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Jin-Fang Eubanks
Metropolitan State University of Denver

Hsin-Te Yeh
Metropolitan State University of Denver

Hungwei Tseng
Jacksonville State University

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Jia-Fang Eubanks and Hsin-Te Yeh [a]

Metropolitan State University of Denver

Hungwei Tseng [b]

Jacksonville State University

[a] School of Education, Metropolitan State University of Denver, Campus Box 21, PO Box

173362, Denver, CO, 80217-3362. E-mail: jiafange@gmail.com (Jia-Fang Eubanks);

hyeh1@msudenver.edu (Hsin-Te Yeh)

[b] Online@JSU & Department of Educational Resources, Jacksonville State University, 700

Pelham Rd. N, 212A Self Hall, Jacksonville, AL 36265. E-mail: htseng@jsu.edu

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Abstract

Digital mobile devices such as iPads have been around for many years and have been more and

more popular in K-12 classrooms. Research has pointed out the advantages of using iPads in

classrooms to enhance teaching, engage learning, and promote learning outcomes. iPads have

been proved to be a useful and powerful digital mobile device in language learning including

speaking, listening, reading, and writing. The purpose of the study was to investigate whether a

technology integrated 21st century writing workshop had an influence on the ability and attitude

towards writing in Chinese for second graders enrolled in the Mandarin Chinese program in a

language immersion elementary school. Twenty-four students participated in the study.

Recording technology (iPad recording app), an iPad camera, and the Book Creator App were

integrated into the 21st century writing workshop. A pre-survey, post-survey, and observation

were used to collect data. The results of the study confirmed that writing barriers decreased when

the Chinese immersion program students utilized iPads in the writing workshop. Also, the

writing ability and attitudes of the Chinese immersion program students improved after the

completion of their 21st century writing workshop.

Keywords: technology integration; iPads; language learning; 21st century writing

workshop; Chinese language immersion elementary school

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Technology in a Language Immersion Elementary School

1. Introduction

China is the world's most populated country with about 1.38 billion people. This means that one fifth of the planet speaks Chinese. Chmelynski (2006) predicted that more U.S. schools would offer Chinese (Mandarin Chinese) language courses, as China is poised to become the next global economic superpower. The prediction has come true that in the past ten years there has been a dramatic increase in the number of K-12 schools in the U.S. offering Chinese world language programs. In the state of Colorado, language immersion schools for K-8 with Mandarin Chinese programs have been increasing since 2006. The number has increased from one private school in 2006 to at least seven public and private full Chinese immersion elementary schools in 2015. It's continuing to grow today.

Even though there has been an increase of Chinese language immersion schools, very little research has been conducted on the curriculum and instruction in the U.S. Chinese language immersion schools. Students face difficulty in developing their writing skills in Chinese language immersion schools due to cultural differences and a lack of Chinese-speaking environment at home. As for learning Chinese, writing is a crucial part of childhood education for many reasons. First, it allows students to communicate their thoughts with the audience in a formal way. Second, it helps students develop critical thinking skills. Writing appears to be a major and essential part of students' academic success. Due to the language difficulty and complexity of Chinese characters, many students lack the skills and motivation to write effectively in the elementary school Chinese immersion language program.

Chinese character writing is considered a complicated and difficult procedure for Chinese language learners. Shen (2004) pointed out that the difficulty in learning characters is the need to retain and rapidly retrieve the three aspects of a character: the shape (graphic form or orthography), the sound (phonology), and the meaning (semantics). Chen, Wang, and Cai (2010) stated that there were three types of curricula for teaching Chinese: 1) unity type, emphasizing the unity of all aspects of Chinese language learning, 2) delay type, avoiding teaching the students any characters for a prolonged period of time, or even at all during the entire first year, with all instructional needs relying on phonetic symbols such as Pinyin, and 3) lag type, emphasizing the oral aural skills with temporary lag in character-learning and a stronger emphasis on speaking more and writing less. Chinese language immersion schools in the state of Colorado adopt the "Unity" type, which is the most widely used type according to Chen, Wang and Cai and is commonly used by full immersion programs. This type emphasizes the development of listening, speaking, reading, and writing skills simultaneously. Students from full immersion programs are more proficient in reading, writing, listening and speaking in general (Brondum & Stenson, 1998; Met, 1993). Besides building up the four areas of language skills, all K-12 Chinese language immersion schools are also required to follow the state's Academic Standards or the Common Core Standards for learning the content knowledge.

