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A STUDY OF EFFECTIVE TEACHING STRATEGIES IN A KINDERGARTEN
CHINESE IMMERSION CLASS

by

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A capstone submitted in partial fulfillment of the
requirements for the degree of Master of Arts in Teaching.

Hamline University

Saint Paul, Minnesota

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CHAPTER ONE

Introduction

Student Teaching in A Chinese Immersion Class

Before my student teaching in a kindergarten Chinese immersion class, I was quite skeptical about the whole idea of immersion at such a young age when kids don't even have a grounded acquisition of their native language. I was also worried that being fully immersed in a new language would scare the kids away and leave them feeling frustrated or defeated. Does it work? How does it work? What do we do when things do not work? With all these questions in mind, I started my student teaching.

None of the students in the class had any experience of learning Chinese before entering kindergarten, not even one single word. A large amount of time was spent on teaching basic rules and daily classroom routines, such as going to the bathroom or having snack, for the first weeks. Once the students were able to follow the basic instruction from the teacher, they were ready for the content subjects. I clearly remembered that all kids learned how to count one to ten in Chinese within two weeks, including recognition of Chinese characters of one to ten. One girl had been struggling with the number seven and ten by mixing them up in English. The interesting thing was, that after a few weeks learning in Chinese, she was able to recognize seven and ten in Chinese, but when you asked her to distinguish these two numbers in English, the confusion was still there. The students had another mid-term evaluation later, and each student was showing progress in Chinese literacy and mathematics. I started getting the answers for the questions I brought to my student teaching. By the end of my student teaching, I saw every kid in that class enjoying learning Chinese. Although some of them

had been struggling with the new language for a while, they were able to quickly adjust with the support from teachers and other students. However, one student struggled. She stayed in this program for the first ten weeks and then her parents decided to transfer her to another regular English school after serious discussion with the teachers and the principal. She missed school a lot and was falling very behind academically. There were many non-academic factors that resulted in her inability to continue the program, such as her unusual family culture and structure and her lack of a steady life style. Then I started to think: how can we, as the teachers, help students to stay in the program?

What Is Language Immersion?

The concept of language immersion was introduced to North America during the 1960s with the founding of the first French Immersion program in Canada (Jacobson, 2013). As the number of immigrants coming to the United States grew, the portion of ESL students in public schools boomed. ESL is the abbreviation for English as a second language. To meet the needs of these ESL students, dual language programs, or schools such as Spanish-English, began to develop. This happened in the 1980s (Gomez, D. S., 2013). It is important for me to point out the definition of dual language education here. Dual language education means that the instruction of first language and second language is separate, not concurrent. Krashen pointed out that many bilingual education studies had shown that concurrent translation is very ineffective for teaching students a second language (as cited in Gomez, D. S., 2013). Students who know that teachers will translate unknown information tend to tune out the language that they do not understand and just wait for the translation (Soltero, 2004). These dual language programs provide a 50:50 immersion model for English and the partner language. The difference between “full

immersion” and “partial immersion/dual language”, as explained by Soltero (2004), is determined by the amount of time allocated the minority language, especially in primary grades. For a full immersion program, the instruction time of the minority language ranges from 80% to 90% while the 10%-20% goes to English instruction in kindergarten to first grade. English instruction time gradually increases as students move to higher grade levels until reaching a balance of 50:50 by the time students are in fourth or fifth grade. For a partial immersion program, or dual language immersion, the ratio of both languages’ instruction time remains 50:50 from kindergarten to fifth or sixth grade.

Why Choose Immersion at A Young Age?

Today, the reasons for enrolling in a language immersion school from the beginning of school age have shifted from addressing non-English speaking students’ needs to meeting a variety of academic and social needs for learners. For example, parents want their child to have a more challenging school experience. Research shows that the human brain is more open to linguistic development in the years before adolescence, and when students start learning a language in elementary school and continue over several years, they can more easily achieve high levels of fluency than students who do not start a second language until high school (Asia Society, 2012). This is particularly important in languages such as Chinese and Arabic, which tend to take longer for students to master than European languages. Besides the language proficiency acquired, longstanding and consistent research study shows that developing a second language at such an early age doesn’t jeopardize basic schooling goals, high levels of English language skills, and academic achievement (Padilla, Fan, Xu, & Silva, 2013). On the contrary, immersion students are capable of achieving as well as, and in some cases

better than, non-immersion peers on standardized measures of reading and math. By integrating second language learning and content, it also benefits students' social and cognitive development as language immersion doesn't just involve memorizing words but provides a full range of insight into a new culture, which improves skills like divergent thinking, mental flexibility, and adaptability (Asia Society, 2012).

Facts about Chinese Immersion Schools

The existence of Chinese language education has been longstanding in the United States, but most programs are available for students in high schools as elective courses or for college students as language majors. Although the four-year college Chinese major can also be considered an immersion program, the biggest difference between these programs and elementary schools offering Chinese immersion programs is that the latter uses Chinese as a media to deliver academic content and are not merely to teach the language itself. In this way, learning a second language becomes meaningful and more tangible. Another non-negligible fact is that Chinese, unlike other alphabetic minority languages here in the United States, has a completely different system, a logographic language system. By definition, logograph is a grapheme which represents a word or a morpheme (the smallest meaningful unit of language). Therefore, there are more and more parents enrolling their kids into Chinese immersion schools from kindergarten (even Chinese pre-schools) up to grade eight with the expectation of a more challenging schooling experience.

Minnesota has been one of the pioneer states to have Chinese immersion schools available from kindergarten. Most programs adopt the full immersion model in which 90% Chinese instruction and only 10% English instruction is offered from grade k to grade 2.

Later on it reaches a balance of 50:50 instruction time for both languages until fifth grade. California also has a long history of providing Chinese immersion programs starting in the primary grades, but most Chinese immersion schools in California adopt the 50:50 immersion (dual language) model from the beginning of the program. The adoption of different program models, more or less, generates different results. This disparity will not be considered as a key factor in this research.

What Remains to Be Answered?

I clearly remember how anxious and overwhelmed I was in the first class at Hamline University. That was the first time I had to listen, speak, read, and write completely in English throughout the entire three and half hours. I have to admit that even at this point when writing my capstone, I am still facing the disconnection between my native language and English. Such disconnection not only affects my academic performance but also impacts my daily communication with others, restrains my range of activities, and causes a sense of uncertainty and insecurity. This experience of learning a foreign language brings me closer to students in immersion schools because I know exactly how it feels when it comes to learning a new language. For kindergarten students, they are experiencing a big challenge; a big change in the beginning of their school life. Special and extra support is needed to guide them through this process. Strategies we use in a regular English kindergarten classroom or other language immersion program need to be modified to better fit the situation where a new language with a complete different reading and writing system is involved; strategies we use to teach older students Chinese need to be adjusted or even abandoned and replaced with new ones; strategies we use to teach Chinese as a language no longer meet the need of this group of students because

here Chinese is more than a language. It is a teaching and learning medium. I am hoping my research can build up a general guideline for kindergarten Chinese immersion teachers by providing them with specific effective teaching and learning strategies from teaching Chinese as a second language to using Chinese to teach mathematics, science, and many other content. More importantly, I am hoping my research can help Chinese immersion students have a successful start during their first year of learning and build up a far-reaching confidence to stay in the program.

Chapter Two Overview

In the next chapter, existing literature regarding teaching pedagogies and strategies in kindergarten are shared. Given the fact that the number of current resource specifically discussing Chinese immersion programs is very limited, the range of the literature review expands to teaching strategies for regular English kindergarten students. The review consists of three parts: teaching pedagogy, teaching Chinese as a language, and teaching content areas through Chinese.

CHAPTER TWO

Literature Review

Due to the scarcity of existing research about Chinese immersion education, the following literature review consists of research about Chinese/Mandarin education and additional resources about other language immersion education or regular English education. This chapter seeks to answer the questions: What teaching pedagogy is used in current language immersion programs? What teaching and learning strategies or methods are adopted in kindergarten in terms of teaching the language itself and using the language to teach other content areas? How can one switch from a previous language-centered teaching model to a balance of content and the language?

Definition of Terms

The website of Center for Applied Linguistics (CAL) organization provided a list of glossary of terms related to dual language immersion in the United States. Some key terms are listed below:

- Dual language immersion: A program in which the language goals are full bilingualism and biliteracy in English and a partner language, students study language arts and other academic content (math, science, social studies, arts) in both languages over the course of the program, the partner language is used for at least 50% of instruction at all grades, and the program lasts at least five years (preferably K-12).
- 50/50: An immersion program model in which English and the partner language are each used for 50% of instruction at all grade levels.

