child does not want to participate they will not be included in the study and there will be no penalty. If your child initially agrees to be in the study they can change their mind later without any penalty.

Will there be any compensation?

Neither you nor your child will receive any type of payment participating in this study.

How will your child's privacy and confidentiality be protected if s/he participates in this research study?

Your child's privacy and the confidentiality of his/her data will be stored in the researcher's password-protected computer. If it becomes necessary for the Institutional Review Board to review the study records, information that can be linked to your child will be protected to the extent permitted by law. In addition to using data for the final paper that will remain on permanent file at the St. Cloud State University Miller Learning Resources Center (library), data may also be

published in professional journals at a later time. At no time during the study or reporting the findings will your child's name be used in any manner.

Whom to contact with questions about the study?

Prior, during or after your participation you can contact the researcher Yahui Shi at [REDACTED] or send an email to [REDACTED] for any questions or if you feel that you have been harmed. You may also contact my advisor Professor Choonkyong Kim at [REDACTED]

Signature

You are making a decision about allowing your child to participate in this study. Your signature below indicates that you have read the information provided above and have decided to allow them to participate in the study. If you later decide that you wish to withdraw your permission for your child to participate in the study you may discontinue his or her participation at any time. You will be given a copy of this document.

I look forward to having your children participate in this innovative study and I thank-you in advance for your cooperation as I continue to complete my graduate study at St. Cloud State University.

Printed Name of Child

Signature of Parent(s) or Legal Guardian

Date

Appendix C: Test Sheet Sample

Direction: Please match the Chinese characters and corresponding English translation.

A.报纸

B.报道

C.电脑

D.电视

E.房间

F.房屋

1.newspaper

2.computer

3.room

A.机场

B.机会

C.教室

D.教书

E.考试

F.考察

1.airport

2.classroom

3.test

A.名字

B.名声

C.米饭

D.米粉

E.牛奶

F.牛肉

1.name

2.rice

3.milk

A.饭店
B.饭盒
C.公司
D.公共
E.工作
F.工业

1.restaurant
2.company
3.work

A.星期
B.星座
C.同学
D.同事
E.商场
F.商务

1.week
2.classmates
3.store

A.身体
B.身份
C.水果
D.水晶
E.颜色
F.颜料

1.body
2.fruit
3.color

A.衣服
B.衣柜
C.眼睛
D.眼镜

1.clothes
2.eye

Appendix D: IRB Approval



Institutional Review Board (IRB)

720 4th Avenue South AS 210, St. Cloud, MN 56301-4498

Name: Yahui Shi

Email: yshi@stcloudstate.edu

IRB PROTOCOL DETERMINATION: **Expedited Review-1**

Project Title: Chinese Vocabulary Acquisition in English-Chinese Bilingual Contexts

Advisor Choonkyong Kim

The Institutional Review Board has reviewed your protocol to conduct research involving human subjects. Your project has been: **APPROVED**

Please note the following important information concerning IRB projects:

- The principal investigator assumes the responsibilities for the protection of participants in this project. Any adverse events must be reported to the IRB as soon as possible (ex. research related injuries, harmful outcomes, significant withdrawal of subject population, etc.).
- For expedited or full board review, the principal investigator must submit a Continuing Review/Final Report form in advance of the expiration date indicated on this letter to report conclusion of the research or request an extension.
- Exempt review only requires the submission of a Continuing Review/Final Report form in advance of the expiration date indicated in this letter if an extension of time is needed.
- Approved consent forms display the official IRB stamp which documents approval and expiration dates. If a renewal is requested and approved, new consent forms will be officially stamped and reflect the new approval and expiration dates.
- The principal investigator must seek approval for any changes to the study (ex. research design, consent process, survey/interview instruments, funding source, etc.). The IRB reserves the right to review the research at any time.

If we can be of further assistance, feel free to contact the IRB at 320-308-4932 or email ResearchNow@stcloudstate.edu and please reference the SCSU IRB number when corresponding.

IRB Chair:

Dr. Benjamin Witts
Associate Professor- Applied Behavior Analysis
Department of Community Psychology, Counseling, and Family Therapy

IRB Institutional Official:

Dr. Latha Ramakrishnan
Interim Associate Provost for Research
Dean of Graduate Studies

OFFICE USE ONLY

SCSU IRB# 1883 - 2418

1st Year Approval Date: 2/22/2019

1st Year Expiration Date: 2/21/2020

Type: Expedited Review-1

2nd Year Approval Date:

2nd Year Expiration Date:

Today's Date: 2/22/2019

3rd Year Approval Date:

3rd Year Expiration Date: