An Evaluation of Electronic Annotated Readers for First Graders in Chinese Dual Immersion to Improve Reading Comprehension and Character Recognition

James H. Cloe Jr.
Brigham Young University - Provo

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An Evaluation of Online Annotated Readers Designed to Improve
Chinese Character Comprehension for First Grade Students
Enrolled in Early Chinese Language Immersion

James H. Cloe, Jr.

A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of
Master of Arts

Dana Scott Bourgerie, Chair
Matthew B. Christensen
Ellen S. Knell

Center for Language Studies
Brigham Young University
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ABSTRACT

An Evaluation of Online Annotated Readers Designed to Improve Chinese Character Comprehension for First Grade Students Enrolled in Early Chinese Language Immersion

James H. Cloe, Jr.
Center for Language Studies, BYU
Master of Arts of Language Acquisition and Teaching

This study is an evaluation of online, annotated readers developed for first grade students enrolled in Chinese immersion. The electronic readers were created to provide additional input to immersion students, who had little time in class for Chinese character reinforcement. The students accessed online readers from their homes and took assessments before and after each reader to test for improved character comprehension. In addition, students were divided into treatment and control groups. The treatment group had annotated electronic readers with audio and games. Conversely, the control group did not have annotations but audio was included. Results demonstrate a significant difference between preliminary and post-assessments, suggesting that students comprehended more characters after reading. No significant differences were detected between the control (non-annotated) and treatment (annotated) groups. Additional data collected from parent surveys provide useful demographics about subjects’ socio-cultural and language variables as well as highlight parental desires for more support and help-aides. Computer Assisted Language Learning (CALL) in relationship to young immersion students learning Chinese is also discussed. Results suggest that online, annotated readers can be an important resource for students who have limited instructional time in the classroom and little opportunity to receive help at home.

Keywords: annotated, annotations, Chinese, early Chinese immersion, character recognition, online materials, CALL, Chinese CALL, electronic readers, vocabulary retention, text with audio, text with animations
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Chapter 1: Introduction

Learning a foreign language can be difficult. Learning to read a non-phonemic language like Chinese is especially challenging for second language learners. Therefore, teaching English-speaking elementary school children how to read Chinese characters is a distinctly daunting task. This study examines an online interactive reader to determine how effective it is in improving children’s character learning. In the field of language teaching, practitioners continually search for methods to improve the classroom environment in order to help their students acquire as much language as possible in a limited time. Teachers try to find the most appropriate texts and develop curriculum to fit their own teaching style, while looking for authentic materials to engage and instruct students. On a large scale, they might seek to connect their curriculum to local and national standards. On a smaller scale they seek to meet individual student needs. However, it can prove challenging for teachers to help students overcome issues and obtain progress beyond the minimums of curriculum requirements.

Currently, Chinese immersion schools in Utah have over 3,500 students in 27 schools participating in the program from Kindergarten to fourth grade. Every Chinese classroom (at least in the lower grades) has a copy of the *Step by Step* booklets developed by the Brigham Young University (BYU) Chinese Flagship program. These *Step by Step* booklets are reading supplements designed to help the instructors introduce Chinese characters for standards-based content into the curriculum. This study uses four of the *Step by Step* booklets to create a digital tool to conduct an experiment over the Internet. This study examines the functionality of each computerized version of the *Step by Step* booklets for effectiveness in increasing Chinese character recognition by using multiple-
choice, preliminary and post-quizzes. The digital or computerized version of the *Step by Step* booklets is hereafter referred to as online readers.

**Purpose of the Study**

This study seeks to measure character acquisition in a manner that does not intrude on the classroom. It utilizes computer-assisted language learning (CALL) as a computer based supplement to instructor materials designed to increase learner exposure to Chinese and help learners develop and implement learning strategies.

This study explores whether reading the texts from the online readers helps the learners to recognize more Chinese characters, toward reducing the amount of time that teachers spend on informing the students about vocabulary and usage issues. The software allows the online readers to show in-text annotations for the purpose of aiding subjects to understand vocabulary and the meaning of context around the vocabulary. This study compares online annotated texts (treatment) to the same texts in online non-annotated formats (control) to determine if the annotations have an effect on the ability of subjects to comprehend Chinese characters as measured by multiple-choice preliminary and post-quizzes. Specifically, the subjects must distinguish the meaning of a word or phrase from the online readers in isolation after controlled exposure to that word or phrase in context.

Hereafter “annotated readers” refers to the online readers that include in-text annotations and “non-annotated readers” refers to the online readers without annotations. Any reference to the “online readers” is interpreted to mean both the annotated and non-annotated readers as a collective.
Significance of the Problem

This study stems from an attempt to improve language training materials in a Chinese immersion first grade classroom. Many locations in the United States with immersion programs serve parents who speak Chinese. They want their children to maintain and improve their English abilities while developing Chinese proficiency in order to obtain future opportunities related to bilingualism. Although parents in Utah have desires for their children to have bilingual opportunities, most Utah communities do not have many Chinese-speaking parents; consequently, they are limited in their ability to help their children learn Chinese. This study may help to inform future development and consequent use of a better tool for parents who do not speak the target language to assist their children learn in a content language instruction environment. It is also potentially a tool for the students to learn Chinese characters on their own at home.

This study focuses on character recognition and retention and tries to demonstrate how one might link professional theories to a pedagogically sound program that parents and students can use independently at home. The students who need more time than the program allows in school to read and assimilate Chinese could benefit from the extra time spent outside of the classroom as well as the added support of parents who work with them to complete reading tasks. Effective interactive tools promise to help parents understand the material that their children are working with but also help the parents who have no Chinese language background to gain a knowledge base of the language. This study considers the potential benefits of a computer-assisted environment for both parents and their children.


**Research Questions**

This study has four research questions:

1. Is there a significant change in participants’ Chinese character comprehension scores following participation with online, annotated readers?
2. Is there a significant difference in test scores between annotated and non-annotated online readers?
3. What social and language demographics characterize the parents of subjects in this study of online, annotated readers?
4. How supported do parents of subjects in this study feel about the Chinese dual immersion program in terms of materials, parent specific help aides, and teacher feedback?

**Overview of the Study**

This study implements an originally designed Internet-based program for volunteer subjects to access. The subjects are six to seven years old and are currently enrolled in Chinese immersion programs in a group of elementary schools in Utah. The subjects access the Internet-based program from their home personal computers. The subjects’ parents fill out consent forms and preliminary surveys that ask for family demographics and about the parents’ perceptions of support from the immersion program. The subjects take a multiple-choice, preliminary quiz and a post-quiz, which are built into the online readers for each text. Statistical analysis with SPSS software uses $t$-tests to check for statistical significance between preliminary and post-quiz scores overall and among treatment and control groups. This study also includes socio-cultural profiles, which characterize the parents of the participating students in this study.

Chapter 2 discusses the literature that informs this study about the structure of a Chinese immersion classroom, especially those in Utah. Chapter 2 continues with
literature on literacy acquisition for young learners and ties that to character acquisition for Chinese learners. The next section examines the use of computer-assisted language learning (CALL) and describes a study with a product similar to the tool for this study. The following section covers literature about the specific use of CALL for Chinese language learning. The next to last section covers materials development from studies that have a relation to this study in answering the research questions and informing the process of building a pedagogically sound tool followed by a conclusion about the literature. Chapter 3 discusses participants, procedures, and materials in the study. Chapter 3 also discusses at length the design and creation of the online readers. Chapter 3 also includes sections about the multiple-choice quizzes and details the parent surveys. Chapter 4 presents the data and carries out a statistical analysis. Chapter 4 includes tables and charts that identify specific findings from the research findings. Chapter 5 provides an overall discussion, the implications and findings of this study. Lastly, Chapter 5 discusses the implications of the findings and considers avenues for future studies in the fields of Chinese CALL and Chinese immersion.
Chapter 2: Review of the Literature

Defining an Immersion Classroom

In order to design a tool that meets pedagogical needs for first grade students enrolled in Chinese immersion, it is necessary to understand the particular characteristics of this model of bilingual education. The subjects in the current study are all part of a robust program for Chinese dual immersion language education that began in 2007 and has been growing every year, with projected growth continuing through high school. The model for Utah Chinese immersion is a 50/50 program with half of the content instruction in English and half in Chinese.

The classrooms in Utah Chinese immersion programs are highly communicative with the instruction occurring solely in the target language. Studies outline how content being taught in an immersion environment is beneficial (Huang, 2003; Knell et al., 2007; Mohan & Huang, 2002). The general philosophy behind instructing students entirely through the target language is to provide them with an environment of comprehensible input, allowing them to learn the language naturally. The instructors expect students to understand via context and cues from the teachers. Immersion provides opportunities for students to increase their ability to communicate more competently based on the amount of input that is comprehensible to them. Knell et al. (2007) discusses the construction of foreign language content programs and notes that the focus turns from learning language from a set of grammatical principles about L2 to more authentic communication about content.
Although the early language training in Utah’s immersion programs focuses on oral and listening skills, reading in the second language (L2) is also a major goal of the program. Students are simultaneously learning to read in both English and Chinese, which have very different orthographies.

**Reading Acquisition**

An extensive amount of research examines reading recognition predictors for English-speaking students learning to read in their L1 (for a review see Adams, 1990). Adams determines from a synthesis of relevant studies that phonemic awareness is an important predictor for English reading ability in young readers. Phonemic awareness is an awareness of sounds in spoken words that uses rhyming or other phonetic measures as predictors of reading skill in the English language. It is possible that phonemic awareness may not be as important to reading Chinese for non-native speakers due to the different nature of the orthography from L1 to L2. Chinese characters and text are distinct from English words in several ways. Aside from the obvious orthographic composition of characters, the structure of a written passage in characters has no spaces between words but spaces between every character. The Chinese language also uses grammatical markers to indicate inflection, whereas in English, punctuation accomplishes this. Other aspects such as plurality and even basic syntax for the parts of speech are different in Chinese than in English. Chinese characters do break down into smaller elements that indicate meaning and phonetics. Everson (1998) quotes statistics from Zhu (1987) stating that 90% of the characters are compounds of these two elements.