- *90/10*: An immersion program model in which students are instructed 90% of the time in the partner language and 10% in English in the first year or two, with the amount of English instruction gradually increasing each year until English and the partner language are each used for 50% of instruction (generally by third grade).
- *Target language*: The language other than English that is used for instruction in immersion programs (<http://www.cal.org>, 2015).
- *Chinese*: In this research, Chinese refers to the official language of the People's Republic of China. It is also known as Mandarin or Putonghua.
- *Pinyin*: The official phonetic system for transcribing the Mandarin pronunciations of Chinese characters into the Latin alphabet in the People's Republic of China. The pinyin system also uses diacritics to mark the four tones.
- *Chinese character*: There are two forms of Chinese characters: simplified character and traditional character. More and more Chinese immersion programs in the United States are adopting the simplified Chinese character system, which is used in mainland China, while some programs continue to teach traditional Chinese characters, mainly used in Taiwan, Hong Kong, and Macau.

Teaching Pedagogies

Kindergarten has been seen as a critical year of transition as all school-age children start receiving formal education. Some of them might have little experience with settings like schools while some may have attended preschool programs. With students coming from all different home cultures and backgrounds, it is imaginable to see how chaotic a kindergarten classroom could be and how clueless kids could be for the first few weeks of school. In a national survey done by Rimm-Kaufman, Pianta and Cox in

2005, 48% children were reported having difficulty in transitioning to school (as cited in Schulting et al., 2005). Although no such survey has been done within immersion programs, it is not hard to imagine that this rate could be higher as children are facing the biggest challenge among all, a brand new language. Thus, how to prepare immersion beginner students for a challenging, but not intimidating, year of transitioning becomes the overarching problem that needs to be addressed first.

Today's classrooms represent more diversity than ever as students are coming from all different cultural backgrounds and teachers probably have a culture quite different from that of their students. This particularly applies to Chinese immersion classrooms, as most teachers are native speakers and did not grow up in the United States. Immersion students are not merely learning a new language but also experiencing a new culture and a new world; one which may not share too much in common with their own. Thus, a more culturally responsive environment is critical. There are several teaching pedagogies sharing a similar ideology, such as culturally relevant pedagogy (CRP), culturally responsive theory, sociocultural theory, and transformative pedagogy.

Culturally Relevant Pedagogy (hereafter referred to CRP)

In 1995, Dr. Gloria Ladson-Billings explicitly defined the term Culturally Relevant Pedagogy as:

A pedagogy of opposition not unlike critical pedagogy but specifically committed to collective, not merely individual, empowerment. Culturally relevant pedagogy rests on three criteria or propositions: (a) students must experience academic success; (b) students must develop and/or maintain cultural competence; and (c)

students must develop a critical consciousness through which they challenge the current status quo of the social order. (p. 160)

Educators who share the view of CRP value the connection between school and culture. Before Ladson-Billings, several scholars did some studies reflecting the idea of CRP. In 1982, Erickson and Mohatt completed a study regarding the cultural organization of classrooms (as cited in Brown-Jeffy & Cooper, 2011) and found that students seemed to benefit more from a learning environment where the teacher shared the same culture or race/ethnicity of the students. In 1987, based on a research study of the Papago Indian tribe's early learning environment, Macias further stated that although much research had shown the benefit of the teacher matching the students' ethnicity, race, or culture, culturally competent teachers were those who knew how to learn enough of the students' culture and incorporate such knowledge into instruction to better facilitate the students' learning (as cited in Brown-Jeffy & Cooper, 2011). Later, a research project done by Craviotto and Heras (1999) revealed the following critical characteristics in terms of building up a culturally relevant classroom:

- Multicultural literature is used as a resource for understanding multiple perspectives.
- Students are regarded as active knowledge generators.
- Classroom dialogue is a fundamental aspect of classroom discourse.
- Classrooms framed as an inviting space for exploration, learning, and dialogue among peers, students, and adults.
- Several languages are used in the classroom as resources for communication and learning.

- Families are actively sought as resources for knowledge. (p. 27)

Cultural Responsive Theory

Cultural responsive theory shares many similarities with CRP. Some educators use these two terms interchangeably. For a more specific definition, Richards, Brown, and Forde (2007) explained, “cultural responsive theory facilitates and supports the achievement of all students” (p.64). They further introduced three dimensions that comprise culturally responsive pedagogy: institutional, personal, and instructional. The institutional dimension refers to the policies and values from the administration level. The personal dimension means the cognitive and emotional attributes teachers need to meet to become culturally responsive. The instructional dimension contains all teaching skills and strategies that teachers use in their instruction (Richards, Brown, & Forde, 2007). More specifically, Rychly and Graves (2012) described several important characteristics of being a culturally responsive teacher:

- Caring and empathetic
- Reflective about own attitudes and beliefs towards other cultures
- Reflective about own culture, namely worldview
- Knowledgeable about other cultures (p.45-46)

Similarly, Oran (2009) found four key characteristics of a culturally responsive classroom:

- Cooperative learning happens in a culturally responsive classroom where substantial interaction between students and students and teachers is highly involved.
- Classroom management developed from a multi-cultural perspective, with the awareness of diversity.

- Students are more motivated when learning in an environment based on caring and concern, where each individual student is valued.
- Teacher reflection is one of the basic standards for all effective teaching, including in culturally responsive classrooms.

Gay (2002) further developed this pedagogy in terms of curricula designing. She encouraged teachers to directly deal with teaching materials that address controversial issues, study a wide range of ethnic individuals or groups, and include knowledge from multiple perspectives. In addition, she pointed out that the teacher's ability of cross-cultural communication was a critical factor to determine what those ethnically diverse students knew and could do because "the intellectual thought of students from different ethnic groups is culturally encoded" (Gay, 2002, p. 110).

Buchanan and Burts (2007) introduced another interesting concept regarding the dynamic classroom culture. They named it "children's created culture". Corsaro said (as cited in Buchanan & Burts, 2007, p.330), "...children create and participate in their own unique peer cultures by creatively taking or appropriating information from the adult world to address their own peer concerns". Buchanan and Burts (2007) further elaborated the application of children's created culture in language arts and mathematics, especially for primary grades.

Sociocultural Theory

Vygotsky's sociocultural theory, which emphasizes the interaction between two or more people with different levels of skills and knowledge, has been widely adopted in the field of education. This theory has often been applied to the learning of second-language as well. Taylor and Sobel stated that learning was better comprehended when

students were able to participate in socially mediated activities, which required cognitive process and extensive communication with peers and other adults (as cited in Sellards, 2015). Sociocultural theory advocates “learning in a second language context should be a collaborative achievement but not an isolated individual’s effort where the learner works unassisted and unmediated” (Turuk, 2008, p.244). Savignon and Sysoyev (2005) pointed out the importance of students developing sociocultural competence that was beneficial in social or cultural situations.

The concept of internalization is also important in sociocultural theory. In a language immersion classroom, it encourages teachers to put students in a learning environment where multiple skills can be developed instead of focusing too much on teaching facts (Turuk, 2008). The concept of the Zone of Proximal Development (ZPD) is usually paired up with sociocultural theory. But for language immersion teachers, this could be a bigger challenge as ZPD normally requires teachers to discover what students can reach through close interaction with them (Turuk, 2008). It is not hard to imagine that such interaction is challenged by the language barrier in a kindergarten Chinese immersion class.

Transformative Pedagogy

Cummin (2014, p.1) defined the term transformative pedagogy as “interactions between educators and students that foster the collaborative creation of power.” For an optimal result, the interactions between teachers and students need to serve as a platform delivering cognitive challenge and intrinsic motivation (Cummin, 2014.). Later, Nagda, Gurin, & Lopez believed that transformative pedagogy was effective in terms of engaging students to become critical thinkers, active learners, and envisioners of

alternative possibilities of social reality (as cited in Sellards, 2015). Cummin (2014) also outlined three components of the framework of transformative pedagogy as following:

- Focus on message: students relate textual facts to their own experience and prior knowledge, bring a critical perspective to interpret text, and finally present the result in the form of a deeper level of thinking not just surface-level comprehension.
- Focus on language: the language instruction would not only focus on formal aspects of the language but the critical language awareness as well. Such language awareness might include controversial issues such as the appropriate time to teach the grammar of the second language.
- Focus on use: students need to be exposed to enough opportunities to apply the second language outside the classroom, otherwise second language acquisition will remain abstract and classroom-bounded. (p. 6)