One of the challenges that educators face in teaching writing skills is that students need frequent practice to build up their writing stamina. The barriers of difficulty and complexity of Chinese writing often reduce students' writing motivation. A tremendous amount of research has proven that writer's workshops improve students' academic achievement and motivates students to become confident writers (Kissel & Miller, 2015; Wiley & McKernan, 2016). Writing in the 21st century often involves digital technology. Integrating appropriate technology into the writing

process can inspire students to develop new communication skills, to increase learning motivation, to be actively engaged in their learning, and to make learning writing more fun (Jang, 2008; Mann, 2011; Nobles & Paganucci, 2015), especially for students who are enrolled in Chinese language immersion programs.

There are many educational tools that can be employed to enhance the writing performances of students. Liu, Lee, Huang, and Hsieh (2012) investigated students' performance while writing Chinese essays using an interactive online writing system. The online interactive system assisted students with Chinese essay writing and influenced students' writing performance. The computer technology has helped students retain better control of their writing process and reflect on their work.

Because of the rapid development of Web 2.0 technology, tools such as social media, wireless connectivity, open source word processing, presentation software, cloud-based collaborative writing, and web-based writing have brought classrooms as a whole into the 21st century and made a significant impact on student learning (Chik, 2014; Demski, 2012; Wu & Marek, 2016). Li, Chu, Ki, and Woo (2012) suggested the integration of Web 2.0 tools (wikis, Google Docs) as well as the use of effective pedagogical strategies in the teaching of Chinese writing could boost writing motivation and increase group interaction.

Bogard and McMacklin (2012) found that recorded oral rehearsal and digital storytelling were powerful tools for writing. Using both non-digital and digital resources engaged and supported young writers in the 21st century. Also, integrating easy-to-use technology into stages of the writing process enhanced how elementary students plan, write, and create digital stories. Using audio recordings allowed the students to verbalize and elaborate their developing stories. This was one of strategies used in the 21st century writing workshop for this study.

1.1. Mobile Assisted Language Learning (MALL)

In recent years, hand-held mobile devices such as tablets and smart phones have been getting more and more popular in educational settings to enhance and improve learning quality. Prensky (2001) argued that "It is now clear that as a result of this ubiquitous environment and the sheer volume of their interaction with it, today's students think and process information fundamentally differently from their predecessors" (p. 1). The features of mobile devices allow course developers to apply and deliver multi-media formats of content and resources to facilitate learning engagement that meets student needs of different learning styles. An array of applications (apps) and Web 2.0 tools running on mobile devices can be easily commissioned for local use (Melhuish & Falloon, 2010), and many of them are suitable for an individual's learning requirements. Cochrane (2014) reviewed longitudinal (2006-2011) participatory action research on mobile Web 2.0 and concluded the following two critical success factors – technological and pedagogical support – and the creation of sustained engagement facilitating ontological shifts for the participants. An instructor can use apps and Web 2.0 tools effectively to develop open and global conversations with students. Much research has indicated the benefits of using iPads in the classrooms to engage students in learning activities and language learning (Ahmed & Nasser, 2015; Mango, 2015). In addition to the mobility and flexibility of iPads, what else makes iPads educational are the various instructional apps teachers can use in the classroom to make learning more engaging, learner-controlled, flexible, and fun! iPads have been proven to be a useful tool for students to learn a different language in terms of writing, reading, and listening (Harmon, 2012; Lys, 2013; McClanahan, Williams, Kennedy, & Tate, 2012; Wang, Teng, & Chen, 2015).

Harmon (2012) studied the impact of using iPads and utilizing apps (e.g., iBooks, WordFlick, Keynote) on reading and writing. Students were encouraged to use apps to create

creative materials and collaborate with their classmates. The results indicated that students had positive comments on using iPads for language learning and they were more critical of their own reading and writing ability. Harmon concluded that iPads can make learning more fun and leave student feeling like they are in control of their own learning. Moreover, Lys (2013) investigated how students learn with mobile technology and how it affects the development of their oral proficiency level. The findings suggested that iPads are well suited to practice listening and speaking proficiency at advanced levels and can engage students in meaningful, purposeful, and goal-directed discourse. Although research findings had shown that task-based language learning approach using iPads facilitated interactions and provided scaffolded assistance, there is a lack of empirical study that examine the acceptance and efficacy of the iPads in different educational contexts and in foreign language learning. In particular, further research to investigate the impact of using iPads in learning writing in Chinese is deemed necessary.