Everson (1998) asserts that only 26% of the character compounds are pronounced according to the phonetic component. That leaves little phonological information for a
student of the language to rely on, and students must memorize a complicated graphic representation and link it to the correct pronunciation. Everson investigates the relationship between correctly pronouncing and correctly identifying Chinese characters with students taking Chinese as a foreign language (CFL) in order to explore the strength of the relationship between an ability to read out loud a character and understand its meaning. Twenty beginning level CFL learners from The University of Iowa participated in the study. The subjects spent 2 semesters or 180 classroom hours learning Chinese. The students were tested at the end of the first semester and the second semester. The test consisted of 46 characters presented one at time on computer screen and students read the character aloud or said pass if they didn’t know the character’s pronunciation. The students then completed a written portion of the test with the same 46 characters where they were given the English equivalent and the pinyin and asked to write the character. A Pearson-product-moment correlation was utilized to measure the strength of the relationship between pronunciation and character identification, and a significant relationship ($p<.0001$) was identified. Everson (1998) further notes a 90.7% probability that the subjects correctly identified a character while also pronouncing that same character correctly. He concludes that CFL learners remember characters by employing methods that are reliant on their ability to pronounce the character. Everson postulates that even though characters have little consistent sound decoding cues, the sound-symbol association must be strongly cultivated for students learning characters. He further speculates that acquiring a strong speaking skillset and oral foundation before learning to read is important.
Everson (1998) also describes the process of instructing CFL students in character sound-symbol correspondences. He cites a survey conducted by McGinnis (1995) that specifies the large amount of practice and repetition required to acquire Chinese characters. In his study, McGinnis discusses the instructional techniques that help students to memorize characters such as flash card drills, repeated writing of characters, mnemonic association. In addition, large amounts of time should be dedicated to reading aloud and other sound-symbol practice activities.

Learners must expend a large amount of effort and time to learn Chinese characters, yet classrooms in the Utah Chinese immersion program only devote 15% of the allotted instructional time for teaching characters. Since Chinese is only 50% of the school day, this leaves students with a small duration of time to learn characters (Utah Chinese Dual Language Immersion website, 2012). This most likely is not enough time for students to master the required number of characters required for reading grade level text in the foreign language. Even the potential for at home assignments may be limited because parents don’t speak or write Chinese. One solution may be to utilize computer-assisted language learning (CALL).

**Computer Assisted Language Learning (CALL)**

Current technology has already advanced beyond the scope of traditional teaching with textbooks and lectures. The interactive capabilities of the internet, availability of global communication technology and even general expectations of teachers to appeal to students’ modern interests requires a different approach to instruction. Chapelle (2009) points out that the gaps between pedagogy and technology can be closed with CALL. Already, the use of multimedia has been tested and generally accepted as effective for
language learning (Tan & Lim 2008). The ability to give students a multimedia exposure to language outside of the classroom frees up class time for more practical application of previously acquired language. The issues that arose since the first efforts to use CALL, including generalization for a diverse population of learners and standardization of materials (Fu, 1996) have diminished since then. Farias, Obilinovic, and Orrego (2007) review the literature on information and communication technology and its impact on language learning. Farias et al. (2007) note a textual shift, which has changed the way today’s youth read and write text. Farias et al. (2007) point out that the quick pace of change from printed to more visually oriented formats requires a similarly quick response form instructors to “engage learners in meaningful cognitive, social and critical understandings.”

A literature review of information and communication technology and their impact on language learning discusses some of the most appropriate designs for such technology (Farias, Obilinovic, and Orrego, 2007). A text composed of images and text or images, text and sound among other multimedia presentations can “re-construct” a pseudo-natural environment where language learners can negotiate for meaning. Farias et al. (2007) argue that instructors should use CALL to engage learners in meaningful cognitive, social and critical understandings. For example, visual stimuli through video have been shown to be more beneficial for student comprehension than just audio alone (Akbulut, 2007; James, 1981; Lee, 1994; Mohsen & Balakumar, 2011; Wilberschied & Berman, 2004). Some studies find significant results in reading comprehension or vocabulary recollection when comparing visual stimuli in addition to text with just text alone and with text and still images (Akbulut, 2007; James, 1981). Other studies find
video to increase results of reading comprehension (Lee, 1994; Wilberschied & Berman, 2004). Wilberschied & Bernam (2004) conduct a review of 18 different studies that show significant differences for multimedia annotations compared to traditional glosses.

A product similar in nature to the one on which this study is based relates to story recall software that allows children and teachers to create stories with a computer and use those stories at home or in class (Tsou, Wang, & Tzeng, 2006). After being asked to create and listen to stories via a computer program, the subjects showed higher comprehension and proficiency rates for the students who used the storytelling software in conjunction with classroom instruction than students who did not (Tsou et al, 2006, p. 24). Computers are a popular at any level; however, determining the way computers can best help instruction is a goal for researchers and educators. Although computers cannot replace teachers, computers can help teachers in their efforts to motivate, increase learner involvement, and improve learner understanding of the material (Chua et al., 2009).

Research with adults and CALL suggests that getting past unknowns in a text can be problematic (Hulstijn et al., 1996). The unknowns are vocabulary words or contextual phrases that limit the ability of a reader to comprehend the meaning of the text. Whether it is meaning or form, looking up or asking about what one does not understand can be daunting, especially when almost everything is new. Hulstijn et al. (1996) show that learners recall more words and retain more of the meaning of vocabulary when the text is accompanied by annotations to help define the words as they appear, rather than having to look up words in their own in a dictionary. Hulstijn et al. (1996) notes that the annotations are presented in a grammatical format that present rules in a formulaic sense to more explicitly show meaning. Elementary age students in particular do not have the
life experience or the cognitive ability to independently use the Web to find material for unknown vocabulary. Instead a tool that teaches them learning strategies, especially for vocabulary development could prove helpful. Winke and Abbuhl (2007) show that the use of input from reading or other modes of input can provide learning strategies to help students improve vocabulary in the subject being studied. Winke and Abbuhl (2007) use annotations to facilitate textual input for subjects using online readers. Annotations explain words or characters and are part of a computerized or written text that has as its purpose to teach vocabulary along with meaning. Annotations are either to the side of a text or brought to sight when clicked in a computer program. Annotations can include video, audio, text definitions or examples, or still imagery to help the reader understand vocabulary in context (Akbulut, 2007; Hulstijn et al., 1996; James, 1981).

**Chinese and CALL**

At this juncture it is important to look at the work that has already been done in CALL that specifically relates to Chinese. There are studies that outline the history of CALL for Chinese as a Foreign Language (CFL) from its beginnings in the 1970’s (Yao, 2009; Xie, 1999; Xie & Yao, 2009; Zhang, 1998). The transition from language software on CDs and programs with categorized character lists to internet resources that are produced by major corporations is fast paced and continues to grow (Yao, 2009; Xie & Yao, 2009). Several researchers conduct evaluations, make annotated bibliographies or list certain websites and software that offer Chinese instruction or materials for curriculum development (Bourgerie, 2003; Xie, 1999; Xie & Yao, 2009; Zhang, 1998). Other research documents the technological advances in software for writing Chinese characters (Chan, 2002). Yet other research chronicles the development of tools like
concordances, which help to organize large collections of Chinese texts the way a corpus organizes words (Chan, 2003; Tsay & Wang, 2000). The present study benefits from understanding the foundation and nature of sources of Chinese language training materials and how the studies surrounding those materials can add to the design and content of the digital tool for this study.

There are also studies detailing the limitations and advantages of CALL for CFL teaching purposes (Bai, 2003; Yao 2009; Xie, 1999; Xie & Yao, 2009). The researchers note several of these limitations, such as some of the products are pedagogically unsound, instructors can misuse programs, and technology changes quickly before users become familiar with different programing (Bai, 2003; Xie & Yao, 2009; Yao, 2009; Zhang, 1998). Conversely, researchers generally agree that it is convenient to use computers for creating, storing and parsing materials for curriculum design as well as designing and implementing assessments (Bai, 2003; Tsay & Wang, 2000; Yu & Michaels, 1998; Zhang 1998).

Most of the previously cited research on CALL in Chinese involves college age student who are intermediate or advanced CFL learners (Bai, 2003; Jin, 2009; Wang, 2008, 2012; Xie, 2002; Yu & Michaels, 1998). Even though there is an age discrepancy from subjects in this study and the previously mentioned studies, advice about using CALL to address learner problems and pedagogical issues provides insight for design specifications (Bai, 2003; Yu & Michaels, 1998). Yu and Michaels (1998) use multimedia video and text based on Chinese textbooks to incorporate drills and exercises into the programing. Yu and Michaels describe the ability of computers to do consistent activities and rate assessment scores as a tool that generally frees instructors’ time to
focus on learner problems. Bai (2003) gives examples of how to integrate computer use into a classroom environment and suggested ways to continue improving the integration based on his experience. Wang (2008, 2012) points out the successful application of annotations for texts where access to definitions and meaning increased reader comprehension and vocabulary recall.