Teaching Chinese as a Second Language

Traditional Ways of Teaching Chinese as a Second Language

The interest in learning Chinese has risen since the visit of former President Nixon to China and reestablishment of diplomatic relations with China in the 1970s. Universities were mostly the institutions providing Chinese language study programs, which meant that most learners were adults (Chi, 1989). Chi described in his study in 1989 that the curriculum for Chinese language programs that time was basically based on textbooks and those textbooks had unclear curriculum goals such as what specific content students would be able to achieve after finishing the course. The adoption of textbooks was not based on careful scrutiny, resulting in teachers' frustration. Chi also pointed out

that there was a lack of language pedagogy for teaching Chinese as a second language. Much more time and emphasis was on reading than on listening and speaking. Chi (1989) further explained the reasons for this unbalance. He said:

First, I believe that reading has traditionally been considered a more important and attainable skill in Chinese studies. Even today, this type of thinking still plays a prominent role in the philosophy and practice of teaching Chinese as a foreign language...Second, I believe that both teachers and learners naturally expect to spend more time on reading character-text materials and writing characters because the Chinese writing system is so unique, complex, and difficult to master. As a result, more time is devoted to reading and writing. (p.113-114)

Controversial Topics in Teaching Chinese as a Second Language

When it comes to teaching students Chinese as a second language at an early age, as early as kindergarten, the whole picture becomes different. Methods or strategies that work for adult learners might not be an option for young kids. Even being the same first-year learners, adults and young kids require different teaching materials and curriculum designs. The biggest difference is that the goal of a Chinese immersion program is not only learning the language itself, but also achieving other content area through the language to at least the same level as peers in non-immersion programs. One also needs to develop a cultural awareness (Jacobson, 2013), instead of aiming for the acquisition of the language itself.

Because of the uniqueness of an immersion program, educators have been debating several topics in terms of the teaching of content of Chinese in the first one or two years of the program, such as whether to delay teaching Chinese characters, not

putting too much emphasis on writing at the preliminary stage, or whether to introduce Pinyin, the alphabetic phonetic system for Chinese, as students might mix it up with English, which could be detrimental to the acquisition of both languages.

With the increasing number of Chinese immersion schools in the United States since the 2000s, many educators are starting to rethink the teaching pedagogy and curriculum for young learners, especially beginners. The writing of Chinese characters has always been a challenge for all different aged learners, as it demands a tremendous amount of time devoted to practice. One major dispute is whether the teaching of Chinese characters should be delayed in the beginning stage. Packard (1990) defined the delay in introducing Chinese characters as “a time lag between the time the course starts and the time the characters are introduced” and conducted an influential research study which showed that a group of students who had a three-week time lag of the introduction of Chinese characters outperformed their peer group who had immediate character introduction in terms of phonetic discrimination and unfamiliar Chinese syllable transcription. These students also acquired more fluency in spoken Chinese. On the other hand, the research also showed that no consistent difference was found between the lag group and the non-lag group in reading or writing performance later, which indicated that such time lag benefited the spoken language but not literacy. Swihart also recommended (as cited in Ye, 2013) that the teaching pedagogy of Chinese as a second language should focus on speaking and listening first, along with the learning of characters at a relatively slower pace. However, Liu (1983) advocated introducing Chinese characters at the very beginning because “the sounds, the syntax and the characters are interrelated in a higher-level structure and they should be integrated from the first lesson.” (p.66)

More recently, Allen (2008) recommended the use of electronic technologies to replace the traditional handwriting of Chinese character, and argued that beginning students should concentrate on character recognition, namely reading, but not writing. Still, the immediate introduction of characters is preferred. Actually, native primary school students in China also followed this traditional method (Allen, 2008). However, Dew argued that children whose first language was Chinese had already developed a solid foundation in the sound system, grammar, and vocabulary for about five to six years before school (as cited in Ye, 2013). Most recently, Ye (2013) conducted research from the perspectives of instructors and students. From the research results, students and instructors who preferred a time lag for learning character listed reasons: a prior solid background knowledge of speaking and writing can make the learning of reading and writing easier, and learning all aspects of Chinese at one time was extremely cognitively challenging, which could result in a loss of interest in learning Chinese. Students and instructors who preferred an immediate learning of characters explained that it was important to get used to characters as early as possible and that were essential. Learning characters from the beginning made it less difficult in the long run and it is important to connect characters with sound and meaning altogether.

As we can see from the above resource, this is still an ongoing debate. The school I student taught at and the school where I am teaching both focus on character recognition but not too much writing involved. Listening and speaking are two primary aspects of teaching Chinese in kindergarten.

Another major controversial topic is when to introduce Pinyin, the alphabetic phonetic system. Here is a sample table of Pinyin: (<http://www.archchinese.com/>, 2008.)

Figure 1 Chinese Pinyin Table

Mandarin Chinese Pinyin Table

mǎ

[Characters]

má

[Characters]

mǎ

[Characters]

mà

[Characters]

ma

[Characters]

m - m is pronounced like **m** as in "mother".
a - a is pronounced like **a** as in "father".

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Some letters do produce a similar sound to English ones, but the finals/vowels don't share too much in common with English. In other words, Pinyin holds no parallel to alphabet languages (Jacobson, 2013). The function of Pinyin was being used as an aid to teach Chinese reading (the characters) and it was created intentionally to serve as a phonological coding system (Cheung & Ng, 2003). Lin et al. (2010) stated that the mastery of Pinyin did not imply formal Chinese literacy itself. They further pointed out that "the extent to which early mastery of this coding system is beneficial for Chinese character reading itself is unclear. After all, Pinyin mastery implies understanding of a system of letters and tonal representations, which have no direct correspondence to Chinese characters themselves." (p.1117) Therefore, some people think introducing Pinyin from the very beginning in a kindergarten classroom will be detrimental, as

students have not acquired a solid foundation of English phonology. The input of Pinyin can cause a lot of confusion between two phonological coding systems.

However, many scholars argued the advantages of promoting Pinyin with reasons as listed below:

- Pinyin directly related the character with its pronunciation, including tones (Shu et al., 2003).
- “Pinyin facilitates pronunciation and recognition of new characters through sub-lexical phonology” (Lin et al., 2010, pp.1118).
- The mastery of Pinyin provided a useful self-learning tool for students (Jacobson, 2013).

Strategies Used in Teaching Chinese as a Second Language

There was little existing research regarding Chinese immersion education in the United States, especially for primary grades. This section will look into strategies used to teach Chinese as a second language in general. Necessary modification will be made in the subsequent chapters of this research.

Even in regular English classrooms, kindergarten students need multiple forms of stimulus to motivate learning and make it fun and effective. Visual support comprises one of them. Shen (2010) conducted research based on dual-coding theory, a theory of cognition, which was hypothesized by Allan Paivio who used the idea that the formation of mental images aids in learning (<http://www.lifecircles-inc.com/Learningtheories/IP/paivio.html>, 2015), to reveal the effectiveness of using verbal and imagery encoding methods in learning Chinese as a second language. The research showed that although there was no significant result found in retention of the

sound, shape, and meaning of concrete words, a big statistical difference was discovered in retention of the shape and meaning of abstract words, compared to using verbal encoding alone. There are also a large number of homophones in Chinese language, which means, for example, characters 八, 爸, 巴, 拔, 把, and 吧 share the same pronunciation: ba. To distinguish homophone characters, it demands substantial practice using verbal-imagery encoding skill.

The second strategy is in regard to which characters can be cognitively appropriate to teach in kindergarten level. Stroke is the smallest unit that comprises a Chinese character. The number of strokes vary from as few as only one stroke, such as “一” which means one, to as many as “瓢” which means ladle and contains sixteen strokes. Shu, Chen, Anderson, Wu, and Xuan (2003) did a research study trying to find out what characters were explicitly taught in Chinese elementary schools in terms of visual complexity, phonetic regularity and consistency, and semantic transparency. A major finding of their research was that the visual complexity, phonetic regularity, and semantic transparency of Chinese characters increases with grade levels. They also pointed that “low-frequency characters tend to be visually complex but phonetically regular and semantically transparent, while high-frequency characters tend to be the opposite” (Shu et al., 2003, pp.27). Thus, the learning of Chinese characters begins with high-frequent, less visually complex, more phonetically irregular, and less semantically transparent ones. This shares some similarity with English.

Everson’s research (1998) revealed the close relationship between being able to pronounce a Chinese character and being able to identify it. Based on this research, he further suggested that learning became more efficient when learners were introduced to

characters that had already within their oral/aural vocabulary. Therefore, materials designed to support this teaching philosophy would consist of unauthentic, pedagogically based, teacher revised texts. This might, however, seem to go against the teaching pedagogy that advocates the use of authentic texts (Everson, 1998). This finding provided extra input for the selection of Chinese characters to teach in Chinese immersion programs.

