Learning Techniques Employed to Learn Mandarin Chinese:

A Survey of Native English Speaking

High School Students

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Abstract

This study first identifies the areas of greatest perceived difficulty for native English speakers learning Mandarin Chinese at the secondary level. Then, the study identifies commonly used Chinese character learning strategies employed by the students in order to identify areas for further research. Thirty-four students in Chinese classes at a high school in Maryland were involved in this study. 23 students were currently enrolled in their second year of Chinese, four had completed their second year of study, and seven had discontinued their study after one year. Based on a descriptive analysis of a survey of character-learning strategies, fourteen strategies are identified with four being the most commonly used by the learners.

CHAPTER I

INTRODUCTION

Overview

As with any language, the ability to read and write a language is a critical aspect to attaining language competency. However, in the study of Mandarin Chinese the absence of a phonetic based alphabet adds a unique challenge to reading fluency for students: a student may be able to understand and verbally produce a given Chinese word, but may not be able to read nor write that word. The inability to read or write a language seriously limits the extent to which one can effectively communicate and engage with outside world.

Over the past six years, this researcher, who is a Mandarin Chinese teacher to native English speaking high school students, has noticed that while students often excel at verbal communication in the language, students struggle to decode and comprehend text and are also unable to write the characters when composing written responses. Research in the field of Chinese Mandarin character acquisition has been limited, and there is no clear "best" pedagogical method to teaching Character recognition, i.e. reading fluency beyond the traditional method of rote memorization or the direct teaching of a character's component *radicals* (Allen, 2008. Both of these methods involve a large time commitment on the part of the learner, and are not effective in increasing a student's ability to retain the information, long term (Jen & Xu, 2000). As the study of Mandarin Chinese makes its way from being solely a language taught at the post secondary level- into secondary and even primary classrooms across America, more research into effective character acquisition and retention pedagogy is needed.

Statement of the Problem

The problem is that native English speakers learning Mandarin as a second language have poor long term retention of individual characters which therefore inhibits their reading comprehension. The purpose of this descriptive study is to investigate the perceived difficulties of learning to read and write Chinese characters by native English speaking high school level students in memorization of a logographic writing system, and to determine the techniques employed by successful students for overcoming those difficulties.

Operational Definitions

A character is a non-phonetic based Chinese ideograph. An ideograph represents a meaning apart from a fixed pronunciation. In the case of Mandarin Chinese, each ideograph also represents a syllable: some are complete words; others are components of a complete word. A logographic language system is a non-phonetic based written language system. In logographic systems, a pictorial character represents a meaningful unit such as a morpheme or word. A morpheme is a word or part of a word that has a meaning and that contains no smaller part that has a meaning. Each logographic morpheme's meaning is formed independently of its sound. A radical is a character component, or morpheme, that holds its own meaning when alone, and can contribute to either a character's overall meaning when within another character, or lend its sound. There are 212 radicals in simplified Mandarin Chinese.

CHAPTER II
REVIEW OF THE LITERATURE

Overview

This literature review seeks to explore the effect of pictographic identification and radical mapping on Mandarin Chinese the writing production of native English speaking high school students taking Chinese I for the first time. Section one provides an overview of the demands of learning Mandarin Chinese as a foreign language on a native English speaker (NES). Section two discusses the specific areas of difficulty native English speakers encounter when learning a non-phonetic based writing system. Section three will explore the differing methods of writing instruction.

Cognitive Demands

Writing refers to the act of producing letters or characters that serve as a visible sign of spoken words, ideas, or symbols. In many language systems, the written form of the language is made up of graphemes, the symbolic representation of phonemes, the smallest unit that corresponds to a particular sound in a language (Bolger, Perfetti, & Schneider, 2005). For example the grapheme "c" in English has two phonemic representations: a hard "k" sound as in "car" and a soft "s" count and in "cider".   Speakers then learn to decode and combine these graphemes in order to produce the sound of an endless variety of words. Understanding the meaning represented by a given combination of graphemes is limited only by the reader's ability to decode the phoneme and their knowledge previous knowledge of the spoken word (Bolger, et.al, 2005). This is true of any phonetic-based writing system.