Wang (2012) examines the use of electronic dictionaries by ten intermediate and ten advanced CFL American students in a study abroad program in China, who were given a placement test to designate their levels. She wanted to know the effects of the e-dictionary on vocabulary learning and reading comprehension. Wang used a shortened text from the internet and the NJStar dictionary for the study. Students read the article twice and used NJStar to look up unknown words and recorded the looked up words both times. After the second reading the students wrote what they could recall from the reading in English. Some of the students were asked to explain why they looked up each word. The number of times students from intermediate and advanced groups looked up words as well as the frequency of words looked up was compared using the placement test as a pre-treatment score and the written recall as a post-treatment score. There was a significant difference in the groups on the pre-test ($p = .02$) but not on the post test. The study found that the e-dictionary helped improve the vocabulary knowledge of intermediate students and closed the gap in their comprehension as compared to the advanced students. Wang suggests that future research examine methods for assisting advanced learners, but she reiterates the effectiveness of electronic dictionaries for readers who are missing knowledge when trying to comprehend a text.
Materials Development

In today’s society, the use of computers to aid in a classroom, especially a language classroom is fairly commonplace. The key question in these digitally bountiful times is how to maximize language acquisition opportunities to utilize the multiple resources that are available to young digital natives. These so called digital natives, a term coined by Prensky (2001), are the youth of modern society, who have grown up surrounded by technology; they are intimately familiar with daily computing practices on smart phones, handheld and laptop computers, and expect to use computers to learn and gather information. As Prensky (2001) says, “Our students today are all ‘native speakers’ of the digital language of computers, video games and the Internet.” This study, with the digital natives in mind, created an internet delivered product for the purpose of experimentation, which requires certain knowledge about instructional practices that helps in the design of the tool. Several instructional practices and their relevance to the creation of the online readers are discussed below.

The lack of CALL studies done with young children learning Chinese illustrates the need for more research with this population. The current study will research CALL in relationship to character acquisition. Understanding certain effects of CALL treatments on young CFL learners is difficult to measure if they do not have a foundation of vocabulary to work from. It was important, therefore, to select material that utilized high frequency characters appropriate to the instructional context.

The booklets were selected because best teaching practices require Utah teachers in the Chinese Immersion program to meet state instructional standards. Efforts to disseminate the standards and make use of them for pedagogical approaches is ongoing
The Standards for Foreign Language Education can also be integrated into parts of the Common Core State Standards Initiative (James, 1998; National Governors Association Center for Best Practices, 2010). The Step by Step booklets were designed to comply with Utah state standards (Lafayette, 1996; Allen, 2002, National Governors Association Center for Best Practices, 2010). The standards are part of the CORE standards that most states use for planning content in any curriculum from grades K-12. The standards give specific content in mathematics, science, social sciences, literature and other topics that students learn in each grade level within a scholastic year. The principles of these standards guide curriculum and language objectives.

The Step by Step booklets were also selected because they served as supplements to the regular science and social studies curriculum, and are utilized for review of previously learned content or as a pre-reading assignment before the next lesson. Best practices in the literature relate to material development by using pre-reading or reviewing (Ajideh, 2003). Ajideh shows how pre-reading activities improve one’s ability to remember language and key vocabulary in adults, which may also apply to young learners in this study. Ajideh worked with a group of intermediate level ESL adult students for a semester focusing on pre-reading activities and other methods for activating the “schema” or mental scaffolding to understand more about what they were going to read. The students responded positively to questions about the process of activating schema and their level of clarity and pleasure from reading afterwards.

It was determined to put in a pre-quiz and post-quiz to gather data on character comprehension once the online readers were constructed. By showing the subjects their scores after the post-quiz they would be able to participate in the process of evaluating
their individual performance. Self-evaluation has been shown to be an important predictor of success for students (Pandian, 2011, pp. 34-35). Pandian when discussing assessment challenges points out that children can participate in their own assessment. In context of an interactive tool, students can gain character knowledge by learning from their assessment results.

The online readers as a finished product should have instructional best practices in mind. High frequency characters are the focus of instruction, and pre-reading and review are part of the design. Self-evaluation occurs before and after each reader and all of the content design is in response to state social studies and science standards. These online readers incorporate best practices into what should be appealing to children who are comfortable operating in a digital world. This study seeks to measure character acquisition in a manner that does not intrude on the classroom. It utilizes computer-assisted language learning (CALL) as a computer based supplement to instructor materials designed to increase learner exposure to Chinese and help learners develop and implement learning strategies.

Specifically, the subjects will be asked to distinguish the meaning of a word or character from the online readers in isolation after controlled exposure to that word or character in context. Previous studies examine character recognition (see Everson, 1998), where the subject reads the character out loud; however, online pre and post-quizzes cannot assess the correct pronunciation of characters. It was, therefore, decided to test character comprehension, defined as a student’s ability to choose the correct Chinese character to match a known English word. This study explores whether reading the texts
from the online readers helps the learners to comprehend and remember more Chinese characters.

It is the ultimate hope that such online readers may prove helpful for teachers to evaluate their students’ abilities to comprehend Chinese. Using the readers, the teachers might be able to pinpoint what they need to focus on in the next class as well as which students might need more help before class starts each day. Freeing time for instructors could give them opportunities to spend less time reviewing and pre-viewing of vocabulary or certain grammatical principles to be taught.

As critical as teacher time may be, parents too may have a lot of time with their children to encourage and assist them with the learning process. Parents enroll their children voluntarily in Chinese immersion programs, and their continued support is most likely important for student success. Unfortunately, when parents do not speak Chinese, they may feel unable to offer educational support. The design of this study also has implications for teacher/parent collaboration to strengthen the affective features of the online reading tool. Namely, motivation of parents who are able to work with a level of understanding about the content of the Chinese homework could improve child motivation to learn the language. Also, instructor feedback about the students’ performance can have a higher level of effectiveness if the parents have more knowledge about the content being evaluated. Studies have shown that strengthening communication between parents and teachers results in more successful educational and language outcomes (Lao, 2004; Pica, 1994; Smith, 2007). The research questions that include parental demographics and parental perceptions of support are intended to expand the discussion about what characterizes parents who select Chinese dual immersion
programs. Also, the amount and type of support parents want to receive from the Chinese immersion program is also examined.

Conclusion

The rising number of learners in Chinese immersion programs increases the demand for effective tools to supplement or improve curriculum and instruction. Students enrolled in Chinese immersion classrooms have relatively little time (only 15% of the curriculum) to learn to read Chinese characters, which are very different from English words. With the body of literature providing strong support for CALL, online readers that annotate characters and provide audio and visual support of school materials could prove very helpful. These readers are based on best teaching practices and include components of self-evaluation, pre-reading and review, and are standards based. Computer programs with annotations provide input at a glance to deal with textual unknowns. With annotations, the learner does not need to spend time searching a dictionary or asking about vocabulary or contextual meaning. Computers also provide a medium for creativity in the L2 as well as allowing for alterations of the product to fit curriculum design.
Chapter 3: Methods

Introduction

This study investigated the effects of online, annotated readers on first grade immersion students’ Chinese character comprehension. Of the 17 Utah schools offering Chinese immersion during the 2011-12 school year, seven schools participated with subjects numbering between 4 and 19 per school. First grade students were the subjects of this study for two reasons: larger numbers of first grade students participate in Chinese immersion programs compared to kindergarten, and they represent the largest potential group that has the least exposure to the Chinese language prior to this study.

Participants

This study involved 74 children between the age of six and seven who were first grade students enrolled in Chinese immersion courses at seven different elementary schools in Utah. The statistical analyses utilized data from 48 subjects that completed multiple-choice preliminary and post-quizzes that measured character comprehension. As shown in Table 1, among the subjects whose parents took the initial survey, 94% were from homes where both parents spoke English as their first language (L1), and 6% were from homes where one parent spoke English as an L2. One subject came from a home where both parents spoke Spanish as L1. Other languages

Table 1
Parents’ First Languages

<table>
<thead>
<tr>
<th>Languages Spoken as L1</th>
<th>Totals</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanish</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Chinese</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Mandarin</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Tagalog</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Korean</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Other than English</td>
<td>8</td>
<td>6%</td>
</tr>
<tr>
<td>English</td>
<td>133</td>
<td>94%</td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>100%</td>
</tr>
</tbody>
</table>
spoken as an L1 were Tagalog, Chinese (Taishanese), Chinese (Mandarin), and Korean. The parents also spoke 22 other languages in addition to their L1. Among parents who spoke other languages, including native speakers, 29% spoke Spanish and 18% spoke French. The other 20 languages represented each counted for 6% or less of the total. Of the parents with Asian language backgrounds 5% spoke Mandarin, 15% spoke a dialect of Chinese, and 24% spoke an Asian language (See Table 2).

Table 2

Other Languages Spoken by Parents

<table>
<thead>
<tr>
<th>Other Language(s) Spoken Besides L1</th>
<th>Totals</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both Parents</td>
<td>22</td>
<td>31%</td>
</tr>
<tr>
<td>One Parent</td>
<td>28</td>
<td>39%</td>
</tr>
<tr>
<td>Neither Parent</td>
<td>21</td>
<td>30%</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>100%</td>
</tr>
</tbody>
</table>

Only 9% of the parents who took the survey indicated they spoke Mandarin Chinese and only 15% of the parents reported that they spoke an Asian language that includes Chinese characters in the orthography. The survey showed that 24% of parents have had enough exposure to or education in Mandarin Chinese to influence their children’s Chinese language experience.

Procedures

The initial request for subjects was in the form of an e-mail message to principals and district language representatives within the school districts who have Chinese immersion elementary schools. The principals or the district language representatives gave permission and another e-mail for instructors went out with a link to a video with a demonstration of the online readers and a letter explaining the project in detail (See Appendix A). The participating teachers then relayed e-mail messages to the parents of their students in the morning and afternoon sections of their classes. The e-mails had letters attached that explained the project and the need
for volunteers (See Appendix A). Upon individually responding affirmatively to the request, the parents received e-mail messages in return with hyperlinks to access the websites for the online readers along with user names and passwords for access. The instructions to parents included a video with a screen recording and a voice over explaining how to navigate the online readers. The video instructed parents to have their children spend as much time as they wanted to take the quizzes and to read the text as many times as they wanted before taking the post-quiz. The video requested parents to help their children log into the online websites for each reader and quiz but not help their children answer the quiz questions (See Appendix B: Image 1 & 2).