Teaching Content Areas through Chinese Language

Mathematics

There have been many research studies showing that the way Chinese language designate numbers between 11 and 19 is different from English or Romance languages (Monastersky, 2005). Think about the English names for number 11 and 12. In Chinese, eleven is named “十一” which means ten and one, and twelve is “十二” which means ten and two. These two numbers in English do not convey numerical information as well as in Chinese. For numbers 13 through 19 in English, which although contain a more obvious numerical sense, the order to read the number is actually backward. We say thirteen instead of teen-three. Numbers under twenty are exactly what kindergarten students need to master. The consistent regularity of numbers in Chinese language represents the concept of place value in a clearer way than English (Han & Ginsburg, 2001; Monastersky, 2005). Miura (1987) found a big difference between Japanese-speaking (Japanese is based on Chinese language) and English-speaking first graders. The Japanese-speaking first graders tended to represent numbers in base-10 form, for example, they use 10 objects as a group, two groups plus three single objects to represent number

23. The English-speaking peers tended to use twenty-three single objects to represent the number (as cited in Han & Ginsburg, 2001).

The clarity of mathematic language in Chinese is not limited to numbers. Han & Ginsburg (2001) analyzed “the inherent compound word structure of the Chinese language to portray mathematical ideas. They used the word “quadrilateral” in English as an example. The word quadrilateral derived from Latin with components of “quadri” meaning four and “lateral” meaning side. But the problem was that these component words were not consistent in English. To teach the concept of quadrilateral in English, teachers need to specifically explain the meaning of each component words. However, in Chinese language, the word for quadrilateral is “四边形” which translates as “four-side-shape”. It is very easy to see that the Chinese term for quadrilateral appears to explain the mathematical concept in a conceptually clear and “visual” way. Such disparity between Chinese and English in terms of naming mathematical concepts can be found in many cases.

Chang’s research (2008) found another interesting difference between Chinese and English language used in mathematic-related daily activities. The research showed that Chinese speaking parents labeled set sizes, and referred to written numerals and ordinal numbers significantly more often than English speaking parents. Even among Chinese-English bilingual speaking parents, such disparity still existed when these participants were asked to describe photos of familiar objects using each language to their kids. More importantly, these participants were not instructed to talk about numbers when describing the objects. It leads to a conclusion that the difference in using mathematical

language in daily life between Chinese and English was mainly affected by the nature of Chinese language itself. This finding has great value for Chinese immersion teachers.

Science and Social Studies-Inquiry Based Learning

In an immersion program, the learning of the second language is intertwined with science and social studies. Because language learning needs to be built on meaningful content, science and social studies have become the perfect carrier to deliver the language. “Social studies is a language-rich context for second language learners” (Franquiz, Guberman, & Salinas, 2006, p. 206). Martin’s (1990) research in a regular English kindergarten class revealed the surprising result that kindergarteners were able to learn social studies by delving deeply into the issues, while the traditional assumption of teaching social studies in kindergarten was that kids in this age were not capable of dealing with important social issues but only simplified concepts. He further explained that teachers should utilize social issues and ideas that arose spontaneous in the classrooms to evoke serious thinking and discussion, and this form of learning should last a longer time than most teacher-centered units. “Young children tend to learn about the world more by living in it” (Marin, 1990, p.317). With the longer time to explore one issue, students were able to stay with it intensively and work through it by doing multiple forms of activities.

A more recent idea of this type of learning is called inquiry-based learning, which starts by posing questions, problems or scenarios—rather than simply presenting established facts or portraying a smooth path to knowledge (<http://www.thirteen.org/edonline/concept2class/inquiry/>, 2004). This method is widely adopted in science class. As part of a large, federally funded research project named the

Scientific Literacy Project (Hereafter referred to SLP), Samaraqungavan, Patrick, and Mantzicopoulos (2011) discovered the positive impact of inquiry-based learning on the science learning and motivating kindergarten students. Compared with another group of kindergarteners that received regular science instruction on a set of similar topics, the target group students who used inquiry-based approach achieved significant academic gains in science. Samaraqungavan et al. (2011) pointed out that learning science required specific cultural context and practices involving distinct domain-specific conceptual constructs, reasoning processes, and patterns of activity. They also emphasized that inquiry-based science learning not only presented the science knowledge in a more meaningful and profound way but also helped students understanding the processes of scientific inquiry, which would benefit them in the long run. Moreover, these kindergarten participants tended to show a stronger interest towards science and to view themselves as competent learners in science (Samaraqungavan et al., 2011).

Another research regarding integrating language learning with inquiry science suggested that inquiry-based science instruction that blended with English Language Development (ELD) instruction might provide an authentic and purposeful context students need to develop the new language (Zweip & Straits, 2013). Although the research was implemented in English classrooms, it has great value for immersion programs to discover new ways to teach.

Remaining Challenge

Although there is well-documented research regarding the advantages of Chinese immersion education as stated in Chapter One and Two, there is an obvious deficiency in research about specific teaching/learning strategies or methods in general as well as in

different grade levels. What is missing is immersion teachers' actual experience in teaching, especially for Chinese immersion which is a relatively new program in the United States. Because most Chinese immersion teachers are native speakers who grew up in a completely different culture, understanding the teachers' side of the story becomes a more important step. A research showed that immersion teachers are struggling with multiple issues such as teacher identity, stakeholder expectations, understanding the diverse culture in the classroom, and knowing the U.S.-style curriculum (Cammarata & Tedick, 2012).

With kindergarten being the first year for kids entering a Chinese immersion program, it is extremely challenging but beneficial if teachers are able to guide them through the whole process with an ongoing interest in learning Chinese. These teachers also help promote academic success in other content areas. This research paper aims to find specific teaching methods/strategies to help Chinese immersion teachers in achieving the above goals.

Chapter Three Overview

In the next chapter, a description of the research method, researcher role, background information, and research design is presented. The entire design is based on the several teaching pedagogies Chapter Two discussed and the existing literature review. All instruments used to collect data are created by myself.

CHAPTER THREE

Research Methods

The literature review chapter started with introduction of several teaching pedagogies that serve as a theoretical lens providing an overview for the following research. The two controversial issues discussed in the literature review presented the diverse perspectives different scholars hold for learning Chinese. It also provided existing research regarding teaching Chinese as a second language and teaching content subjects through Chinese language. In the following chapter, I will describe my research method with its characteristics, as well as my role as the researcher, where I created the research design, the selection of instruments, and the way to interpret the data. In sum, this research project is designed to address the current scarcity of Chinese immersion program research by focusing on the first year of the program, namely kindergarten, by studying effective teaching strategies or methods for this grade level learners.

Research Approach

Given the nature of this research topic, I decided to adopt the qualitative research approach under a constructivist philosophical worldview. In the eye of a social constructivist, Creswell (2014) explained that the more open-ended the questioning, the better the researcher allows participants to construct the meaning of a situation through discussions or interactions with others. Research studies holding a constructivist worldview do not start with a theory, but generate or inductively develop a theory or pattern of meaning based on the information provided by the participants. This research also embraces a pragmatic worldview, which emphasizes what works and how it works.

“Understanding a problem does not necessarily solve it-knowing is not enough” (Heath & Heath, 2010, p. 67). In the book *Switch*, the Heath brothers (2010) presented an idea named bright spot, which focused on looking for solutions to the problem instead of putting too much emphasis on analysis.

According to Creswell (2014), qualitative research has the following characteristics:

- Natural setting: Qualitative researchers tend to collect data in the field instead of bringing participants into a designated place. In such settings, research normally involves face-to-face interaction among participants or between participants and the researcher(s).
- Researcher as key instrument: Researchers do not tend to use questionnaires or instruments developed by others. Instead, qualitative researchers collect data themselves through observations, examining documents, or interviewing. They may design instruments by themselves to collect and gather data.
- Multiple sources of data: Qualitative research typically includes multiple forms of data, such as interviews, observations, participants’ work samples, documents, and even audiovisual records.
- Emergent design: In qualitative research, the initial plan may not be fixed, and some parts of the process may change as the research proceeds. The key idea is to best obtain the participants’ view.
- Reflexivity: Qualitative researchers reflect on the impacts from their own personal background, culture, and experiences in order to shape the direction of the study and interpretation of the collected data. (p. 185-186)

Researcher's Role

As mentioned above, the researcher plays an important role in a qualitative research as the direction of the study is influenced by the researcher's past experience. I grew up in China, where society has a much different view of teaching philosophy. I might bring ideas that I believe are beneficial to student participants or select certain strategies to use in this research. My student teaching experience also contributes to the design of my research. To address the two controversial issues regarding teaching Chinese as a second language, my research was conducted in the following setting:

Chinese characters are still introduced in the first year of the program, but more emphasis is put on speaking and listening. Reading is mainly focusing on sight words, and writing is also encouraged throughout the year in order to maintain an appropriate level of interest for learning Chinese.