This is not true of logographic, non-phonetic based, language systems.   In logographic systems, a pictorial character represents a meaningful unit such as a morpheme or word. A morpheme is a word or part of a word that has a meaning and that contains no smaller part that

has a meaning. Each logographic morpheme's meaning is formed independently of its sound. As a result, a different area of the brain is activated during reading (Liu, Zhang, Tang, Mai, Chen, Tardif, & Luo, 2007).

> Previous neuro-imaging studies have shown that the conversion of orthographical to phonological processing (grapheme –to-phoneme conversion) in processing alphabetic stimuli was performed by left posterior sites of temporoparietal regions whereas Chinese stimuli need the left middle frontal gyrus for both conversion of graphic from orthography to syllable, and other operations.(Liu et al., 2007 p.1359).

An additional study by Deng, Booth, Chou, Ding, and Peng (2008) not only confirmed the above findings but his study further suggests that the "left fusiform gyrus is involved in the orthographic processing of [Chinese] characters" (p. 1874). The implications of these findings for native English speakers (NES) learning Mandarin Chinese is that not only do learners have the daunting task of learning a radically different type of writing system, but these learners will also be activating a "new" section of the brain, thereby needing to form a whole new network of neural connections.

Although NES learning Mandarin Chinese have the added challenge of engaging "new" areas of their brain in the time consuming reading and writing process, according to Konyama, Hansen and Stein (2008) having a strong long-term visual memory is a strong predictor of their Character pre-writing performance. This suggests that visual long-term (i.e. recognition) memory is very important for reading and writing logographic characters. However, strong orthographic memory as measured by the radical position task, was a significant predictor of both Kana (a phonetic Japanese script) and Kanji (a logographic Japanese script) acquisition (Konyama et. al., 2008) . "Most modern characters (about 80-90%) consist of a phonetic component (the phonetic)

and a semantic radical" (p. 42). These characters contain at least one radical. A radical is a morpheme that holds its own meaning when alone, and can contribute to either a character's overall meaning when within another character, or lend its sound. One example of a radical lending meaning is "yán" 言, which means to "speak or to say". This radical appears in the word twice in the word "yǔ" 語 meaning "language". An example of a radical lending its sound can be seen in the radical "ba" 巴， as seen in the word "bàba" 爸爸. This result suggests that a direct teaching of a radical's meaning and pronunciation to character writing proficiency would be beneficial for improving writing proficiency in those NES learning Mandarin Chinese that have a stronger orthographic memory, as opposed to a strong visual memory.

Areas of Learning Difficulty

Unlike phonetic based language systems, logographic scripts require a large proportion of a native English speaker's study time to master a single lesson's vocabulary. According to Allen (2008), between over 50% of first level NES learning Mandarin Chinese devoted between 20% and 50% of their study time to Chinese orthography (character writing) as opposed to any of the other three language skills of listening, speaking, or reading. Furthermore, this "writing" that students are devoting study time to is not in composition, but rather in memorization and reproduction of individual construction. Allen calls this "pre-writing" to differentiate it from writing composition and goes on to compare this pre-writing to a first year-French student spending a third to half of his time practicing his spelling his vocabulary. Even as students progress on to higher levels of language proficiency, although students that persist in learning the language develop in their efficiency of attaining the needed pre-writing skills, the increase of the amount of vocabulary expected of each student keeps the time spent on pre-writing statistically

the same. This clearly limits the speed of students' language proficiency compared to those of phonetic based language systems. Furthermore, because character learning (pre-writing) comprised the majority of students' study time it is not surprising that students cite the difficulty of writing Chinese characters as the number one reason when asked why they decided to discontinue taking Chinese after the first year of study. 91% of the students who did leave Chinese study complained about the amount of time dedicated to character writing. Regardless of the strategy used, even among the highest performing student, when tested, students are not able to produce on average 61% of the characters they have previously learned even though they can identify (read) and pronounce those same characters (Jen & Xu, 2000).