The control group was comprised of students who used the non-annotated electronic readers, which consisted of still images and audio. The treatment group was comprised of students who used the annotated readers with Flash animations and special annotations for each Chinese character. The immersion program divides the children into morning and afternoon schedules. The students who attend Chinese courses in the morning and English courses in the afternoon constituted the control group. The students who attended English courses in the morning and Chinese courses in the afternoon were designated as the treatment group. The use of the different class sections was a convenient method for keeping order while assigning subjects to treatment and control groups. The division of subjects by class sections also reduced the possibility that subjects would share knowledge of the different types of readers with classmates from the other section, thus minimizing any potential jealousy for one version being more entertaining than the other.

To provide anonymity of test subjects, test scores were linked with initial surveys via a password. The parents received a specific username and password in the introductory e-mail. Consent forms required the user name and password to authenticate the user as one of the
subjects. The Qualtrics survey flow allowed for various means of validation through a panel of user names. The survey software used the panel for validation of each of the quizzes to keep track of the children who took each quiz and the survey that coincided with that person.

**Materials**

A set of reading booklets known as the *Step by Step* booklets were converted into electronic readers. The *Step by Step* booklets are reading supplements designed to help the instructors introduce content-based Chinese characters into the curriculum. Each booklet in the series generally has six pages including the front and back covers with imagery and or text on both sides of each page. Each page in the booklets has one sentence that is part of an eight sentence story. The booklets themselves are grouped in threes by subject matter and the vocabulary in each group of booklets builds upon the same theme. The vocabulary in each theme is also related to one or more grammatical principles or to certain parts of speech.

The first booklet converted into an electronic reader had a “Friendship” theme and became the sample online reader for demonstration purposes. The last three booklets with a “Time” theme were also created into electronic readers for the experiment (See Appendix C). The reason for using the last three booklets in the series was to reduce student encounters with the vocabulary by selecting readers introduced late in the school year.

There were some differences between the paper and electronic readers. For every first use of a Chinese character in the paper version of the booklets, a form of Romanization (*pinyin*) is shown below that character. Subsequent uses of that same character no longer have the *pinyin* below. *Pinyin* is a phonetic pronunciation convention that uses Latin script and diacritics for non-native speakers of Chinese. *Pinyin* is not explicitly taught to the students in school, but they are exposed to *pinyin* in some of the teaching materials. The non-annotated online readers do not...
show any pinyin for the Characters except in the glossary. The annotated online readers offer pinyin in the annotations for every character. Pinyin was placed in the annotated readers in order to assist the parents of the students sound out characters if they chose to help their children read the electronic texts. The front cover of each paper Step by Step booklet has an English translation of the story and a key word glossary at the end of the booklet. The electronic readers include a page for the English translation, a page for the glossary and a page with the entire text without imagery or annotations (See Appendix B Image 5-7).

Four non-annotated paper booklets, with only still imagery, text, and audio were converted into one demonstration reader and three online readers for use by the control group. The images from the paperbacks were scanned into a computer and saved in a campus share drive to use in the Hyper Text Markup Language (HTML) coding of language learning software for annotated texts. The text for each page was typed onto the background to duplicate text placement as found in the booklets. The software, known as The Interactive Annotated Reading Application (TIARA) was programmed for this study by a computer programmer for the ARCLITE Lab of the Center for Language Studies at Brigham Young University (See Figure 1). The TIARA software is designed for instructors to create annotations for self-written texts or authentic texts from other sources and centralize tools offered by digital programing such as imagery, video and audio. The tools help students define and understand vocabulary in context without going to multiple external sources.

The digital images of the paperback booklets provide the background for TIARA software instead of the normal interface of the TIARA programing. The interface no longer has all the “buttons” and other peripheral functions that adult learners use. In place of the buttons, text indicating “English” or “Glossary” is on each page of the software and has annotation
Figure 1. A Screen Capture of the Original TIARA Interface Without Text

functionality that causes a new, smaller widow (or annotation box) to appear (See Appendix B: Image 4). Upon clicking the English text, the English translation of the entire booklet in the annotation box appears (See Appendix B: Image 5). Similarly, clicking the Glossary text shows the vocabulary list for the entire booklet in its annotation box with Chinese characters, *pinyin*, and English translation side-by-side (See Appendix B: Image 6). Additionally, the programing includes Small Web Format (SWF) files that imbed MP3 audio into the scanned artwork from the paperback booklets. The resulting image on the non-annotated readers has the capability of click-to-play audio that plays the Chinese sentence on the page. An animation designer for the Center for Teaching and Learning (CTL) at BYU designed the SWF.

Each non-annotated electronic reader had a distinct Web address and required a unique user name and password for each subject in the study. The user names and passwords were indicators of school and whether the subject is in a control or treatment group. HTML coding linked surveys and quizzes from the BYU Qualtrics website. The survey connects to the first
online reader and all the readers have a preliminary quiz before the text pages and immediately after the text pages. The final look and feel of the non-annotated readers is very similar to the original paperback texts (See Appendix B: Image 4).

Four annotated readers utilized the same TIARA software and similar programming for user names, passwords, and Qualtrics surveys and quizzes as the non-annotated readers. One was used for demonstration purposes, and three others for the experiment. In addition to the original programming, the annotated readers have other SWF and HTML5 animations in the HTML coding of the TIARA software. The annotated readers did not include text on the page for English and Glossary like the text in the non-annotated readers. The figures from the booklet pages are animated with Adobe Flash. When a subject clicks on the page, the figures move in conjunction with the audio that plays for the text on the page. Each Chinese character in the text on the webpage had a unique annotation box that appears by clicking on the Character. Small HTML5 animations (showing stroke order) for each Chinese character along with pinyin, the English translation, and an audio icon that enabled the participant to listen to the pronunciation of the Chinese all function by clicking on any Chinese character. The annotated version of the readers also had a Flash game after the post-quiz on the webpage. The CTL animator used written directions on Microsoft Power Point (PPT) slides with images from the Step by Step booklets to design the SWF files, HTML5 files and game (See Figure 2). Explicit directions on the PT slides displayed what type of functions the images should perform as animations. Programming in the SWF makes MP3 audio files coordinate with animation movements.

The following section details several features of the online readers that are particularly pertinent to this study. These include a computer game with the annotated readers, online parent permission forms and surveys, pre and post-quizzes, and instructional videos.
Figure 2. Screen Capture of PPT Directions for the CTL Animator

**Computer games.** A game that reinforced the characters from the text in each annotated reader was available to the students in the treatment (with annotation) group (See Figure 3). Additionally, Power Point slides that show sample images and directions about the game functions were utilized. Arrow keys on the keyboard moved the traditional lion’s head in perpendicular or horizontal motion one step at a time. The space bar allows the lion’s head to consume the Chinese character in the space that the lion moves into. The basic concept of gameplay is to move the lion’s head along a grid with a fixed number of obstacles and Chinese characters. The goal for the gameplay is to “consume” the correct Chinese character(s) by selecting the answer to a question with the English equivalent. Consuming a correct character makes a pleasant “yum” sound play and points are given. All the correct Chinese characters must
be eaten for the game player to advance to the next level. Each game for the annotated readers has five levels. Every level asks a question about different Chinese characters. The grid for game-play has obstacles to maneuver around and distractor characters. If the player eats a distractor character an unpleasant “yuck” sound indicates a wrong choice and points are lost. The other figure in the game is a darker lion’s head that moves independently from the main lion’s head. Touching the darker lions head causes an “Ouch” sound which results in one “life” to be lost. After losing all five “lives” the game starts over again from the beginning. Completing all five levels causes a fireworks display to appear with the words “You Win!” The game does not collect data as its only intent is to be a motivational feature. The instructional video in the
original e-mail to the parents of treatment group subjects included a segment on how to play the game. The video did not instruct the parents and their children on any specific use of the game, only encouraged them to enjoy this feature before closing the webpage.

**Consent forms and survey.** The parents filled out Implied Consent as well as Parental Permission for a Minor (See Appendix D) in order for their children to participate in the experiment. The first two pages of the Qualtrics survey were the consent forms for this study. The non-annotated and annotated readers automatically uploaded the parent survey when a parent logged into the webpage for the first booklet. The parents of each subject filled out a 14-question survey (See Appendix E) that asked various questions about demographics, language skills of the parents, and some of their opinions regarding online Chinese resources as well as the Chinese immersion program. The survey required the user name and password as validation to continue the survey. The statistical reports between the surveys and quizzes tracked the subjects based on user names and passwords.

**Quizzes.** The Qualtrics link administered multiple-choice quizzes before and after the reading in order to determine if the students improved their character comprehension. The quizzes were also built on the Qualtrics website and linked to the non-annotated and annotated reader webpages on the first and last pages for each online reader (See Appendix F). The preliminary quiz and a post-quiz tested the subjects’ knowledge about the vocabulary from each text. Quizzes required the subjects to enter their distinct user name prior to answering questions (See Appendix B: Image 2). Parents were told to help their children enter their user names in order to take the quizzes. Each quiz has eight multiple-choice questions with three possible answers. The content of each question is a key vocabulary word from the text within the reader. Most of the words are from the vocabulary list at the end of the readers, but some of the tested
words are from other portions of the text. Four of the questions asked the subject to identify the Chinese character(s) for an English word or words, and the other four questions asked the student to identify the English word(s) for a Chinese character or characters. The preliminary quiz and post quiz for each online reader were identical but have separate links to the Qualtrics website to help segregate data. Subjects could not take quizzes a second time, and only the post-quizzes displayed the subject’s correct and incorrect answers after completing the quiz. The scores from the eight questions on each quiz rated as passing or not passing by a measure of 75% correct answers (six or more out of eight possible correct answers). The timing on the quizzes and between quizzes is measured with data from the Qualtrics data.