In kindergarten, Pinyin, the official alphabetic phonetic system for demonstrating the pronunciations of Chinese characters, is not introduced to avoid confusion between Pinyin and English. Students are only introduced with the concept of rhyme.

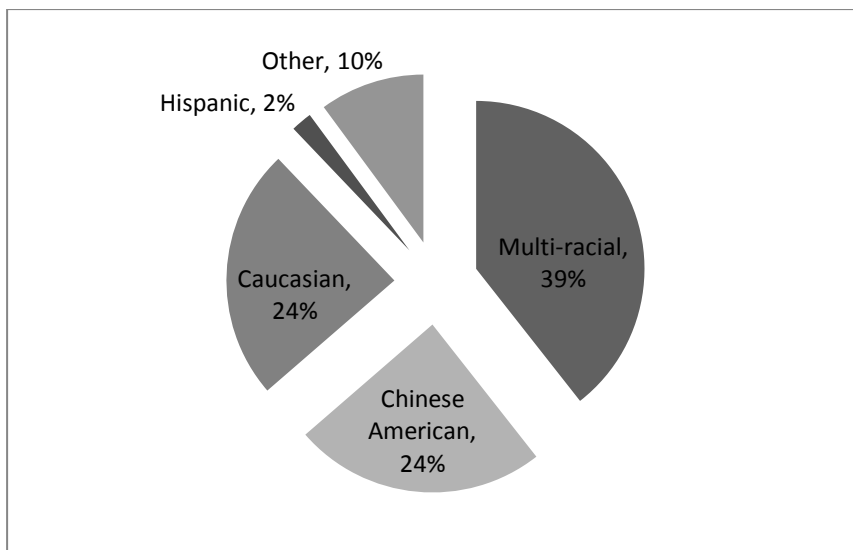
Research Setting & Subjects

School Setting

The school where my research was conducted is a private pre-K through 3 Chinese immersion program in an urban setting on the west coast of the United States. The school was founded in 2008 and started offering an emerging K-8 program in 2012. In 2015, the school had elementary grade Kindergarten through 3rd grade, and a separate pre-K program. The total enrollment is approximately 140 students from K to 3rd grade,

and the student-teacher ratio is around 1:10, which requires each classroom to have two homeroom teachers. The population of the students is quite diverse as Chart 1 shows:

Chart 1



The school adopts a progressive student-centered educational philosophy which focuses on authentic problem solving and critical thinking. The curriculum does not come with any textbook. Instead, it consists of teacher-developed interdisciplinary inquiry-based units.

Classroom Setting

The research class consists of 21 students, 10 girls and 11 boys. There are 18 students enrolled in the pre-K program in the same school, which means they already had some exposure to Chinese language, mainly in speaking and listening. Two students had no experience of learning Chinese and one had Chinese as a heritage language at home. Normally the Chinese immersion schools in the United States have students with zero exposure to Chinese language before entering kindergarten. Unlike these peer programs,

the unique pre-exposure of Chinese language in my research school laid a foundation for the inquiry-based learning unit instruction model, which meant much less time would be spent on helping students getting familiar with daily routines or building up basic instructional language. There are two homeroom teachers in the research classroom, and both are native speakers.

Participants

This research focused mainly on collecting data from student participants, along with insights from peer teachers and the school principal. Consent letters were sent to all students' parents at the beginning of the school year. Nineteen students' parents signed the form to participate in this research and two did not response.

Research Design

At the beginning of September, an introductory letter with a brief explanation of the goal and content of this research was sent to each student's parents. All activities that designed for this research were integrated in regular instructional time. The letter contained a consent form requiring a parent's signature indicating whether they agreed to allow their kids to participate in this research.

The research consisted of three parts with activities designed by myself to test the effectiveness of several teaching strategies in terms of learning Chinese characters, learning mathematics through Chinese, and using inquiry-based learning in science and social studies.

The first part of this research was trying to look for ways to help young beginner students learning Chinese characters. It has been widely acknowledged that using visual stimuli to support learning a new language is critical, and such strategy can be easily

applied to concrete words. But when it comes to academic terms or words, teachers need to present them in a more concrete way along with a variety of activities for students to practice. In the water/weather unit, students were expected to learn words in Chinese, such as 水 (water), 浮起来(float), 沉下去(sink), and 雨(rain). Students will have a lot of opportunities to do hands-on experiments or projects. I used the following table to take notes during these activities (see Table 3.1).










Table 3.1 Water/weather Unit Observational Notes

	Activity	Observational Notes
1.		
2.		
3.		
4.		
5.		

Another activity was designed to find out what factors should be considered when creating a sight word list for kindergarten Chinese immersion students. The rationale behind it is that students tend to make better connection with Chinese words that are within their oral-aural English vocabulary. I created a list (see Appendix A) of 20 high-frequency Chinese characters which vary from characters like “我” meaning “I” to abstract words like “的” which does not have a corresponding meaning in English but was one of the most frequent characters in Chinese. I included in the list characters varying from few strokes to the more visually complex to see whether the number of strokes was one factor impacting the recognition of a Chinese character. This form was sent to students at the end of the first trimester. Students were asked to color the

expression face they felt about each Chinese character and read each character independently. Table 3.2 shows part of the list as a sample. Please refer to Appendix A for the full list.

Table 3.2 Sample of High Frequency Chinese Character List

我			
的			
你			

The second part of this research was designed to see how often mathematical related language was used in the classroom daily. This included morning meeting, transitional or wait time, and other time periods that were not formal instructional time. I took notes of all different activities involving mathematical language, along with the corresponding mathematical language in English (see Table 3.3).

Table 3.3 Mathematical-Related Language Notes

Activity	Mathematical-Related Language	Corresponding Language in English

The last part of this research tested whether an inquiry-based interdisciplinary learning model is an effective way for beginner Chinese immersion students. Did it create a deeper and longer-lasting memory? Although the rationale behind inquiry-based learning is that learning should build on meaningful content, the language barrier could still be a big challenge for immersion students. One inquiry-based unit lasts five to six weeks. Students were randomly divided into two groups to complete the evaluation form with the teacher one-on-one. The evaluation form (see Appendix B) was sent to the first group one week after the completion of My Personal History unit and the same form was sent to the second group two weeks after.

The form included 7 key words that students were expected to be able to recognize by the end of the unit. Students were also asked to draw and describe one activity/project that they enjoyed from this unit. The evaluation was based on the level of details that students were able to recall. The actual assessment sheet was in Chinese.

Summary

In Chapter One, I introduced the concept of “language immersion” and its history in the United States. I also explained my interest in the research topic and the fact that the current existing resources regarding Chinese immersion education, especially for young learners, were difficult to find. In Chapter Two, I introduced teaching pedagogies adopted in language immersion classroom as an overall lens to guide my research. Then, I summarized existing teaching and learning strategies or methods that were adopted at the kindergarten grade level in terms of teaching the language itself and using the language to teach other content areas. In Chapter Three, I stated my research method and my role in it. The design of instruments was based on the literature review and aimed to answer the

question: what teaching strategies are effective for kindergarten Chinese immersion students? In the next two chapters, all data collected for this research will be presented and any unexpected observation or incidents will also be shared.

CHAPTER FOUR

Results

For the 2015-2016 school year, there are 21 students enrolled in a kindergarten class in an urban private elementary school setting where this research mainly took place. All students were offered the opportunity to participate in this research under the approval of their parents or guardians. There are 19 students' parents signed the consent form and agreed to their child participating this research. The other two students' parents did not reply to the consent form, so the total number of participant students in this research is nineteen. Among these 19 participants, 11 boys and 8 girls, two had no experience of speaking or learning Chinese before kindergarten and one had some exposure to Chinese as a heritage language while the rest had been in the pre-school Chinese immersion program.

This research contains four instruments, two requiring the researcher taking notes from daily classroom activities and two requiring students' direct participation by responding to the instruments. Instruments with students' direct response were conducted on a one-on-one basis, which means the researcher gave out the questionnaire to each student and asked the student to finish it individually. The researcher mainly used Chinese to communicate with all participants. Only when the research was impeded by students' limited Chinese acquisition did the researcher communicate with the participants in English.

Structure

The research was conducted for the purpose of this capstone throughout different content areas, Chinese Literacy, Math, and Science in the form of Units of inquiry. It lasted approximately six weeks. The results gathered include the following:

- The water/weather observational notes (throughout the research)
- The high frequency Chinese character (one-on-one, one-time)
- Mathematical-related language usage notes (throughout the research)
- Inquiry-based unit assessment (one-on-one, one-time)

The reporting of the results of each instrument attempts to answer the following questions:

- What were students' reaction/response when they learn new scientific-related Chinese words through specific activities/experiments?
- Was the visual complexity or the level of English-Chinese corresponding meaning a key factor to consider when we create a sight word list for beginner students, namely kindergarten students in this capstone?
- Except for the designated math block, how frequently do students have exposure to mathematic-related conversation or opportunities to practice using mathematic-related language?
- Is an inquiry-based interdisciplinary learning model an effective way for beginner Chinese immersion students? Did it create a deeper and longer-lasting memory?