1.2. Pedagogical and Design Framework of the Study

Knowing the impacts of technology and globalization on our multiliterate experiences, the multiplicity of communication channels and linguistic diversity in the world today have brought us a much broader view of literacy than portrayed by traditional language-based approached (The New London Group, 2000). The concept of multiliteracies provides an appropriate pedagogical framework for teaching literacy in a world undergoing significant economic, social and technological change. Moreover, to better utilize and integrate appropriate technology and techniques in language learning, the 21st century writing workshop in this study was based on the pedagogy of multiliteracies embedded with multiple literacy methods (linguistic, visual, audio, and multimodal) to encourage engagement and communication.

In addition, to foster learners' interests and motivations in learning Chinese, the three communication modes (interpretive, interpersonal, presentational) described in the Standards for Foreign Language Learning in the 21st Century (SFLL) was adopted as a design framework for developing the 21st century writing workshop. SFLL have been developed by the National Standards in Foreign Language Education Project and the American Council on the Teaching of Foreign Languages (ACTFL) to provide a "broader, more complete rationale for foreign language education" (National Standards, 2006, p .15). The activities in the workshop associated with three communication modes were a) engaging with media (interpretive mode): students created three-part storyboards according to their recording and peers' feedback, b) facilitating communication and interaction (interpersonal mode): students developed their stories through recorded oral rehearsal using iPads and had their partners listen to each other's recordings and conferred together and, c) sharing ideas to the audience (presentational mode): students published their digital storybooks on the classroom website and shared with their parents. The detailed information of the 21st century writing workshop is described in section 2.2.4.

Chinese is not an easy language to learn, especially in writing because of the complexity of Chinese characters. The purpose of this study was to explore whether a technology integrated 21st century writing workshop would have an effect on students' ability and attitudes towards writing for those who are enrolled in the Chinese language immersion program. The research question for the study was: Is there a difference in writing and attitudes toward writing in Chinese for elementary school students enrolled in a Chinese language immersion program after participating in the technology integrated 21st century writing workshop?

2. Methods

2.1. Participants

The study was conducted in a language immersion elementary school in Colorado. The participants for this study were 24 second grade students enrolled in the Mandarin Chinese program. Seven boys and 17 girls were included in this group. Students were 7-8 years of age and had been in the Chinese program for one to two years. All students were non-Chinese native speakers. Their parents did not speak Mandarin Chinese. They started to learn Chinese when they were enrolled in the language immersion school. The majority of the students started at kindergarten. Only one student is considered as Chinese heritage speaker because her parents speak Mandarin Chinese at home. Also involved in the study was one second grade classroom teacher. All the participants participated in the 21st century writing workshop, in which a story map, recording technology (iPad recording app), an iPad camera, and the Book Creator App were used.