**Instructional videos.** Every parent who volunteered to participate received an instructional video based on either the non-annotated or annotated version of the readers, depending on their child’s association with the control or treatment group. The videos were screen recordings of the steps needed to follow along, with a voice-over describing each step. The readers demonstrated in the videos were from the first booklet in the series so as not to reveal potential answers on the quizzes in the other readers in the study. The game for the animated reader demonstration video is the same game that was used for the first reader.

**Summary**

This study designed a tool for showcasing two computerized versions of the *Step by Step* booklets, and had subjects answer multiple-choice questions about the Chinese characters within each text. Parents completed a survey prior to beginning the experiment for the purpose of gathering socio-cultural and language information. In order to answer the first research question regarding the effectiveness of online annotated readers, paired sample *t*-tests were used to compare preliminary and post-quizzes. Independent samples *t*-tests measured the mean scores of
the quizzes from the online readers to investigate possible differences between annotated and non-annotated texts. In order to answer the third research question concerning parent socio-cultural and language characteristics, data from the completed parent surveys were used. The survey questions also explored parental perceptions of support in regards to materials, help-aids, and teacher feedback.
Chapter 4: Results

The following section begins with research questions and then provides the relevant statistical analyses as described in previous sections. The topic for each section relates to the individual research questions for this study.

Improving Character Comprehension

(1) Is there a significant change in participants’ Chinese character comprehension scores following participation with online, annotated readers?

A paired samples t-test indicated a statistically significant difference between mean scores on the preliminary quiz of the first reader to the post-quiz. Significance was \( t(47) = -3.381, p<.001 \) (two-tailed), and Eta squared (\( .196 \)), indicated a large effect size as shown in Table 3.

Table 3

Differences between Pre-quiz and Post-quiz Scores for Electronic Books 1-3

<table>
<thead>
<tr>
<th>Book Number</th>
<th>N</th>
<th>Pretest Mean</th>
<th>SD</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Significance two-tailed</th>
<th>Eta Squared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 1</td>
<td>48</td>
<td>3.96</td>
<td>1.271</td>
<td>4.71</td>
<td>1.429</td>
<td>-3.381</td>
<td>47</td>
<td>.001</td>
<td>19.5%</td>
</tr>
<tr>
<td>Book 2</td>
<td>27</td>
<td>4.89</td>
<td>1.086</td>
<td>5.44</td>
<td>1.476</td>
<td>-1.581</td>
<td>26</td>
<td>.126</td>
<td>8.8%</td>
</tr>
<tr>
<td>Book 3</td>
<td>12</td>
<td>6.50</td>
<td>1.446</td>
<td>6.67</td>
<td>1.435</td>
<td>-.340</td>
<td>11</td>
<td>.740</td>
<td>1.0%</td>
</tr>
<tr>
<td>Books 1-3</td>
<td>87</td>
<td>4.60</td>
<td>1.505</td>
<td>5.21</td>
<td>1.578</td>
<td>-3.454</td>
<td>86</td>
<td>.001</td>
<td>0%</td>
</tr>
</tbody>
</table>

These results suggest that subjects comprehended significantly more Chinese characters after reading the text for the first online electronic readers. Subsequent scores from the second reader showed no statistically significant increases in the mean scores from the pre-quiz. Additionally, scores from the third reader showed no statistically significant increases in the mean scores from
the pre-quiz. The post-test mean scores for Books 2 and 3 increased, but this difference was not statistically significant. A paired samples $t$-test was also conducted to evaluate the change in subjects’ mean quiz scores for all three readers combined. There was a statistically significant increase from mean preliminary quiz $[t (86) = -3.454, p<.001$ (two-tailed)].

**Differences Between Annotated and Non-Annotated, Online Readers**

(2) Is there a significant difference in test scores between annotated and non-annotated online readers?

An independent samples $t$-test was conducted to compare the quiz scores of the control group (non-annotated readers) and treatment group (annotated readers) (See Table 4). There were no significant differences in post-test scores for the non-annotated readers and the annotated readers $[t (83.775) = -.248, p=.430$ (two-tailed)]. The results from the comparison of annotated and non-annotated online readers showed that it did not make a statistical difference if the subjects read one version or the other before taking the post-quizzes. Other independent samples $t$-tests were also conducted for the individual readers and no statistically significant results were found in those tests (See Table 4).

The first preliminary quiz took participants an average of 10 minutes to finish. Subjects took an average of 8 minutes on the post-quiz. All subsequent quizzes took an average of 2 minutes, 15 seconds to complete. Each quiz had eight questions, which required between six and eight correct answers to perform 75% or better on the quizzes. Subjects performed better on the post quizzes than the preliminary quizzes and subjects passed the quizzes at higher rates as they worked through each electronic reader. The first reader had passing scores increase from 7% on the pre-quiz to 20% on the post-quiz. The second reader had passing scores increase from 31% to
Table 4

Differences between Annotated and Non-annotated Online Combined Books 1-3

<table>
<thead>
<tr>
<th>Book Number</th>
<th>Treatment or Control</th>
<th>N</th>
<th>Post-test Mean</th>
<th>SD</th>
<th>Sig 2-tailed (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book 1-3</td>
<td>Annotated</td>
<td>51</td>
<td>5.25</td>
<td>1.573</td>
<td>.430</td>
</tr>
<tr>
<td></td>
<td>Non-annotated</td>
<td>41</td>
<td>5.17</td>
<td>1.657</td>
<td></td>
</tr>
<tr>
<td>Book 1</td>
<td>Annotated</td>
<td>5</td>
<td>6.40</td>
<td>1.140</td>
<td>.611</td>
</tr>
<tr>
<td></td>
<td>Non-annotated</td>
<td>7</td>
<td>6.86</td>
<td>1.676</td>
<td></td>
</tr>
<tr>
<td>Book 2</td>
<td>Annotated</td>
<td>14</td>
<td>5.79</td>
<td>1.528</td>
<td>.420</td>
</tr>
<tr>
<td></td>
<td>Non-annotated</td>
<td>17</td>
<td>5.35</td>
<td>1.412</td>
<td></td>
</tr>
<tr>
<td>Book 3</td>
<td>Annotated</td>
<td>22</td>
<td>4.50</td>
<td>1.566</td>
<td>.515</td>
</tr>
<tr>
<td></td>
<td>Non-annotated</td>
<td>27</td>
<td>4.78</td>
<td>1.396</td>
<td></td>
</tr>
</tbody>
</table>

55% while the third reader had passing scores increase from 65% to 75%. Subjects more successfully answered questions in the first reader from English to Chinese than from Chinese to English. Subjects correctly answered questions in the second and third readers more often from Chinese to English than from English to Chinese.

Demographics of the Population

(3) What social and language demographics characterize the parents of subjects in this study of online, annotated readers? The parents who filled out the initial survey indicated that they had an average family size of 3.99 children and 76% of the parents stated their socioeconomic status as middle or high middle income (See Table 5).

Table 5

Parental Socioeconomic Status

<table>
<thead>
<tr>
<th></th>
<th>Number of Parents</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Income</td>
<td>5</td>
<td>7%</td>
</tr>
<tr>
<td>High Middle Income</td>
<td>19</td>
<td>26%</td>
</tr>
<tr>
<td>Middle Income</td>
<td>38</td>
<td>51%</td>
</tr>
<tr>
<td>Low Middle Income</td>
<td>9</td>
<td>12%</td>
</tr>
<tr>
<td>Low Income</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100%</td>
</tr>
</tbody>
</table>
Parents also answered questions about their educational background that aside from two blank responses indicated that 90% of the parents have a college education.

Table 6

Parental Education

<table>
<thead>
<tr>
<th>Education</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High school</td>
<td>10</td>
<td>7%</td>
</tr>
<tr>
<td>Assoc. Degree</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>Voc. Cert</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Bachelors</td>
<td>63</td>
<td>43%</td>
</tr>
<tr>
<td>MA</td>
<td>48</td>
<td>33%</td>
</tr>
<tr>
<td>PhD</td>
<td>12</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>146</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Note.* Assoc. = associate; Voc. = vocational; Cert. = certificate.

The language skills reported by parents were previously mentioned in Chapter 3 of this study. Six percent of the parents spoke languages other than English as an L1, and 30% of parents spoke only English. Seventy percent of the parents (including the six percent who spoke English as L1) reported that they spoke another language in addition to English. (See Table 7) There were 22 languages represented in the group of parents, with 29% speaking Spanish, 24% speaking Asian languages (15% Chinese dialects), 18% speaking French, with an additional 14 other languages that represented 1% to 8% each.