Water and Weather Unit Observational Notes

The first research instrument was conducted from the beginning of the water/weather unit of inquiry, which lasted six weeks. The adoption of units of inquiry as a form to teach science as well as the target language in this school fits perfectly with Shen's (2010) research about the effectiveness of using verbal and imagery encoding methods in learning Chinese as a second language. The research showed that although there was no significant result found in retention of the sound, shape, and meaning of concrete words, a big statistical difference was discovered in retention of the shape and meaning of abstract words, compared to using verbal encoding alone. Students are expected to learn the target language through multiple scientific experiments or hands-on projects, in such a way that the language is presented not just verbally but also visually connected.

My first research instrument was conducted in a form of anecdotal notes. Each afternoon students have one unit of inquiry station in small groups. The notes are listed in time order, from the beginning to the end of the water/weather unit. Please refer to Appendix C for the full notes.

High Frequency Chinese Character List

The second instrument was designed to find out whether a strong corresponding English-Chinese meaning or the visual complexity of a Chinese character is a key factor to consider when we create a high frequency word list for kindergarten Chinese immersion students, the beginner learners. The writing of Chinese characters has always been a challenge for all different aged learners, as it demands a tremendous amount of time devoted to practice. One of the debates for teaching Chinese language is whether the teaching of Chinese characters should be delayed in the beginning stage. After his

research study, Packard (1990) argued that the holding off on Chinese characters could help learners getting more fluency in spoken Chinese. On the other hand, Liu (1983) emphasized that the sounds, the syntax, and the characters are highly interlinked so that the learning needs to be integrated from the very beginning.

Previous research conducted by Shu et al. (2003) revealed the learning of Chinese characters begins with high frequent, less visually complex, more phonetically irregular, and less semantically transparent ones. However, my second research instrument showed some different results. Appendix A is a list of 20 high frequency characters the students had been learning from the beginning of kindergarten. Please note that the actual form does not contain the English meaning of each character.

Students were asked to color the face expression. For example, if they know the character they can color the smiley face. If they think they know the character but not quite sure, they can color the neutral one. After students finishing coloring, they were asked to read all twenty characters to the teacher individually.

Before we discuss the result, I need to explain more about the selection of these twenty characters first. Among these characters, the number of strokes ranges from three to as many as twelve. There are three characters, 爱, 喜欢, and 家, that have ten or more than ten strokes. Characters like 小, 大, and 个 only contain three strokes. In terms of corresponding English-Chinese meaning, as you can see in the English translation, characters 的, 个, and 是 do not have a strong connection in English given the fact that no concrete corresponding English word can be found.

The result discussed here was mainly based on the accuracy with which the students read. Students' self-evaluation, the face expression coloring, was used as a

supplemental resource. According to the result as shown in Appendix D, ten out of these twenty characters achieved 100% accuracy. These characters are: 我, 的, 小, 爱, 爸, 吃, 妈, 喜欢, 大, and 不. All these characters have a strong corresponding English-Chinese connection and even in English these can be seen as high frequency words. The lowest accuracy is the character 岁, whose usage is limited to the context about age.

Mathematical-Related Language Usage

The third research instrument was designed to see how often mathematical related language was used in the classroom daily. This will include morning meeting, transitional time, and other time blocks that were not formal instructional times for math. Except for the way that Chinese language designates numbers, which is different from English, there are many daily language usages involving numbers in Chinese. Chang (2008) found that Chinese-speaking parents referred to written numerals and ordinal numbers significantly more often than English speaking parents. The difference in using mathematical language in daily life was mainly affected by the nature of Chinese language itself. Inspired by Chang's research, I designed the Appendix E to record Mathematical-related language usage in my classroom. This does not include formal Mathematic instruction time.

Unit of Inquiry Assessment

The last instrument was designed to know whether an inquiry-based interdisciplinary learning model is an effective way for beginner Chinese immersion students. Did it create a deeper and longer-lasting memory? Although the rationale behind inquiry-based learning is that learning should build on meaningful content, the language barrier could still be a big challenge for immersion students. Students were randomly divided into two groups to complete the assessment (see Appendix B) one-on-

one with the teacher. One group did the assessment one week after the completion of the unit “my personal history” and the other group did it two weeks after.

For the first character recognition part, 16 out of 19 participant students recognized 5 or 6 characters they had been learning in this unit. The rest three students recognized 4 or 5. All students were provided with a portfolio folder that contained sample works for each project they had done in this unit so that it helped them recall their learning. All students were able to write some key Chinese words about their favorite project. Five students shared their thoughts with a lot of detail and used key words they had learned in this unit. Six students also expressed their thoughts with key words and some details. Seven students recalled a few key words, mainly focused on the favorite project instead of the whole unit, with a few details. One student was only able to use a few key words related to the favorite project but no detail involved.

I categorized the reasons that students shared about their favorite project into five as following:

- The project is about myself and I was able to create things about me and work on details to express myself.
- The project is about my family, people that I love the most.
- I was able to learn new characters that I did not know in preschool. Now I am able to write a lot more Chinese characters and these are about my family.
- The project has a cool artistic look. I was able to design the look and the project took some time to finish, which made me proud of myself.
- I enjoyed interacting with other teachers and working in a team when making the project.

Chapter Five Overview

In the next chapter, I will revisit some literature review that are most related to my research. The findings from each research instrument will be shared. In addition, the implications based on the finds will be discussed. I will point out the limitations of this research. Some suggestion for further research will also be shared.

CHAPTER FIVE

Conclusion

This chapter first revisits some of the literature review that relates to the design of my research instruments and their results. Then it elaborates findings from each research result followed by their implication. Last, it lists some limitations this capstone had and some possible further research in the future.

Revisiting the Literature Review

The inspiration of this research project came from the insights and thoughts gained from the literature reviewed in Chapter Two. The curriculum of my current kindergarten class consists of Chinese literacy, Mathematics, and Units of inquiry (science or social studies). The target language, Chinese language, is the only language used to deliver all curricula. We all know that the learning of a new language is challenging while the learning of academic content through a new language is even more challenging. Even in regular English classrooms, kindergarten students need multiple forms of stimulus to motivate learning, making learning fun and meaningful. Visual support is one of the most effective ways. In addition, the large number of homophones in Chinese language requires students having a solid grasp of verbal-imagery encoding skill (Shen, 2010). Our units of inquiry contain substantial hands-on activities or experiments so that students are able to develop a more concrete understanding of the new words for that unit. This seems to bridge the abstract look of Chinese characters and the authentic usage and meaning behind it.

Students are not asked to be able to write all new words, but only selectively. Many words from Units of Inquiry aim to expand the oral vocabulary. This sounds similar to what Everson (1998) revealed-that learning became more efficient when learners were introduced to characters that had already within their oral/aural vocabulary.

One controversial topic in teaching Chinese as a second language is whether to delay teaching Chinese characters, not putting too much emphasis on writing at the preliminary stage. My observation in my kindergarten classroom was that students highly enjoyed working with Chinese characters. They loved using small white boards to practice writing Chinese words; they were always excited to recognize characters they already learned in a new text; they liked looking for similarity among different characters. To them, the character itself is a powerful visual stimulus. Then, why do we need to delay teaching writing of Chinese characters?

In terms of the selection of Chinese characters taught in kindergarten, Shu et al. (2003) found that the learning of Chinese characters begins with high-frequent, less visually complex, more phonetically irregular, and less semantically transparent ones. My second research instrument was built on this finding and there are some interesting findings I will share later in this chapter.

Moving to mathematics, the consistent regularity of numbers in Chinese language represents the concept of place value in a clearer way than English (Han & Ginsburg, 2001; Monastersky, 2005). For numbers 13 through 19 in English, although they contain a more obvious numerical sense, the order for reading the number is actually backward. We say thir-teen instead of teen-three. The clarity of mathematic language in Chinese is

not limited to numbers. Han & Ginsburg (2001) analyzed the inherent compound word structure of the Chinese language to portray mathematical ideas. For example, in Chinese a week starts on Monday. Instead of having designated names for each day, we say 星期一, 星期二, 星期三... which means day one of the week, day two of the week, and day three of the week. It's the same case for the names of each month. We say 一月, 二月, 三月, which means month one, month two, and month three.