2.2. Procedure/Data Collection

This study was conducted over a three-week period of time in the 2nd half of the Fall semester. The writing workshop was integrated into the regular curriculum for students enrolled in the Chinese immersion program. It was held daily after lunch for about 80 minutes. Data was collected for analysis using a pre-survey and a post-survey, completed participant observation, and audio-visual materials collection during the three-week writing workshop period. Figure 1 illustrated the procedure and data collection of the study.
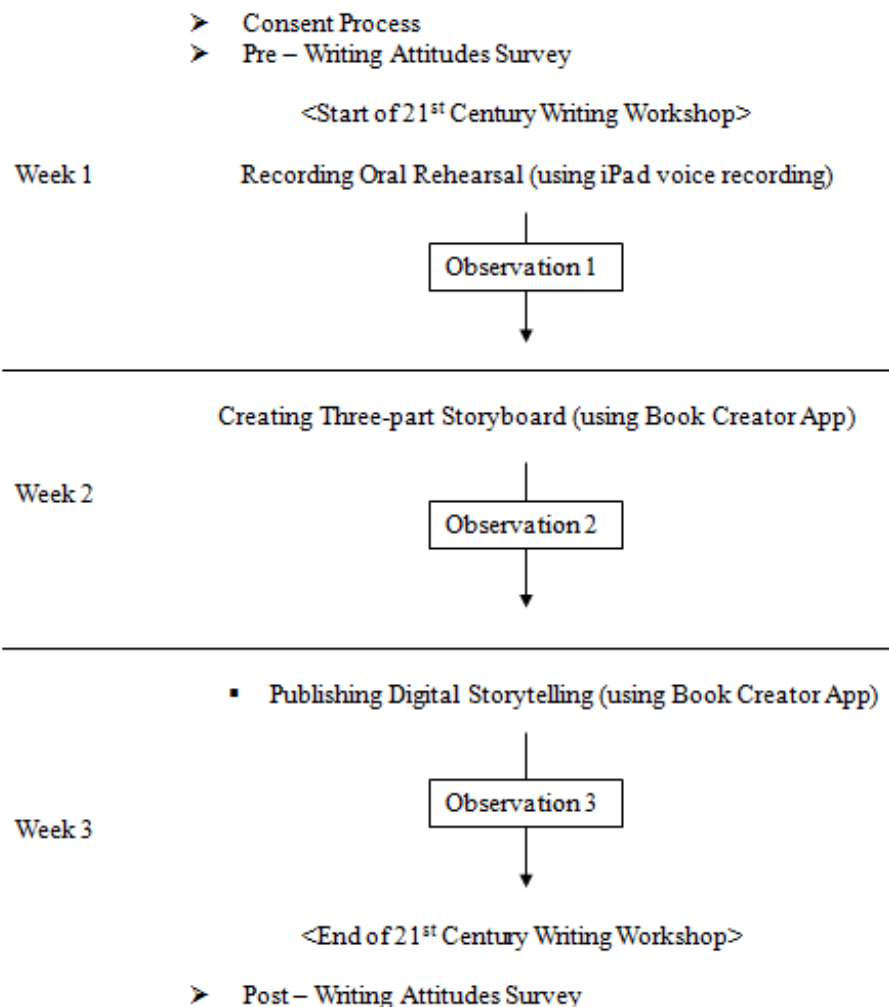
> ➤ Consent Process
> ➤ Pre – Writing Attitudes Survey

<Start of 21st Century Writing Workshop>

Week 1   Recording Oral Rehearsal (using iPad voice recording)

Observation 1

Creating Three-part Storyboard (using Book Creator App)

Week 2

Observation 2

• Publishing Digital Storytelling (using Book Creator App)

Observation 3

Week 3

<End of 21st Century Writing Workshop>

> ➤ Post – Writing Attitudes Survey

Fig. 1. Data collection procedure.

2.2.1. Consent Process

Before the data collection started, the researchers obtained the principal's approval and parental consent. Also, the students were verbally asked for their agreement to participate in the study.

"同学们好，接下來三個星期我们将会用 iPad 来写作文。我们來看看 iPad 能不能帮你把作文写得更好。要是你不想用 iPad 的话，你可以用纸与笔的来写作文。要是你想用

iPad 來写作文的话，请你举手。" The following is the English Translation: "Children, over the

next three weeks, we will be using iPads as a part of our Chinese writing to see if it will help you

get better at writing. If you do not want to use iPads for Chinese writing, you will use pen and

paper as before. If you want to join us in this activity by using iPads, please raise your hand

now." All twenty-four students raised their hands and agreed to participate in the study and use

iPads.

2.2.2. Writing Attitudes Survey

All students took a pre-survey before the writing workshop started and a post-survey at

the end of the workshop. The two surveys were used to measure students' attitudes towards

writing. Figure 2 demonstrated sample questions in the survey. The survey is similar to the one

used to measure attitudes towards reading in the study conducted by McKenna and Kear in 1990.

Because the participants were only second graders, the survey was on purpose designed to avoid

complexity and thus, to be short and easy to respond with the use of Emoji. There were six

questions in the survey. 1) How do you feel when you write a note to a friend in Chinese? 2)

How do you feel about writing at home for fun in Chinese? 3) How do you feel about getting a

new notebook, journal, or diary as a gift? 4) How do you feel about writing Chinese in your free

time at school? 5) How do you feel when it is time for writing Chinese in school? 6) How do you

feel when you have to write about what you just learned in Chinese? The purpose of the survey is

to evaluate students' interests and motivation on writing in Chinese. The surveys use a Likert

scale: Wonderful (4 points), Good (3 points), Okay (2 points) and Bad (1 point). Cronbach's

alpha statistic (Cronbach, 1951) was used to estimate the lower bound of reliability of the pre-

test and post-test. The α statistic for both pre-test ($\alpha = 0.815$) and post-test ($\alpha = 0.807$) fell within

a commonly accepted range as "Good" reliability (Henson, 2001).