Because of the time character pre-writing necessitates of its learners, Allen argues that handwriting is an unnecessary waste of students' time. The research of Guan, Liu, Can, Ye, & Perfetti (2011) however, indicates that that there is a strong correlation between a student's reading comprehension and overall vocabulary acquisition with the number of character's he is able to write from memory as opposed to those that study character "pre-reading" (recognition) only. Guan et al. suggests this is due to what they term as sensory-motor memory traces that are inferable from character stroke order. Furthermore, evidence suggests that native Chinese children's reading skills are highly correlated with their and the ability to copy characters, even amongst dyslexic Chinese children (Tan, 2005). The behavioral studies reported by Guan et. al. were further supported by the neuro-imaging studies of Liu et al. (2008) and the team concluded that "writing practice… is an important part of courses in Chinese to support more robust student learning of the spoken and written language" (p. 1359).

Current Practices

To date, only a small amount of research has been conducted on current Chinese-character learning strategies. Most of the existing studies center on the reading strategies used by non-native beginning learners of Chinese (Hayes, 1998). The results of this study indicate that the learners used both visual and graphic strategies in encoding Chinese characters in a word context, but that they relied more heavily on graphic structure to recognize previously exposed characters in a sentence context. Even fewer studies have been conducted that focus on Chinese learners developing their writing skills. Two studies conducted by McGinnis (1999) and Ke (1998) collected data from daily classroom learning activities and focused on self-reported character learning strategies applied by English speaking first-year college learners of Chinese as a foreign language (CFL). Among both studies, rote-repetition and the use of flashcards were the most frequently used strategies.

The next most frequently used strategy in McGinnis' (1999) study was the creation of students' own idiosyncratic stories about the characters. In Ke's (1998) study of the perceptions of Chinese language learning strategies, after rote repetition, most students considered the knowledge of radicals more useful than creating their own stories about the appearance of characters in learning new characters. Among the various strategies used, overall participants indicated that orthographic-knowledge-based learning strategies, whether based in actual component meaning or idiosyncratic in nature were use most frequently, where as meta-cognitive strategies were most rarely used (Shen, 2005).

As CFL courses gain in popularity in colleges and secondary schools across the United States and in Europe have sought programs and opportunities to enliven the time-consuming task of character learning through the use of electronic games. A survey study by Hao, Hong, Jong,

Hwang, Sun & Yang (2010) explored the effectiveness of a motion based game that detected a learner's gestures using a web-cam to write Chinese characters. The program was designed for learning the stoke order of Chinese characters and after directly teaching the stroke order to a participant, the program then prompted the students to repeat the stroke order. Their gestures were then picked up by a web-cam and processed by the program. While this program is certainly a novel approach at character writing and does involve a kinesthetic element not present in traditional pen and paper practice, the learning strategy at the program's core is nothing more than repetition again.

The study conducted but Ke (1998) cited another frequently used character learning method: knowledge of a character's constituent radicals. Wu, Zhou, and Shu's (2010) pre-experimental study confirmed Ke's observations. Focusing on third grade and sixth grade primary school students, the experiment explored the phonological primes (radicals) and the semantic primes and the effects on students' reading achievement. The team concluded that there was a stronger effect in the lower grades with characters that had a phonological connection to a radical, which they termed prime, but in the sixth grades, there was a stronger effect with characters that had a semantic connection. The implications of this priming effects suggests that in reading complex characters, the embedded phonetic radicals are decomposed and mapped onto each student's own phonological and/ or semantic representations, in parallel to the mapping for the whole character, so any reading or writing program that emphasizes the phonetic and semantic radical in its program will help learners.