Samaraqungavan, Patrick, and Mantzicopoulos (2011) discovered the positive impact of inquiry-based learning on the science learning and motivating kindergarten students. They also emphasized that inquiry-based science learning not only presented the science knowledge in a more meaningful and profound way but also helped students understand the processes of scientific inquiry, which would benefit them in the long run. Other research regarding integrating language learning with inquiry science suggested that inquiry-based science instruction that blended with English Language Development (ELD) instruction might provide an authentic and purposeful context that student need to develop the new language (Zweip & Straits, 2013).

Findings

Water and Weather Unit Observational Notes

Reading through the notes, my first reaction was that the students were really enjoying learning about water and weather. They came up with questions; they tried to construct their own explanation; they used their prior knowledge to make connections with what they were learning. A few students were able to include the newly introduced words. The majority of students were still using English to answer questions or to share

their findings. The teacher delivered everything in Chinese, which, on the other hand, means that if the students were able to answer questions with reasonable answers or follow instructions, they understood what the teacher said including new words. Some words, such as float and sink, are very domain-specific. It takes a longer time, with a lot of repetition, to be fully absorbed into someone's vocabulary in the new language. For the word 水, water, students showed a much higher level of acquisition both in oral and written language after this unit. The first reason I can think of is that the word 水 has already existed in their aural/oral vocabulary for a long time as they constantly need to use this word to express their need to drink water (喝水) in their water bottle (水壶). So when they saw the written word 水, they quickly made the transition from the oral vocabulary to the written one. The second reason might be that this character is less visually complex. It only has four strokes. Students actually showed a high level of interest when practicing writing it. The last reason might be that this unit was all about water, which made the word 水 the highest frequency word throughout the unit. The constant exposure to the language itself along with concrete related objects made the learning process much more effective.

High Frequency Chinese Character List

The majority of the twenty Chinese characters had been formally taught and practiced multiple times, but I also included the characters, 你 (you), 家 (home) and 是 (to be), which had been presented only in the environmental print, such as the morning meeting message, read aloud, and songs. As you can see from the result (Table 4.3), two students were not able to recognize 你 or 是 and only one student failed to identify 家.

These results validated the importance of environmental print in the process of language learning. Especially for beginner learners, too much writing may overwhelm them but taking one step back by focusing on character recognition can better prepare an effective learning pace for the long run. The truth is that after students can recognize the character, learning to write it becomes less challenging.

Another finding is that there is no certain relationship between the visual complexity of a character and the accuracy. Characters such as 爱 and 喜欢 have the most number of strokes, ten and 12, but both have 100% accuracy. 岁 (years old) has the lowest accuracy but it only has six strokes. My interpretation behind this is that the grasp of 岁 is rather domain-specific as students learned this character from the unit of inquiry about “personal history”. The only context they can practice using this character is “how old are you? I am five/six years old.” This is much less frequent than characters with more strokes; for example, students are able to use 爱 (love) to express a lot of ideas and they see this character in different sentence patterns and contexts.

In terms of corresponding English-Chinese meaning, as we can see in the English translation, characters 的, 个, and 是 do not have a strong connection in English, but all three characters are frequently used in both daily and academic language. 是 had a rather low accuracy rate probably because it had not been formally introduced to the students but only presented in environmental print (reading print from the environment around us, such as a letter signs, logos, and labels) and is relatively visually complex. The accuracy for the other two characters was quite high. Thus, it might be reasonable to conclude that there is no direct relationship between corresponding English-Chinese meaning and

students' ability to read that character as long as they have gained enough exposure and practice.

Mathematical-Related Language Usage

One important finding gained from the note (Table 4.4) is that the inherent word structure of the Chinese language to portray the names of each day and month provides large amount of opportunities for students to practice counting. This is especially critical for kindergarten students to develop number sense in the beginning stage. I do, however, notice that many students have difficulty matching each month with its English meaning. For example, one boy's birthday is in April and he was having a hard time telling me his birthday in Chinese. This could be due to the fact that the names of each month in English do not follow a numeric pattern so that students do not have a solid understanding of the fact that January is the first month of each year.

Counting numbers in Chinese conveys more consistent numerical information than in English. In Chinese, eleven is named “十一” which means ten and one, and twelve is “十二” which means ten and two. The consistent regularity of numbers in Chinese language represents the concept of place value in a clearer way.

Another thing worth sharing here is the certain pattern to say ordinal numbers in Chinese. Basically by adding the character 第 in front of any number, it becomes an ordinal number. In this way, it provides students another consistent way to practice numbers.

In terms of character recognition, the majority of students showed their acquisition of the new set of vocabulary they learned through my personal history inquiry. When shown a portfolio folder that contained sample works for each project they had

done in the last unit, students were able to recall something about what the project was and how their project looked like along with a drawing. Except for one student who was not able to construct a comprehensive description of his favorite project, all other students were able to at least use some key words in Chinese to elaborate their work. When we reviewed the portfolio folder together, students showed a high level of fulfillment and pride. They were excited to talk about what they had learned. From the reasons that students listed about their favorite project, we can conclude that they loved learning things that are closely related to them. Such forms of learning stimulate their prior knowledge easily, which enables their brain to be excited about the new language. This unit lasted six weeks, which provided adequate time for students to focus on one topic, along with multiple projects or activities to internalize the content.

Implications

Kids in kindergarten love all different kinds of hands-on activities and enjoy learning more about things in their life. They are not intimidated by scientific terms in a new language as I thought they might be. On the contrary, they are learning the language within meaningful contexts. However, one thing I need to clarify here is that language learning should not be the only purpose of units of inquiry. Students are also learning how to think critically, how to pose questions, and how to revise a design. Another important factor about units of inquiry is its time span. One unit lasts normally five or six weeks, or even longer. This provides students with substantial time and opportunity to delve into one topic as well as to internalize new terms and words from a new language. I enjoyed teaching the kids Chinese language through units of inquiry, and I can tell from their faces that they enjoyed learning Chinese through units of inquiry, too.

The way that Chinese designates numbers, especially between 11 and 19, is different from English. We need to take advantage of the consistent regularity of number names in Chinese by doing lots of counting. Besides, the existence of mathematical structure in Chinese language is pretty common. In kindergarten, kids are learning days and months. Later, they need to learn the names of different shapes that also involve number-related language. As they move to the higher grades, they will soon start seeing fractions, which have a certain pattern as well. Both denominator and numerator are cardinal numbers. For example, $\frac{1}{4}$ reads “4 分之 1” and $\frac{2}{5}$ reads “5 分之 2”. For math, teachers should continue using mathematical-related language as much as possible to foster number sense. Even during read aloud, questions like “how many characters are in the story?” or “what was the second problem?” can bring some mathematical talk in an authentic, everyday context.

For beginner learners like kindergarten students, the exclusion of writing Chinese character takes away the fun part about learning Chinese. Moreover, Chinese characters, unlike English words, cannot be sounded out, which means each single character is a sight word requiring a lot of repetition and practice. The teaching of character writing should start with the most frequently used ones, those that are most closely related to the learners and that the learners can practice using daily. The number of strokes or a corresponding English-Chinese meaning is not necessarily a factor that needs to be considered.

Limitations

One big limitation this research has is that the student participants were at a higher starting point than many other Chinese immersion schools in the United States. The majority of the class came directly from the preschool at the same campus, which offers a Chinese immersion program as well. This means these students were already familiar with daily routine language and equipped with basic vocabulary for further learning. This might also contribute to their readiness to have curriculum like units of inquiry. The aural/oral vocabulary they accumulated at preschool is a big advantage to prepare them to start writing. The school where I student taught had a 100% zero-exposure rate to Chinese language before entering the program, which means that every kindergarten student had no previous experience with Chinese language. In other words, the research class is not the most typical Chinese immersion kindergarten class in the United States.

On average, the students learn one or two new characters each week. Since the research started at the end of the first trimester, the number of characters that could be used in the high frequency character list was limited. The bigger the sample is, the more valid the result is. As I was organizing the research results, I suddenly thought that I probably should have asked the students to do written-dictation of the words as well because the acquisition of a Chinese character involving the ability to write it independently. Recognition of words does not reflect students' ability to write the characters. It overlooked the possibility that students might not be able to write certain characters, which indicates an incomplete acquisition.

The notes recording mathematical-related language may generate a more straightforward result if I count the number of times such language emerged in class and compare it with such language used in a regular English kindergarten class.

Future Research

I would be interested in further research about the reading skills taught in a kindergarten Chinese immersion class. We all know that the mechanism of English language results in the fact that once students acquire the proper sounds of the alphabet letters, they can use those sounds to sound out or decode a word. And this can happen as early as in kindergarten, or even pre school. For Chinese language, it is a completely different situation. Each character is a sight word. Although there are a large number of phonograms in Chinese, they require a solid foundation of high frequency words in the first place. For beginner learners, they are building up their vocabulary pool of basic characters that can benefit the decoding of phonograms in the future. Thus, such decoding skills do not work for primary grade students. Moreover, the phonogram rules do not apply every time, which means that specific practice is still required for every character.




