1. How do you feel when you write a note to a friend in Chinese?

Wonderful 4   Good 3   Okay 2   Bad 1

2. How do you feel about writing at home for fun in Chinese?

Wonderful 4   Good 3   Okay 2   Bad 1

Fig. 2. Sample survey questions.

2.2.3. Chinese Input Method

There are two types of built-in input methods on iPads for students to input their Chinese writing - handwriting input (see Figure 3) and Pinyin input (see Figure 4). The handwriting input method is the same as the regular character writing that students have been using for two to three years in school. The Pinyin Romanization method was first introduced to students at the beginning of the second grade. Students were allowed to choose their input method depending on their personal preference.

Fig. 3. Chinese handwriting input.

Fig. 4. Pinyin input.

2.2.4. Twenty-First Century Writing Workshop

The model of the 21ˢᵗ century writing workshop used in this study is similar to the combination of traditional and new literacies described in the 21ˢᵗ century writing workshop study by Bogard and McMackin in 2012. In that study, during the workshop all students were instructed to collect ideas that could potentially be developed into personal narratives. Students collected their written ideas from "quick writes" with pictures, oral sharing, and brainstorming with classmates in their notebook. Following the idea collection, the students chose an idea and wrote their own narratives.

In the current study, the students chose the ideas/sentences they did before the workshop during the semester. For example, 我长大后，我要做一个兽医。(I want to be a vet after I grow up.) Later, they expanded the ideas/sentences and turned them into a story. They used crayons to create story maps that focused on the beginning, middle, and end of expected stories. Students talked about their stories according to the story maps they created and also they recorded their stories using iPads. They had their partners listen to each other's recordings and conferred together. According to students' recording and the feedback from other peers, they created three-part storyboards that include narration, sketch, and digital media (Book Creator App) as the planning for their digital stories. The narration was the recording and the sketch was the drawing they did earlier. The last part was to use Book Creator App to put together everything into a digital book. The students inserted the drawing and entered the Chinese characters using either handwriting or Pinyin input method according to the recording on the App. For example, 我长大后，我要做一个兽医，因为我要帮助动物们。我还要做一个医生，因为我不要同学们生病。我也要做一个老师，教同学们数学。我也要做一个动物管理员，因为我喜欢动物和我

爱动物。(After I grow up, I want to be a vet because I want to help animals. I also want to be a

doctor because I don't want my classmates to feel sick. I want to be a teacher to teach my

classmates math. I want to be a manager for animals too because I like and I love animals.)

During the writing process, the researcher/field investigator would help if they had trouble

writing the characters. Lastly, students published their digital storybooks on the classroom

website and shared with their parents. Figure 5 illustrated the procedure of the 21st century
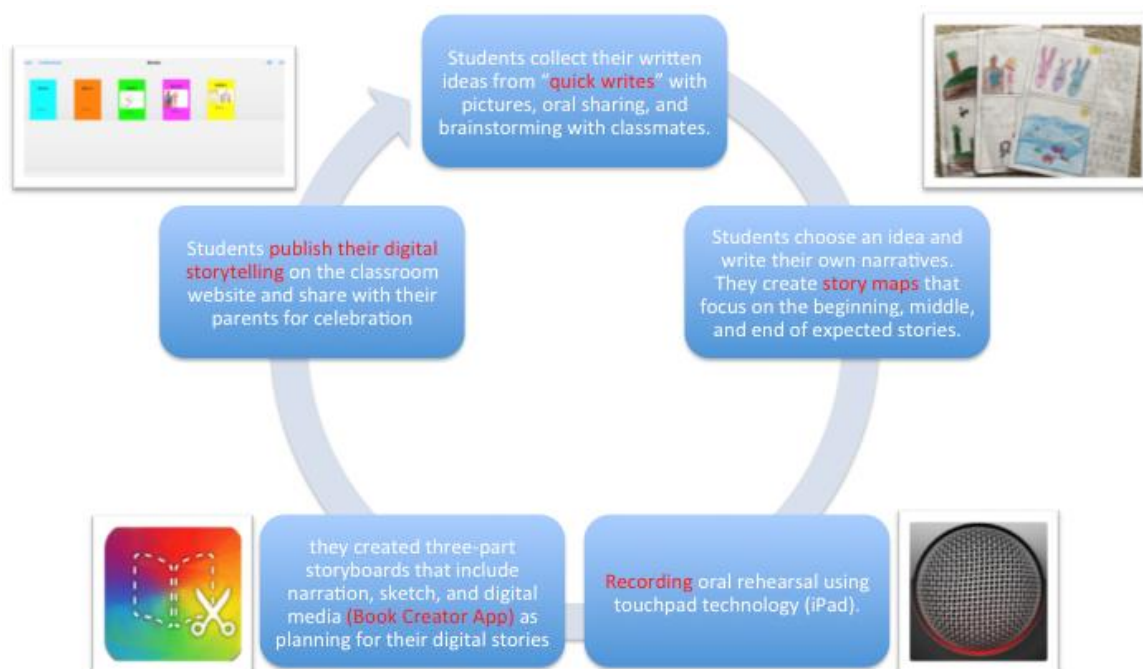
writing workshop in this study.