Parents also reported the amount of time they spent helping their children with Chinese homework. Nearly one third of parents (28%) spend 2 to 6 hours a week helping their child with Chinese homework. A little over one third (37%) spend 30 minutes to an hour and a half each week, and about one third (34%) of parents spend less than 15 minutes a week helping their children with Chinese homework (See Table 8).
Table 7

Parent Languages in Addition to L1

<table>
<thead>
<tr>
<th>Language</th>
<th>Percent of Total</th>
<th>Language</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanish</td>
<td>29%</td>
<td>Afrikaans</td>
<td>1%</td>
</tr>
<tr>
<td>Cantonese</td>
<td>6%</td>
<td>Norwegian</td>
<td>1%</td>
</tr>
<tr>
<td>Mandarin</td>
<td>5%</td>
<td>ASL</td>
<td>1%</td>
</tr>
<tr>
<td>Jiangxihua</td>
<td>1%</td>
<td>Dutch</td>
<td>1%</td>
</tr>
<tr>
<td>Chinese</td>
<td>4%</td>
<td>Laotian</td>
<td>1%</td>
</tr>
<tr>
<td>Japanese</td>
<td>5%</td>
<td>Hmong</td>
<td>1%</td>
</tr>
<tr>
<td>Korean</td>
<td>4%</td>
<td>Cebuano</td>
<td>2%</td>
</tr>
<tr>
<td>French</td>
<td>18%</td>
<td>Salone Krio</td>
<td>1%</td>
</tr>
<tr>
<td>German</td>
<td>5%</td>
<td>Cambodian</td>
<td>1%</td>
</tr>
<tr>
<td>Portuguese</td>
<td>8%</td>
<td>Bislama</td>
<td>1%</td>
</tr>
<tr>
<td>Italian</td>
<td>2%</td>
<td>Greek</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8

Time Spent Helping Children with Chinese Homework

<table>
<thead>
<tr>
<th>Time Spent per Week</th>
<th>Number</th>
<th>Percent</th>
<th>Average Minutes per 5 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-15 min</td>
<td>23</td>
<td>34%</td>
<td>3 min</td>
</tr>
<tr>
<td>15-30 min</td>
<td>11</td>
<td>16%</td>
<td>6 min</td>
</tr>
<tr>
<td>30min-1hr</td>
<td>14</td>
<td>21%</td>
<td>12 min</td>
</tr>
<tr>
<td>1hr-2hr</td>
<td>8</td>
<td>12%</td>
<td>24 min</td>
</tr>
<tr>
<td>2hr-3hr</td>
<td>8</td>
<td>12%</td>
<td>36 min</td>
</tr>
<tr>
<td>6hr</td>
<td>3</td>
<td>4%</td>
<td>72 min</td>
</tr>
<tr>
<td>Total</td>
<td>67</td>
<td>100%</td>
<td>26 min</td>
</tr>
</tbody>
</table>

Parental Support

(4) How supported do parents of subjects feel about the Chinese dual immersion program in terms of materials, parent specific help aides, and teacher feedback?

The majority of parents (96%) answered the survey questions concerning the amount of support they felt in terms of materials for their child, specific aids for parents and feedback from
the instructors (See Table 9). A large number of parents in this study (54%) expressed that they felt minimal (44%) to no (10%) support. Eight percent of parents reported feeling very well supported, and 38% indicated adequate support. These results suggest that parents want more materials for their children to work with at home as well as more specific help aids for parents. Help aids include but are not limited to descriptive notes from the teachers about what is expected of the students during homework assignments, language aids for parents to understand phrases and vocabulary, and any sort of blog, video, or other medium that can facilitate some understanding of the Chinese language (on a first grade level) for parents who don’t speak the language. The results also suggested that parents want more feedback from the teachers about the way their children are performing and how they (the parents) can assist their children.

Table 9
Parental Indicators of Support

<table>
<thead>
<tr>
<th></th>
<th>Materials</th>
<th>Help</th>
<th>Feedback</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Support</td>
<td>3</td>
<td>15</td>
<td>4</td>
<td>22</td>
<td>10%</td>
</tr>
<tr>
<td>Minimal Support</td>
<td>32</td>
<td>36</td>
<td>25</td>
<td>93</td>
<td>44%</td>
</tr>
<tr>
<td>Adequate Support</td>
<td>31</td>
<td>17</td>
<td>33</td>
<td>81</td>
<td>38%</td>
</tr>
<tr>
<td>Very well supported</td>
<td>5</td>
<td>3</td>
<td>9</td>
<td>17</td>
<td>8%</td>
</tr>
<tr>
<td>Totals</td>
<td>71</td>
<td>71</td>
<td>71</td>
<td>213</td>
<td>100%</td>
</tr>
</tbody>
</table>

Summary

In response to the first two research questions; the statistical analyses from the paired samples $t$-tests indicated that the students increased their Chinese character comprehension after reading the online readers. Independent samples $t$-tests indicated that it did not make a difference if the students read annotated or non-annotated online readers.
In response to the last two research questions, the survey results indicated that the families in this study were generally middle income, highly educated, with a strong language learning background. The parents were also highly involved with their children in the Chinese immersion program. In addition, the majority of parents expressed a desire for more support from the Chinese immersion program with regards to materials and help-aids. They also want more feedback from teachers about their children’s progress or needs.
Chapter 5: Conclusions

This study examined whether the use of interactive electronic annotated readers effectively increased character comprehension for first grade students enrolled in Chinese immersion. The results showed that the subjects significantly improved their post-test scores for both the annotated and non-annotated online readers. The data measuring character comprehension showed significant statistical effect, but in comparing the annotated readers with the non-annotated readers there was no statistical significance.

The initial parent survey also answered questions about social and language demographics that characterize the parents of subjects in this study. A high percentage of the parents had incomes in the mid to high-mid range, college educations, and language learning experiences. A high percentage of the parents also spent a substantial amount of time working on Chinese homework with their children.

The survey also provided data concerning parental perception of support, and parents indicated they desired more support from the program.

Discussion

The first online readers as well as all three online readers combined showed statistically significant differences from preliminary quizzes to post-quizzes ($p<.001$).

The first question one may ponder when observing increasing quiz scores is what is the causation of such a phenomenon? The desirable answer is because the readers engaged the subjects in learning and helped in the process of character acquisition. The CFL learners in the Everson (1998) study demonstrated recognition of characters based on their knowledge of the pronunciation of those characters. Perhaps the auditory features of the online readers reinforced a similar connection between recognition and pronunciation for the subjects of this study. Also,
similar to the subjects in the Ajideh (2003) study, the students were successful in remembering vocabulary because of “schema” activation. The story line in the online readers was about children in similar classroom situations and this commonality would most likely activate background knowledge and schema structures that could have assisted with comprehension. Additionally, the subjects of this study possibly enjoyed the material and the way it was presented, which helped them to stay on task and focus on meaning, giving them repeated exposure to the characters and increasing their memory and recall.

This study supported the findings of previous studies that showed CALL improved student performance (Akbulut, 2007; James, 1981; Farias et al., 2007; Lee, 1994; Mohsen & Balakumar, 2011; Wilberschied & Berman, 2004). This may be especially important for students enrolled in Chinese immersion programs who have very little time to learn Chinese characters in class. Researchers report that learning characters can be very time intensive (Everson, 1998; McGinnis, 1995) and outside practice could prove beneficial for students. However, when parents are unable to assist in this practice, online readers can provide the needed practice and reinforcement.

Significant results were not obtained when Books 2 and 3 were compared but the sample size was very small. The effect sizes or magnitude of differences between groups was low except for the first reader, which had the largest group of participants (48) that took both the pretest and post-test. Low effect strengths quite possibly indicate that the sample sizes were not large enough.

The results of statistical analysis showed that the differences between annotated and non-annotated readers had no statistically significant differences. This finding was different from the findings of other research, which used annotations or other textual helps. Even though the
treatment did not have a significant effect like the treatments in the story recall software used by Tsou et al. (2006) and the marginal glosses used by Hulstijn et al. (1996) and other annotations used by researchers (Akbulut, 2007; Hulstijn et al., 1996; James, 1981), it is possible the results could change to match those found in the other studies if conducted with a larger sample size.

It is also possible that the nonannotated readers provided adequate support for young students who merely needed experience pairing the sound and character together. The features of the annotated reader; namely the Flash animations, *pinyin*, character stroke order animations, and the games were extra features meant to draw attention to characters and elicit interest to focus on the characters for a longer time. The more critical portion of the readers was the text and audio combination. Again, the Everson (1998) study did show statistical significance between the phonemic and orthographic features of characters when students were asked to identify characters and pronounce them.

A point for discussion is whether or not the annotated readers have a purpose even if they cannot be statistically proven to improve Chinese character recognition any more than non-annotated readers. Parents indicated in the open ended survey questions that they wanted an online resource that they could do with their children. Obviously motivation is not the sole factor among all possible factors, but it is a point of interest for designing a computerized learning tool (Quinn, 2005) or working with a Chinese language classroom (Chua et al., 2009).

**Limitations**

As mentioned previously, the lack of significance between annotated and non-annotated was most likely due to small sample sizes. Even with the statistically significant test scores that were in the first set of readers, the sample size divided into control and treatment groups goes
below 30 subjects in either group, which is not enough to provide adequate power for the analyses.

It would have been helpful to administer interviews or examine motivation scales like the Chua et al. (2009) study to get more data regarding motivation and the annotation features. These interview could have informed the study about the types of activities or tasks that students would appreciate. The surveys could have also informed the study about student interest in classroom and computer integration as discussed by Bai (2003).

Another limitation could have been the nature of the assessments used in this study. They were limited to only eight questions and alternate formats for assessment were not considered. The assessments were also administered over the internet with no supervision, which could have adverse effects on test reliability. Effectively, even with the effort spent on training, the opportunity to try multiple variations to optimize research and strengthen the model was not plausible for the time constraints and seasonal displacement of the subjects outside of the school environment.

Finally, the timing of experiment implementation in conjunction with the time required for a complete build of the online readers was not ideal. The students were finishing the school year as the experiment began and were attending the second grade by the time the last results were being collected. The length of collection time was partially due to the amount of construction time that elapsed between the readers which caused parents and students to wait longer than it took to use one online reader. Teachers, parents and students were likely preoccupied with other life events and lost interest in participating.
Future Directions

The challenge of communicating with administrators, teachers, and parents and then logistically implementing the plan for this study informs future directions. Starting earlier in the school year would likely strengthen results, as students would be working within the classroom structure and organization.

Future studies should explore relationships between parental demographics and socio-cultural variables and post-test scores. It was felt that eight items did not constitute enough power to conduct this type of analysis in the current study, but this will be interesting to explore in larger studies of this population. The elements of subject gender and subject academic performance in addition to subject language skill and L1 reading comprehension levels could all have been included to add more dimensions to this study.