I also noticed, from my short experience as a teacher, that for a student to make a meaningful guess of an unfamiliar character in a text, it requires the student to have a large oral vocabulary so that he or she can look for possible characters that fit. In other words, if the student has a small aural/oral vocabulary, he or she probably will have difficulty in even making a guess about an unknown character. This makes learning Chinese challenging and sometimes frustrating for beginner learners.































Final Thoughts


I still clearly remember the first time I observed a kindergarten class at a Chinese immersion public school in Minnesota. I was so amazed by how authentic the way the students spoke Chinese and how large their vocabulary already was. That was my first time to experience the idea of “immersion” and I did not expect a second language to be more than a language.

The development of Chinese immersion programs in the United States is an ongoing process. There are still a lot of challenges and difficulties that need to be addressed. My role as a Chinese immersion teacher will continue to be an action researcher to explore new ways to support teaching the language itself and other content areas through this language.

Appendix A: Twenty High-Frequency Chinese Characters

我 I, me	  
的 possessive particle; of --	  
你 you	  
看 look, see	  
小 small	  
爱 love	  
好 good	  
爸 dad	  
手 hand	  

吃 eat	  
妈 mom	  
喜欢 like	  
个 measure word used to indicate how many	  
会 can	  
家 home	  
大 big	  
是 a verb, to be	  
不 no, not	  
有 have	  

<p>岁</p> <p>years old</p>	
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Appendix B: Unit of Inquiry Assessment

Please read the following Chinese characters that you learned from last unit and read them to me: 爸爸, 喜欢, 岁, 有, 妈妈, 会, 爱	0-2 character	2-3 characters	3-4 characters	4-5 characters	5-6 Characters
Please describe one activity/project that you enjoyed from the last unit. You can draw a picture to help you explain. (Provided student a portfolio folder to review all the projects they've made.)					
Few key information recalled	Some key information recalled with some details	Key information recalled with some details	Key information recalled with enough detail		
Notes: Why did you enjoy the above project the most?					

Appendix C: Water and Weather Observational Notes

	Activity	Observational Notes
1.	Students are free-exploring water.	We had a paper table cloth and one boy unexpectedly discovered when the table cloth got wet that it became easier to draw on the it with crayon than when it was dry. The finding amazed the boy.
2.	Students are doing the “sink or float” experiment with different kinds of objects. This was the first scientific activity for the water/weather unit.	The new words are 浮起来 float and 沉下去 sink. After a few rounds asking questions with these new words, along with gestures, students were able to answer with these words.
3.	Students are doing the “sink or float” experiment with different kinds of fruits.	One girl said: 我们在做 experiment, 我们在看它会不会浮起来还是沉下去。有一些大的会沉下去, 有一些大的会浮起来。(We are doing an experiment. We are seeing whether they will float or sink. Some big things sink and some big things float.)
4.	Students are doing sink &	Students were getting more comfortable to both

	float experiment with salt water.	hear and say the words 浮起来 float and 沉下去 sink. Without teacher giving the gesture, they were able to pick the right word to describe whether the objects sank or floated. Many students were curious to know how many spoons of salt they need to put into the water to make things float in particular.
5.	Students are playing with the water table with different tools.	<p>One boy was stacking two cups with the bottoms one filled with water. He commented: “老师，看！ (Look, Teacher!) The cup can squeeze the water out!”</p> <p>Another boy kept filling water in a cup with a few toy bears floating on the water. Once he continued adding the water even the cup was full, he excitedly shared his discovery: “老师，看 (Look, teacher)! If we pour more water, the bears are coming out!”</p>
6.	Students are making boats out of foil and testing how many coins would make the boat sink.	<p>One girl said: “ I like playing with water. 我们在做船 (We are making boats) . I could put 69 coins in my boat because it was round.”</p> <p>Another girl commented: “We used this kind of paper and we made a boat. We put it in water. We</p>

		put in coins to see if it can still float. 我喜欢因为我可以 (I like it because I can)make the boat, 还有我可以 (and I also can) put it in the water.”
7.	Students are doing a simulation experiment of the Aesop’s fable, The Crow and the Pitcher.	Students were engaged to answer questions like “does the water become more after we add the rocks?” or “will the water (level) rise or decline? Why?” One girl shared her thought: “ I think the 水(water) will drop if we take out the rocks because the rocks will take away some water with them”. Another boy held a different perspective: “水会变多因为 (the water will become more because) it’s(the water level) higher”.
8.	Students are making rain in a Ziploc bag. Students need to draw a few clouds with writing the Chinese character 云 inside the clouds, a sun with the character 太阳 inside it, and the character 水 which means water on the bottom. Then they can add	Almost every student was excited about this project; some even said comments like “This is the best project ever”, or “this is so fun.” During the following days, kids loved looking at the “rains” inside the bag and many of them were able to use “下雨 rain” to share their findings.

	some colored water into the bag and hang it up on windows.	
9.	Students are doing the experiment “surface tension with water and coins”	The leading question for this experiment was “你的硬币可以有几滴水 how many water drops can your coin hold?” Almost every student was able to answer the question using the new target word “水 water” in their response.
10.	Students are creating “tornado” inside a glass jar with water and dish detergent.	The word 龙卷风 tornado was completely new to the students so that it was not even in their oral vocabulary. Students were curious to observe closely about how the “tornado” in the glass jar moves and why the shape of a tornado looks like that. One student said: “我的龙卷风有 29 （my tornado can last 29） seconds” after I encouraged them to count how long the tornado last.
11.	Students are making a windsock and using it to tell the direction of the wind.	Students were excited to test the windsock outside the classroom. They were able to answer the key question “风从哪个方向来？ which direction does the wind come from?”. One student asked “is the 风 (wind) the same as the 风 in 龙卷风 (tornado)?”

12.	Students are working in pairs to create a rainproof tent-like project to protect a piece of paper from getting wet.	<p>Students were extremely engaged with this open-ended activity as they got to choose different types of materials for their project. Some teams revised their project when they saw the team had a more stable and stronger design. I asked questions including key words 水(water), 下雨(rain), 湿湿的 (wet), 保护 (protect), and etc.</p> <p>Students were able to provide reasonable responses mainly in English.</p>
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Appendix D: Accuracy Rate for Twenty High-Frequency Chinese Characters

我 I, me	100%
的 possessive particle; of --	100%
你 you	89.5%
看 look, see	94.7%
小 small	100%
爱 love	100%
好 good	94.7%
爸 dad	100%
手 hand	94.7%
吃 eat	100%
妈 mom	100%
喜欢	100%

like	
个 measure word used to indicate how many	94.7%
会 can	94.7%
家 home	94.7%
大 big	100%
是 a verb, to be	89.5%
不 no, not	100%
有 have	94.7%
岁 years old	84.2%

Appendix E: Mathematical-Related Language Usage Notes

Activity	Mathematical-Related Language	Corresponding Language in English
Read morning message during morning meeting	Everyday during morning meeting, students read a morning message containing the following sentence pattern about date “今天是 2015 年 11 月 12 日，星期四。”	“Today is Thursday (day four of the week), November (the eleventh month of the year) 12 th , 2015.”
Daily calendar	Students need to find out what day is tomorrow, what day was yesterday, and what day is today by using sentence pattern like “今天是星期四，昨天是星期三，明天是星期五。”	“Today is Thursday (the fourth day of the week); yesterday was Wednesday (the third day of the week); tomorrow will be Friday (the fifth day of the week).”
Days of school	Students need to find out how many days they have been at school and count by 1, 2s, 5s, or 10s.	Counting in English

Counting game	<p>In circle, students count one by one in a given number range.</p> <p>Students who said the assigned number(s) need to sit down. A more challenging variation of this game can be counting by 2s or 5s.</p> <p>A number line is displayed in the front white board to help students keeping track of the numbers. “1,2 ... 11,12,13...20”</p>	Counting in English
Counting backwards	<p>During cleaning up time, students and the teacher count backwards together slowly.</p> <p>“10,9,8 ... 0”</p>	Counting backwards from ten in English
Clapping game	<p>During transition time, the teacher says: “如果听到我的声音，比我拍手多/少一次。”</p>	“If you hear me, clap one more/less time than me”
Ordinal numbers	<p>There is a certain pattern to say an ordinal number in Chinese</p> <p>“第 X 个” (X can be any number).</p> <p>The use of ordinal numbers is</p>	For example, 第 2 个 means the second.

	<p>common during daily classroom activity. For example, teacher informs the class there will be five students coming to the front to do an activity. “第一个是 The first one is... 第二个是 The second one is ...</p>	
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