Fig. 5. Writing workshop procedure.

The 21st century writing workshop took place during the guided Chinese reading and

writing period from 12:10 pm to 1:30 pm daily. It was embedded into the regular small group

writing instruction that replaced the traditional paper and pencil writing. During the small group

guided time, the 24 students were randomly divided into five groups. Each group was rotated for

small group writing instruction every 15 minutes while the other groups participated in other instructional activities with their homeroom teacher. Each student in the writing workshop group was given an iPad for his or her writing that includes oral recording in Chinese and Chinese digital story writing.

2.2.5. Observation

During the workshop time, one of the authors (the field investigator) observed students' reactions to learning and attitudes towards their Chinese story writing according to the following three stages: 1) Story developing oral rehearsal in Chinese by using iPad voice recording, 2) Inputting Chinese story writing in the digital media (Book Creator App), and 3) Final published recording of their writing in the digital media (Book Creator App). Field notes were taken during the workshop each day to describe/state students' reactions to learning and attitudes towards writing in Chinese during each stage. The field investigator jotted down what she saw about students' reactions, behaviors, facial expressions, and interactions for each group during the workshop. Also, she would write down what she heard about students' conversations with one another regarding the learning activities. Preliminary analysis through self-reflection was done meanwhile. The field notes were organized into an MS Excel spreadsheet right after the workshop each day by the field investigator.

2.3. Data Analysis

During the study, the field investigator collected students' audio-visual materials including their story maps, recording sound tracks, planning stories, and final digital published writing. These artifacts served as the first set of data that showed students' learning outcomes in the study. The second set of data was the results of the pre-survey and post-survey as described in 3.1. The third set of data was the observation field notes that described students' reactions to

learning and attitudes, which was summarized in 3.2. This set of data also included level of engagement and improvement in writing ability. All the collected data were used to help analyze the 21st century writing workshop's effectiveness on students' ability and attitude towards writing.

The field investigator reviewed and evaluated the collected artifacts from students to judge the quality of students' work, which served as the evidence for students' progress during the workshop. As for the survey, a paired t-test was used to compare the pre-survey and post-survey and to understand how students' attitudes had changed before and after the workshop. Along with the collected students' work samples, field notes from observation were analyzed to understand students' engagement and improved writing ability. The field notes included a detailed description of the setting followed by subjective interpretation of the data of each writing stage. This self-reflection process was considered as preliminary analysis. The field notes were read carefully several times to get a sense of the whole and then to come up with a list of meanings/topics. Those meanings/topics were abbreviated as codes and placed in the relevant spot in the context (Creswell, 2014). By synthesizing and comparing those codes, conclusions/themes emerged as described in 3.2. Artifacts, field notes and codes were cross-checked by other researchers to ensure reliability. In addition to participatory mode of research by the field investigator (also a participant), triangulation and peer examination were done to ensure trustworthiness for this study (Merriam & Tisdell, 2015).

3. Results

3.1. Pre-Survey vs. Post-Survey Responses

A paired-samples t-test was conducted to compare the pre-survey and post-survey data for all the six questions in the survey. Table 1 showed the overall results of pre-survey and post-survey.

Table 1

Results of pre-survey and post-survey ($N = 24$).

	Bad 1		Okay 2		Good 3		Wonderful 4	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Question 1	0	0	5	1	11	4	8	19
Question 2	0	0	2	0	9	2	13	22
Question 3	1	0	2	0	5	2	16	22
Question 4	1	0	3	0	9	3	11	21
Question 5	0	0	2	0	9	2	13	22
Question 6	1	0	8	1	7	4	8	19

For Question One, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 3.13$, $SD = 0.74$) and post-test ($M = 3.75$, $SD = 0.53$) conditions; $t(23) = 3.16$, $p < .05$. The results suggested that the 21st Century Writing Workshop improved students' attitude towards writing notes to friends in Chinese.