Summary

Character writing is one of the more important yet time consuming aspects to learning Mandarin as a foreign language. As much as 50% of students' study time is spent learning the skill with a rather low retention rate (Jen & Xu, 2000). But as Guan et al. (2011) noted, the act of learning to write strengthens a student's over all ability to read and pronounce a given word at any time. So how do Mandarin Chinese educators assist their students in increasing the number of word's a student can remember and write, while decreasing the overall time spent in lower level memorization and repetition? While the research is limited, it suggests that a combined approach of radical knowledge, both semantic and phonological, combined with idiosyncratic stories, and repetition would likely be met with the most success. Further research would be required to substantiate this claim.

CHAPTER III

METHODS

The purpose of this descriptive study is to investigate the perceived difficulties of learning to read and write Chinese characters by native English speaking high school level students in memorization of a logographic writing system, and to determine the techniques employed by successful students for overcoming those difficulties.

Design

This is a descriptive study. In particular, the study utilizes a survey of students currently enrolled in Chinese Level II classes, as well as and students who have discontinued their study of Mandarin, on their perceptions of a methods to learn to read and write Chinese characters.

Participants

34 students in Chinese classes at a high school in Baltimore County, Maryland were involved in this study. 23 students were currently enrolled in their second year of Chinese, four had completed their second year of study, and seven had discontinued their study after one year. The average age group of the students was 15 years old. 16 students were male and seventeen were female. All students who participated in the study had completed at least one year of Chinese Mandarin. *Pinyin* Romanization was first introduced to students before characters. No students with prior knowledge of any Asian language speaking backgrounds participated in the study.

Instruments

One questionnaire was developed for the purposes of this study. The survey was a semi-structured questionnaire containing seven questions: three multiple choice questions and four open-ended questions. It was designed to elicit character-learning difficulties encountered by

students and the strategies they used to overcome them. Not all students answered all questions, because some students were not quite sure what strategies they used, or they chose not to use any strategy. After the survey was administered, all answers from the survey forms except for those that were illegible or incomprehensible were collected and typed up in a list under each question. The excerpt below illustrates the sample responses from the students to question five, an open ended question.

> *What technique(s) work(s)/ worked best for you to memorize the writing of Simplified*
>
> *Chinese characters? Name and describe all techniques that you employed.*
>
> **Student A**: Index cards with the characters, pinyin and tones, and definitions
>
> **Student B:** A combination of paper flashcards and Skritter [an online writing program]
>
> **Student C:** [teacher made] stories really helped me a lot. I don't make my own.
>
> **Student D:** In class games like spoons and go fish that make us remember the *hanzi*
>
> **Student E:** When [the teacher] writes them on white board and makes us copy them [sic]

From the students' written responses, this researcher was able to identify a total of eight areas of difficulty (including repeats) encountered by non-native learners of Chinese and nine strategies (including repeated items) used by students in the learning of characters.

Procedure

The survey was administered in March, 2014. Twenty-three students were currently enrolled in their second year of Chinese, four had completed their second year of study, and seven had discontinued their study after one year. The students chosen from each group were randomly selected based on their current enrollment status by a third party to participate in the survey. This survey did not include the beginning level students because at the time the survey

was administered, the school was not running a beginning level course. Surveys were collected by a third party to ensure the anonymity of participants.

CHAPTERS IV AND V

DISCUSSION AND ANALYSIS OF THE DATA

The purpose of this research is to identify the difficulties native English speakers encounter when studying Mandarin Chinese at the secondary level and to determine the most prevalent learning techniques employed by students. Through individual surveys, this study strived to elucidate students' perceptions of the most helpful techniques for memorizing the Chinese writing system. This chapter will identify the overriding themes that emerged from the surveys for comparison with the literature so this researcher can recommend modifications and improvements to mainstream Mandarin Chinese instruction.

Discussion of the Data

34 high school students who have completed at least one year of Mandarin Chinese were surveyed as a part of this study. The survey was comprised of seven questions. These questions paid no attention to a participant's age, gender, or ethnicity. The sole requirement for participation in the study was past or current enrollment in the school's Mandarin Chinese program. Several themes emerged through this research including: the participants' motivations for studying Mandarin Chinese, the most difficult aspects of study, the techniques for overcoming those difficulties, the hours of out-of-class study, and the students' plans for further study. The following sections will examine these themes as they relate to students studying Mandarin Chinese at the secondary level.