In the future, adding a classroom portion to this study could ensure that along with the use of the online readers, a certain amount of production and usage could be implemented to help with character comprehension. Also, a number of comments on the initial survey indicated that the parents were relying wholly on instructors to provide language training during school time. Had this study been conducted as part of the classroom environment with classroom and teacher support, more students and parents may have wanted to participate. As indicated on the initial survey, many parents reported disappointment with the amount of support they receive from the immersion program. A stronger level of communication, therefore, between parents and teachers could improve the strength of future studies in this area.

The design of the present study used an existing supplement to the Chinese immersion courses. Research indicates that teaching might be improved through a mixture of theory and pedagogical application (de Graaff et al., 2007; Fu, 1996; Tan and Lim, 2008). Future
researchers and public school administrators may consider combining and testing multiple ideas at one time to find ideal combinations of pedagogical applications and theoretical principles.

Some questions that may provide insight into future studies are: “What aspects of subject background such as parental demographics have an effect on reading comprehension scores?”; “Does learning Chinese in a CALL environment have an effect on motivation?” In addition to the questions above, longitudinal studies could incorporate studies of phonemic awareness, pragmatic awareness and other theories of language acquisition not expounded in this study.

Based on results in this study, it seems that the students were able to increase character comprehension with the non-annotated readers, which would suggest the extra features and games in the annotated readers are not necessary for CFL students at this age. Further research should be conducted with older students to examine if using games and annotated readers has more relevance and appeal to them.

**Pedagogical Implications**

This study can inform CALL instruction for this population of young children learning Chinese characters. The online readers were shown to improve post-test scores when the number of subjects was adequate. This illustrates a way that students can increase their time learning characters without taking away from the school day. In addition, the online readers are an improvement over the paper *Step by Step* booklets in the logistics of keeping first grade students from losing materials or damaging them within a single semester. Consequently the online readers could lower the cost of teaching materials in the future. The end goal is not only to provide evidence of a tool that can increase reading skills but also a product that can more comprehensively improve reading, writing, speaking and listening. The annotation features within the TIARA software are capable of adding functions to accommodate all the language
skills and become a better-rounded product for use by teachers, students, and parents. This research supports the production of such online materials. Parents seem to be highly invested in their children’s education in Chinese immersion and desire to have more support in terms of language and help-aides.

**Conclusion**

This study examined online, annotated readers for first grade students in Chinese immersion in the state of Utah to determine how effective they were to improve character comprehension. With the use of multiple-choice preliminary and post-quizzes to measure character comprehension before and after the subjects read online digital texts it was found that the online readers did improve character comprehension, but there was no difference between the online readers with and without annotations. The surveys that collected data regarding socio-cultural and language characteristics indicated that the parents of the subjects in this study were well educated and highly involved in their children’s studies of Chinese, but they felt a need for more support from the program.

This study contributes to the field of Chinese CALL by adding information about younger subjects and by detailing the logistics behind setting up online Chinese character readers. Also, materials that are pedagogically sound are integrated into the study, avoiding the pitfall of creating inappropriate content. Even if technology may change dramatically in the near future the need for new first grade students to learn content Chinese will still exist and will need a mixture of theory and pedagogy to update the methods for assisting the students to acquire characters.

This study contributes to the field of reading and vocabulary research by researching an underrepresented group of young learners. Additionally, this research contributes to pedagogy as
a CALL approach in the form of online readers was shown to benefit students’ character comprehension. Call can extend the time that immersion students spend learning Chinese as well as provide opportunities for parents to be more involved with their children’s education.

With the expansion computer-assisted language learning materials and the growing number of young students learning Chinese, it is important to continue researching CALL materials that have the potential to reinforce and extend L2 earning. The need for tools to conduct informative research and to disseminate knowledge about what is successful and what needs to be improved should drive future research. The more resources a teacher can provide students and their parents to motivate and educate the students to higher levels of language proficiency, the more standards of language education can be met and exceeded.
List of References


Appendix A: Project Descriptions

Project Summary to Teachers

Summary of the Home Computer Chinese Reading Project:

This project has been designed by the BYU Chinese Flagship Program with support of the Utah State Education Office in order to support first grade students as they read the *Step-by-Step* [Yi Bu Yi Bu] readers. The *Step-by-Step* readers meet the State core curriculum and help students learn to read Chinese characters. Some sentiments have been made about the children having difficulty reading the books at home without support. Additionally, parents lacking Chinese language skills are not able to help their children.

In order to provide more support for students and parents when reading the *Step-by-Step* books, an interactive computer program has been designed that is delivered via the internet. This program is completely voluntary and will be conducted unobtrusively via the internet from the homes of interested participants. Minimal training will be required to implement this project. Parents and students need only go to the website to gain access to the electronic booklets. It is expected that in a computer-assisted environment these readers can help the students acquire more language in less time without adding to the 20 minute homework limitations.

In order to determine how helpful this computer program is for parents and students, two versions have been created. Both versions allow students to see the story page and click on the text to hear it in Chinese, but one version will provide extra audio, animations and game activities. To track progress there will be short, built-in, mastery assessments for reading comprehension. In addition, parents will be asked to complete a survey about the computer program to determine if they think it has been helpful for their children.

Teachers will also have access to the computer program at school or home and will have access to data regarding time use and mastery scores for their students. Additionally, participating teachers will also be asked to complete a survey to gather their opinions about the computer program.

This project should take approximately 6 weeks’ time to implement. The purpose of the project is to improve Chinese reading comprehension for immersion students and do so in an enjoyable, interactive way. In addition, parents will gain an opportunity to be involved in helping with their children’s Chinese education. This user friendly project will not interfere with normal studies and classwork. It is hoped that the information gathered about this program from the computer data and surveys will provide information that will enable the creation of additional computer programs to be used in the future for all grade levels to help students increase their ability to read and understand Chinese.

We are hopeful that you will join us in the effort to improve these learning materials by participating.

Sincerely,

JC Cloe
Graduate Student of the
BYU Center for Language Studies and Chinese Department
Project Summary to Parents (Afternoon Students)

Dear Parents,

I am a graduate student of the BYU Center for Language Studies and Chinese Department who is conducting research. I have designed a project to support your first grader as they read the Step-by-Step [Yi Bu Yi Bu] readers. My project is supported by the BYU Chinese Flagship Program and the Utah State Education Office. The Step-by-Step readers meet the state core curriculum and help your child learn to read Chinese characters. Some sentiments have been made about the children having difficulty reading the books at home without support. Additionally, parents have noted that they are not able to help their children because they lack Chinese language skills.

To provide more support for you and your child when reading the Step-by-Step books, an interactive computer program has been designed that is delivered via the internet. This program is completely voluntary and requires minimal training. You and your child need only go to a designated website to gain access to the electronic booklets and instructional videos. It is expected that in a computer-assisted environment these readers can help your child acquire more language in less time.

The electronic readers themselves will allow your child to see the story page and click on the text to hear it in Chinese and see English and phonetic aids. There are also extra animations and a game. To track your child’s progress there will be short, built-in, mastery assessments for reading comprehension. In addition, you will be asked to complete two surveys, one about your language background and comfort with computers and one about the computer program itself. To study the benefits of this computer program for you and your child these electronic readers will be digitally tracked for time spent, assessment results and minor demographics provided by you in your surveys.

Your child’s teacher will have access to the computer program to observe your child’s progress. Your child’s teachers will be asked to complete two surveys to understand classroom environment and their opinions about the computer program.

This project should take approximately 6 weeks time to implement. The purpose of the project is to improve Chinese reading comprehension for your child and do so in an enjoyable, interactive way. In addition, you will gain an opportunity to be involved in helping with your child’s Chinese education. This user friendly project will not interfere with normal studies and classwork. It is hoped that the information gathered about this program from the computer data and surveys will provide information that will enable the creation of additional computer programs to be used in the future for all grade levels to help dual immersion students’ increase their ability to read and understand Chinese.

We are hopeful that you will join us in the effort to improve these learning materials by participating.

Sincerely,

JC Cloe
Project Summary to Parents (Morning Students)

Dear Parents,

I am a graduate student of the BYU Center for Language Studies and Chinese Department who is conducting research. I have designed a project to support your first grader as they read the Step-by-Step [Yi Bu Yi Bu] readers. My project is supported by the BYU Chinese Flagship Program and the Utah State Education Office. The Step-by-Step readers meet the state core curriculum and help your child learn to read Chinese characters. Some sentiments have been made about the children having difficulty reading the books at home without support. Additionally, parents have noted that they are not able to help their children because they lack Chinese language skills.

To provide more support for you and your child when reading the Step-by-Step books, an interactive computer program has been designed that is delivered via the internet. This program is completely voluntary and requires minimal training. You and your child need only go to a designated website to gain access to the electronic booklets and instructional videos. It is expected that in a computer-assisted environment these readers can help your child acquire more language in less time.

The electronic readers themselves will allow your child to see the story page and click on the text to hear it in Chinese. There are links for the glossary and English translation on every page. To track your child’s progress there will be short, built-in, mastery assessments for reading comprehension. In addition, you will be asked to complete two surveys, one about your language background and comfort with computers and one about the computer program itself. To study the benefits of this computer program for you and your child these electronic readers will be digitally tracked for time spent, assessment results and minor demographics provided by you in your surveys.

Your child’s teacher will have access to the computer program to observe your child’s progress. Your child’s teachers will be asked to complete two surveys to understand classroom environment and their opinions about the computer program.

This project should take approximately 6 weeks’ time to implement. The purpose of the project is to improve Chinese reading comprehension for your child and do so in an enjoyable, interactive way. In addition, you will gain an opportunity to be involved in helping with your child’s Chinese education. This user friendly project will not interfere with normal studies and classwork. It is hoped that the information gathered about this program from the computer data and surveys will provide information that will enable the creation of additional computer programs to be used in the future for all grade levels to help dual immersion students’ increase their ability to read and understand Chinese.

We are hopeful that you will join us in the effort to improve these learning materials by participating.