For Question Two, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 3.46$, $SD = 0.66$) and post-test ($M = 3.92$, $SD = 0.28$) conditions; $t(23) = 3.11$, $p < .05$. The results suggested that the 21st-Century writing workshop improved students' attitude towards writing at home for fun in Chinese.

For Question Three, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 3.50$, $SD = 0.83$) and post-test ($M = 3.92$, $SD = 0.28$) conditions; $t(23) = 2.20$, $p < .05$. The results suggested that the 21st-Century writing workshop improved students' attitude towards receiving a new notebook, journal, or diary as a gift.

For Question Four, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 3.25$, $SD = 0.85$) and post-test ($M = 3.88$, $SD = 0.34$) conditions; $t(23) = 3.50$, $p < .05$. The results suggested that the 21st-Century writing workshop improved students' attitude towards writing Chinese in their free time at school.

For Question Five, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 3.46$, $SD = 0.66$) and post-test ($M = 3.92$, $SD = 0.28$) conditions; $t(23) = 3.41$, $p < .05$. The results suggested that the 21st-Century writing workshop improved students' attitude towards writing Chinese in school.

For Question Six, the paired-samples t-test results indicated a significant difference in the scores of pre-test ($M = 2.92$, $SD = 0.93$) and post-test ($M = 3.75$, $SD = 0.53$) conditions; $t(23) = 3.61$, $p < .05$. The results suggested that the 21st-Century writing workshop improved students' attitude toward writing about what they just learned in Chinese.

The results of the paired-samples t-test indicated significant differences in the scores of pre-test and post-test for all the six questions in the survey. Further, Cohen's effect size value ($d=.94$) suggested high practical significance. Table 2 showed the overall results of paired-sample t-test for pre-survey and post-survey.

Table 2

Results of paired-samples t-test for pre-survey and post-survey.

	Mean & Standard Deviation			
	Pre-Test	Post-Test	t	p
Question 1	3.13 (0.74)	3.75 (0.53)	3.16	0.0044*
Question 2	3.46 (0.66)	3.92 (0.28)	3.11	0.0049*
Question 3	3.50 (0.83)	3.92 (0.28)	2.20	0.0383*
Question 4	3.25 (0.85)	3.88 (0.34)	3.50	0.0019*
Question 5	3.46 (0.66)	3.92 (0.28)	3.41	0.0024*
Question 6	2.92 (0.93)	3.75 (0.53)	3.61	0.0015*

$*p < 0.05$

3.2. Observation

Observation was done in each of the following three stages as mentioned in 2.2.5: 1) Story developing oral rehearsal in Chinese by using iPad voice recording, 2) Inputting Chinese story writing in the digital media (Book Creator App), and 3) Final published recording of their writing in the digital media (Book Creator App). Observation field notes included statements/descriptions of students' reactions to learning and attitudes towards writing in Chinese in each stage. Descriptions/statements from stage one were, for example, "During the recording, 5 students had a hard time expressing their ideas in Chinese...felt frustrated coming up with writing ideas." and "After multiple times of repeated recording, students were able to self-correct their writing ideas."

Descriptions/statements from stage two were, for example, "Students practiced their Chinese handwriting skills and improved their ability to write Chinese characters since the handwriting input method was the same as normal handwriting." and "Writing the characters and finding the correct one from the keyboard made students feel like they were involved in a game type of activity."

Descriptions/statements from stage three were, for example, "Students were excited to record many times and listen to their own recordings in order to get the best results for their published writing." and "Students' reading speed and fluency increased during and after the recording. Most of the students were able to memorize their writing and recite the stories to the teacher and their classmates."

After reading all the field notes including descriptions/statements several times, 60 themes emerged (see Table 3). Fifty-one themes were categorized as positive/motivated such as "engaged and focused," "repeated recording" and "enjoyed hearing own voice." Six themes were categorized as negative/frustrated such as "difficulty coming up with topic" and "problems with stroke order." Three themes were categorized as others such as "absent for a week" and "interrupted by English intervention."

Some themes (e.g., "tried multiple times to match drawn character", "chose some incorrect characters", "short attention span", & "mixed Chinese and English when didn't know vocabulary") might at first glance appear to be negative/frustrated. However, they were categorized as positive/motivated because the students expressed their positive attitudes and were actively engaged in the writing process despite the descriptions. This was indicated as the results of preliminary analysis in the field notes.