What is the most difficult aspect of learning the Chinese (Mandarin) Language as a native English Speaker?

Of the thirty –four students surveyed, students were asked to self-identify the aspects of learning Mandarin that each considered- the most difficult. No limit was placed on the number or responses students could give. Across the three groups of students surveyed, eight areas of difficulty were identified: character writing from memory, character identification from memory (reading), content recall and application, tone discrimination and production, pronunciation (not tones), auditory discrimination of homonyms, the linking of pronunciation to its character, and lastly grammar. As can be seen in Table 1, the majority of Mandarin learners (61.8%) perceive the writing for Chinese characters from memory to be the most challenging aspect of study. Character identification, or reading, with 44.1% of respondents identifying it, is the second most identified area of difficulty for native English speakers learning Mandarin Chinese. These results confirm what this researcher suspected, and thus reaffirms the initial impetus for conducting the study.

Table 1 Perceived Areas of Difficulty for Native English Speakers Learning Mandarin (% of students holding the perception)				
Area of Difficulty	Completed Chinese I	Currently enrolled in Chinese II	Completed Chinese II	Average percentage of students at all levels that perceive the area as difficult.
character writing from memory	57	65	50	61.8
character identification from memory (reading)	43	44	50	44.1
Content recall and application	14	9	0	8.8
Tone discrimination and production	0	9	25	8.8
Pronunciation (not tones)	0	9	0	5.9
Auditory discrimination of homonyms	14	4	0	5.9
linking of pronunciation to the character	0	4	0	2.9
grammar	14	0	0	2.9

What techniques(s) work(s)/ worked best for you to memorize the writing of Simplified Chinese characters. Name and describe all techniques that you employed.

After indicating the areas each considered the most difficult to learning Mandarin Chinese, students were asked to self-identify the techniques of character writing memorization that worked best, and to name all techniques that each used. Again, no limit was placed on the number of responses students could give. Across the three groups of students surveyed, 14 techniques were identified, the most prominent being the use of idiosyncratic stories, use of the online character learning program provided by the school, the use of character flashcards, repetitive writing, character visualization and the playing of character based games in class (see Table 2).

Idiosyncratic Stories

Of the high school students surveyed, 38.2% reported that of idiosyncratic stories was the most helpful in the memorization of written Mandarin Chinese. According to the students' teacher, Ms. M, in Chinese I, the students are provided with fictional stories that incorporate a word's meaning and appearance, and in most cases the character's radical in order to help connect the character to the student's prior knowledge (personal interview, 2014). As the students are exposed to and learn more characters, the teacher increasingly incorporates the students' prior knowledge of characters into the stories. By level II, the teacher hands over the responsibility of story creation to the students; initially requiring each to create their own stories for homework. "By the end of Chinese II, each student can decide for himself whether or not to create a story. It is only one technique to character mastery and for some, creating the story itself makes memorization that much harder" (personal interview, 2014). Based on the interview with

the students' teacher, the "story method" seems to incorporate several elements of character study including character visualization, knowledge of radicals, and the accessing of prior character knowledge.

These findings differ somewhat from the findings reported by McGinnis' (1999) and Ke's (1998) studies of students' approaches to the study of Chinese. Both researchers found that rote repetition and the use of flashcards were the most frequently employed strategies applied by English speaking first-year college learners of Chinese as a foreign language (CFL). The creation of idiosyncratic stories about the characters came in third. Whereas Ke's study of perceptions of Chinese language learning strategies, after rote repetition, most students considered the knowledge of radicals more useful than creating their own stories about the appearance of characters in learning new characters. What neither McGinnis' nor Ke's studies indicated was whether or not the idiosyncratic stories were explicitly taught, whether the stories themselves incorporated knowledge of radicals, or connected to previously learned character knowledge. It is worth further investigation the extent of which these components of idiosyncratic story use affects a student's ability to memorize how to write a character.