Sincerely,

JC Cloe
Appendix B: Still Shots of Online Readers

Image 1: Log-in page used by subjects and their parents to access the readers

Image 2: Log-in page that allowed a subject to take a quiz.
Image 3: Still image of the sample reader “non-annotated” version

Image 4: Still image of “non-annotated” reader with the link for the English translation
**English**

There are people here.
Here there is one person.
I am here.

**Words**

这里 ...... here
有 ...... have
个 ...... (general counting particle for people and things)
人 ...... person/ people
我 ...... I/ me
在 ...... at/ here/ on
Chinese

这里有。
这里有一个人。
我一个人在这里。
Appendix C: Booklet Cover Images and pages

Image 1: First booklet in the Sept by Step Series

Image 2: First booklet in the "Time" theme
Image 3: Second booklet in the "Time" theme

Image 4: Third booklet in the "Time" theme
Appendix D: Consent Forms

Implied Consent

You are being invited to participate in this development research project of the Step by Step Chinese readers. My name is JC Cloe, I am a graduate student at Brigham Young University and I am conducting this survey under the direction of Dr. Dana Bourgerie. I am interested in finding out about your perspective on computer-assisted language learning and how it may benefit your child in this Chinese immersion program. Your participation in this study will require the completion of the following survey. This should take approximately 10 to 15 minutes of your time. Your participation will be anonymous and you will not be contacted again in the future. You will not be paid for being in this study. This survey involves minimal risk to you. The benefits, however, may impact society by helping increase knowledge about effective methods to increase Chinese character reading comprehension for your child.

You do not have to be in this study if you do not want to be. You do not have to answer any question that you do not want to answer for any reason. We will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem you may contact me, JC Cloe at jcloe01@gmail.com or my adviser, Dana Bourgerie at dana_bourgerie@byu.edu.

If you have any questions about your rights as a research participant you may contact the IRB Administrator at A-285 ASB, Brigham Young University, Provo, UT 84602; irb@byu.edu; (801) 422-1461. The IRB is a group of people who review research studies to protect the rights and welfare of research participants. The completion of this survey implies your consent to participate. If you choose to participate, please complete the survey and fill out the Parental Permission for a minor in order to proceed to the online booklets. Thank you!

- **YES**, I agree to the terms for participation in this survey and the adjoined project.

- **NO**, I do not accept the conditions for participating.
Parental Permission for a Minor

Introduction
My name is JC Cloe. I am a graduate student from Brigham Young University. I am conducting a development research project about effective methods to increase Chinese character reading comprehension for your child. I am inviting your child to take part in the project because he/she is participating in a first grade Chinese Immersion program that uses the Step by Step Chinese Readers as a learning resource.

Procedures
In order to provide more support for you and your child when reading the Step-by-Step books, an interactive computer program has been designed that is delivered via the internet. This program is completely voluntary and will be conducted unobtrusively. Minimal training is required to implement this project. You and your child need only go to the website to gain access to the electronic booklets. It is expected that in a computer-assisted environment these readers can help the students acquire more language in less time without adding to the 20 minute homework limitations. This project should take approximately 6 weeks’ time to implement.

If you agree to let your child participate in this research study, the following will occur:

- You may access an instructional video that will demonstrate how to navigate the booklets online.
- You can access the booklets at any time via the internet from your home computer. Your child will have small quizzes at the beginning and end of the booklets to gauge his/her character recognition.
- You and your child will have ample time to work on and review the electronic booklets every week.
- As you complete one booklet and move to the next, all materials will remain available until the end of the six week project timeframe.

Risks
The risk involved in this development research project is minimal. Your child’s standing in school or grades in class will NOT be affected by this project.

Confidentiality
No personally identifying information will be collected for this project. The researcher will also keep all collected data in secure password-protected locations. Only the researcher will have access to the data. At the end of the study, data will be locked down in BYU’s electronic research data archives. Potential future research that may involve data from this project must be consistent with the original purpose. The data will be stored until other projects or research is conducted that nullifies the usefulness of the data.

Benefits
The purpose of the project is to improve Chinese reading comprehension for your child and do so in an enjoyable, interactive way. In addition, you will gain an opportunity to be
involved in helping with your child’s Chinese education. This user friendly project will not interfere with normal studies or classwork. It is hoped that the information gathered about this program from the computer data and surveys will provide information that will enable the creation of additional computer programs to be used in the future for all grade levels to help your child increase his/her ability to read and understand Chinese.

**Compensation**

There will be no compensation for participation in this project.

**Questions about the Research**

Please direct any further questions about the study to JC Cloeat jcloe01@gmail.com; 801-367-2118. You may also contact Dana Bourjerie at dana_bourjerie@byu.edu; 801-422-4952.

Questions about your child's rights as a study participant or to submit comment or complaints about the study should be directed to the IRB Administrator, Brigham Young University, A-285 ASB, Provo, UT 84602. Call (801) 422-1461 or send emails to irb@byu.edu. [You may print a copy of this consent form to keep for your records]

**Participation**

Participation in this research study is voluntary. You are free to decline to have your child participate in this research study. You may withdraw your child's participation at any point without penalty.

By filling in your child's assigned username, the classroom pass-code, your name and the date below, you consent to allow your child to participate in this project.

User Name: 

Classroom Passcode: 

Parent Name: 

Date: 
Appendix E: Parent Survey

1. What would you consider your socioeconomic status to be?
   Low Income  Low Middle Income  Middle Income  High Middle Income  High Income

2. What is your level of education and experience?

<table>
<thead>
<tr>
<th>Your education</th>
<th>Highschool</th>
<th>Associates Degree</th>
<th>Vocational Certification</th>
<th>Undergraduate Degree</th>
<th>Graduate Degree</th>
<th>Doctoral Degree</th>
<th>Number of years of professional experience.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0-1</td>
</tr>
<tr>
<td>Your spouse's education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0-1</td>
</tr>
</tbody>
</table>

3. How many children do you have?

1
2
3
4
5
6

3a. Do you have another child in Chinese Dual immersion?
   Yes  No

4. Do you have a computer in your home?
   Yes  No

Does your child have access to a computer outside of the school?
   Yes  No
5a. In one week how often and for how long does your child use the computer?  
(Please check only one by selecting one row and one column that applies to your child's computer use)  
For example: If your child uses the computer 3 times a week for any reason for 15 minutes each time please select the dot under 10-15 minutes on the row that says 2-3 times a week. It is okay to estimate.

<table>
<thead>
<tr>
<th></th>
<th>Amount of time spent per session of computer use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-5 minutes</td>
</tr>
<tr>
<td>Once a Week</td>
<td>●</td>
</tr>
<tr>
<td>2-3 Times a Week</td>
<td>●</td>
</tr>
<tr>
<td>Once a Day</td>
<td>●</td>
</tr>
<tr>
<td>2-3 Times a Day</td>
<td>●</td>
</tr>
<tr>
<td>4 or more times a Day</td>
<td>●</td>
</tr>
</tbody>
</table>

6. In one week how often and for how long do you and / or your spouse spend time helping your child to study Chinese?  
(Please check only one by selecting one row and one column that applies to your time spent)  
For example: If you help your child with their studies 3 times a week for any reason for 15 minutes each time please select the dot under 10-15 minutes on the row that says 2-3 times a week. It is okay to estimate.

<table>
<thead>
<tr>
<th></th>
<th>Amount of time spent per study session with your child</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-5 minutes</td>
</tr>
<tr>
<td>Once a Week</td>
<td>●</td>
</tr>
<tr>
<td>2-3 Times a Week</td>
<td>●</td>
</tr>
<tr>
<td>4-6 Times a Week</td>
<td>●</td>
</tr>
<tr>
<td>Daily</td>
<td>●</td>
</tr>
</tbody>
</table>

7. How comfortable are you and your spouse with using a computer?
8. What is your native language?  
(Type the name of the language in the text boxes below.)

Your Native Language  

Your Spouse's Native Language  

9. Do you speak other languages?  
- Only you speak a foreign language.  
- Only your spouse speaks a foreign language.  
- Both you and your spouse speak foreign languages.  
- Neither you or your spouse speaks a foreign language.  

What other languages do you and your spouse speak?  
(Type the name of your other languages in the boxes below)

<table>
<thead>
<tr>
<th>Second Language</th>
<th>Third Language</th>
<th>Fourth Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yourself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your Spouse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. How familiar are you with Chinese?  

(If you can tell that it is Chinese but cannot produce it or understand it for the skill listed please select can recognize)
12. How supported do you feel in working with your child who is in Chinese immersion?

<table>
<thead>
<tr>
<th></th>
<th>Not Familiar</th>
<th>Can Recognize</th>
<th>Kind of Familiar (Survival Production)</th>
<th>Familiar (Communicative Production)</th>
<th>Very Familiar (Fluent Production)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11a. Speaking Chinese</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11b. Listening to Chinese</td>
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<td></td>
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<tr>
<td>11c. Reading Chinese</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>11d. Writing Chinese</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. Please describe the kinds of support you believe that you already have for your child's language training.

14. What additional support would you like to have? (Explain any frustrations you have that such support could help.)
Appendix F: Sample Quiz

一步一步 Pretest

Q1 What is the English for the following character? 我
  ○ you
  ○ have
  ○ me

Q2 What is the English for the following characters? 这里
  ○ there
  ○ here
  ○ where

Q3 What is the English for the following character? 人
  ○ person
  ○ have
  ○ one

Q4 What is the English for the following character? 有
  ○ is
  ○ have
  ○ you

Q5 What is the character for the following English word? me
  ○ 你
  ○ 我
  ○ 这

Q6 What are the characters for the following English word? here
  ○ 你们
  ○ 我们
  ○ 这里

Q7 What is the character for the following English word? person
  ○ 一
  ○ 有
  ○ 人

Q8 What is the character for the following English word? have
  ○ 有
  ○ 我
  ○ 个
  ○