Online Character Learning Program

The second most cited helpful character memorization technique referred to a program named Skritter, a subscription based character learning program provided the students by the school (personal interview, 2014). Students in each level of study were required to log a minimum of 60-90 minutes per week outside of class on the program. The program integrates four aspects of Chinese study- into one program: Character writing, including stroke order; character identification and meaning (reading); character pronunciation (pinyin spelling); and

character tones. According to the program's website, Skritter uses a spaced repetition algorithm to review characters or vocabulary ("Spaced Repetition", n.d.).
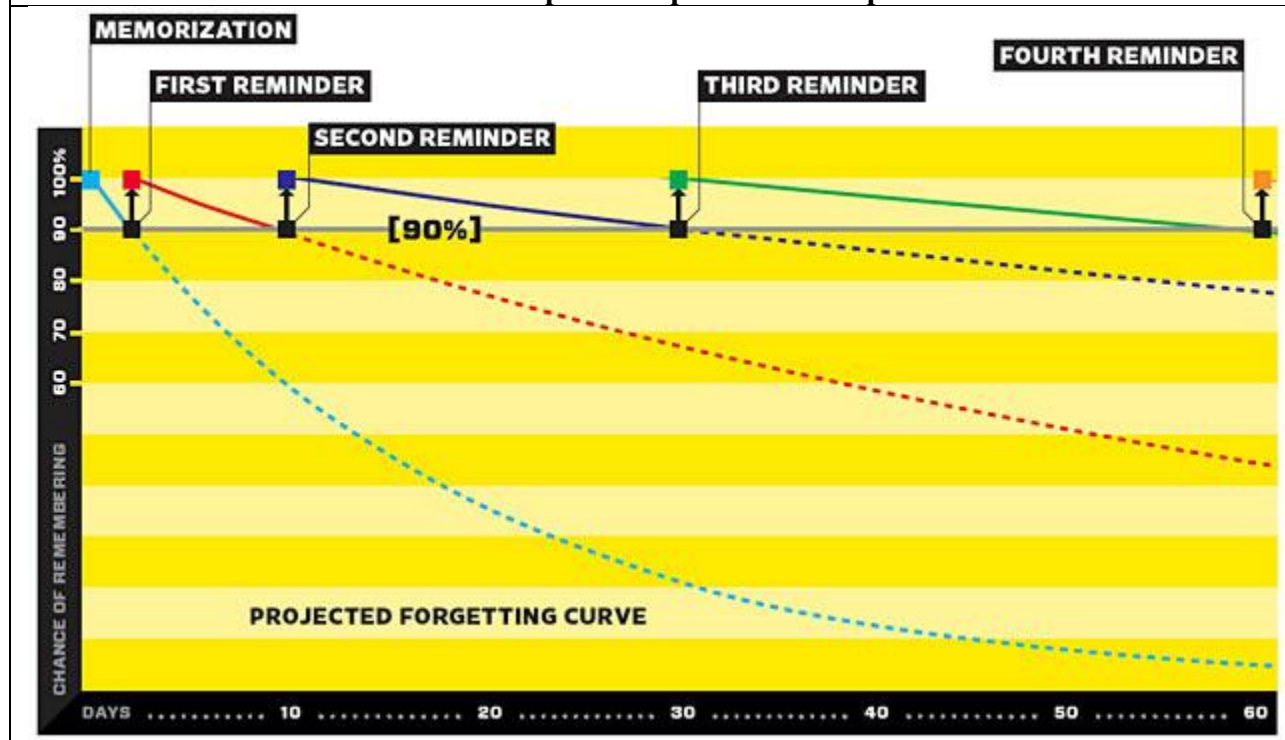
> The principle behind spaced repetition is that it's a lot more effective to review something at the point when it's about to be forgotten. The longer you have known it, the less frequently you'll have to review it.
>
> Ideally, you want to review things when you have a 90% chance of remembering them (corresponding to a 90% retention rate). After several repetitions of a character, your repetitions will be months apart (and soon years apart). Refer to Figure 1.

Research by Jen and Xu (2000) indicates the average student retains the ability write only 39% of the words they've learned from memory using the traditional methods of repetition and flashcards. The Skritter company conversely claims that program users remember how an average of 90.2% of the characters learned ("Two Reasons", n.d). While no independent, peer-reviewed research has been conducted as to the validity of the program's claims, student perceptions as to the helpfulness of the program in memorizing Chinese characters is slightly higher than those that prefer the more traditional use of flashcards and repetitive writing: 23.5% of students cited the online program as their primary character learning technique compared to 20.6% that preferred the use of flashcards, and 17.6% who preferred repetitive writing in some form . However, similar to the findings of Hao, et al. (2010), the learning strategy at Skritter's core is repetition in relation to time spent outside of class studying, which is beyond the scope of this study. Further, independent research, is needed to validate the marketing claims made by the Skritter company in regards to the program's effectiveness as compared to the more traditional methods of repetitive writing and flashcards.

Learning Technique	Completed Chinese I	Currently enrolled in Chinese II	Completed Chinese II	Average percentage of students that employ the learning technique
Idiosyncratic Stories	29	39	50	38.2
"Skritter" Online Character Learning Program	57	13	25	23.5
Flashcards	14	17	50	20.6
Repetitive Writing	29	13	25	17.6
Character Visualization	14	9	50	14.7
Character Games	0	5	0	14.7
In Context Writing	14	4	25	8.8
Writing on Whiteboards	0	13	0	8.8
Partner Study	0	13	0	8.8
Direct Instruction	0	9	0	5.9
Linking Character to Pronunciation	0	4	0	2.9
Pop Quizzes	0	4	0	2.9
Typing	0	4	0	2.9
Reading In Context	0	4	0	2.9

Table 2
Learning Techniques Employed by Students
(% of students holding the perception)

Figure 1
Skritter's Spaced Repetition Principle

Conclusions and Future Research

What was once a language program offered only to the hardiest of students at a few universities across America, more and more schools, from elementary schools through college, view Mandarin Chinese language programs as a vital part of a globalized curriculum. However, unlike its European counterparts, very little research has been conducted regarding the best methods for native English speakers to master Mandarin Chinese. The existing research has shown that the non-phonetic based language activates different areas of the brain (Liu et. al., 2007), and mastery of the written system requires a much longer amount of time compared to phonetic based systems (Allen, 2008). If Mandarin Chinese programs, specifically at the secondary level, are going to survive and grow, administrators and curriculum writers must gain a better understanding not only of *how* the native English speaker's brain processes the new writing system, but must also *implement* the best instructional practices based on proven research, and have research based expectations of *how long* mastery will take.

This study confirmed the conclusions of earlier studies discussed in the literature review: learning and mastering the Chinese writing system is the most difficult and time consuming aspect of the language study. This study also confirmed that students, even at the secondary level, most often employ the use of idiosyncratic stories, rote repetition, and flashcards to memorize the vocabulary. However, the information learned in this study still leaves many unanswered questions. Does the incorporation of knowledge of radicals and prior character knowledge in their idiosyncratic stories increase a student's long term memory retention of a written character? Does the direct instruction of the idiosyncratic story matter? How are students using their flashcards? Are they looking at the definitions and then writing the character, vise versa or both? How much time are students spending outside of class studying? How much

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time do students spend reviewing previously learned material and how does this time spent relate to the student's overall memory retention of a character? Does Skritter's "spaced repetition algorithm" actually increase character retention to as much as 90%, as they claim? How? And lastly if mastery of Mandarin Chinese does, indeed, take more time; would it be or is it unfair to hold a third year Chinese foreign language (CFL) student to the same performance expectations as a third year Spanish foreign language (SFL) student? What is a reasonable time frame? Further research into these areas is needed to ensure that the best instructional practices are implemented in CFL classrooms.

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