Table 3

Emerged themes from observation field notes.

Positive/Motivated

Engaged and focused	Repeated recording	Recited writing by self
Enjoyed hearing own voice	Wrote 4 pages	Corrected writing by self
Improved reading speed/fluency	Used semantic cues to read unknown characters	Improved stroke order with practice
Asked for help with character input	Expressed writing ideas quickly	Read/Listened to other students' recordings
Input characters by self	Recorded story by self	Shared writing with others
Corrected pronunciation by self	Enjoyed inputting characters	Used new vocabulary in writing
Recording helped self-correct writing ideas	Recording helped organize ideas	Used handwriting input enthusiastically
Input characters one-by-one	Learned new vocabulary	Enjoyed recording
Listened to own recording multiple times	Reviewed recording multiple times	Chose some incorrect characters
Expressed writing ideas clearly	Recording helped remember what to write	Self-corrected by re-reading story
Learned to use phrase input	Came up with good ideas	Used handwriting input
Repeated writing helped to learn characters	Good understanding of stroke order	Improved speaking speed/fluency
Knew how to input Chinese characters	Mixed Chinese and English when didn't know vocabulary	Repeated speaking helped to learn new vocabulary
Pictures helped to complete recording	Discovered how to switch keyboards	Tried multiple times to match drawn character
Enjoyed using iPad	Quickly finished input	Short attention span
Improved character recognition by reading	Improved character recognition by listening	Repeated reading helped to learn characters
Revised writing during recording	Recognized characters and chose correct ones	Helped other students with writing

Negative/Frustrated

Difficulty expressing himself/herself in Chinese	Problems with stroke order	Difficulty reading new vocabulary
Required help to record ideas	Lack of knowledge/experience with character writing rules	Difficulty coming up with topic

Others

Absent for a week	Interrupted by English intervention	Referred to recording to remember when writing

Those themes along with all the associated statements/descriptions were assorted into "positive/motivated", "negative/frustrated", and "others" categories for each stage. In stage one (story developing), 26 statements/descriptions were considered as positive/motivated while 6 were considered as negative/frustrated with the other 3 considered as others. In stage two (inputting Chinese), 42 statements/descriptions were considered as positive/motivated while 7 were considered as negative/frustrated with the other 4 considered as others. In stage three (final published recording), 64 statements/descriptions were considered as positive/motivated while only 1 was considered as negative/frustrated with the other 1 considered as others. This result indicated that the "Final Published Recording" (98%) is the most positive/motivated followed by "Inputting Chinese" (86%) and "Story Developing" (81%). Based on the results, it is clear that for all three stages students overall demonstrated positive/motivated reactions to learning and attitudes towards writing in Chinese, especially in the final published recording stage (see Table 4). The last stage helped students recognize the importance of the tones for Chinese. Compared to the work they did before the workshop during the semester, all students were able to produce significantly more writing during the workshop. The students were not only using the sentence structures they had learned before, but also increasing the usage of new vocabulary (see section

2.2.4). In addition, they were able to express their thoughts and wrote stories that connected to their own experience. Some students indicated that they enjoyed writing on the iPad because their hands didn't feel sore anymore. Lastly, students' confidence in writing increased, and they were proud to share their writing with their classmates and other audiences.

Table 4

Summary of percentage of positive/motivated and negative/frustrated by stages.

Category	Motivated	Frustrated
Story Developing	81%	19%
Inputting Chinese	86%	14%
Final Published Recording	98%	2%
Overall	90%	10%

3.3. Artifacts

During the writing workshop, students worked on developing ideas, creating story maps, recording sound tracks, planning stories (storyboard), and final digital published writing. The field investigator instructed and helped students with developing ideas. Most students had no problem with their ideas while very few did not like the topics. After talking to the field investigator and making modifications, those students were happy with their topics. Each student's story map clearly showed the idea and topic. The students recorded their oral rehearsals. The recordings were fun to listen to and they demonstrated understandable and clear pronunciation. The field investigator reviewed each student's storyboard and confirmed that each student was on the right direction towards the completion of the digital storybook. At the end, each student completed and published the digital storybook (see Figure 6) in the digital

classroom library (see Figure 7). The field investigator evaluated each digital storybook and was satisfied with the A to A+ quality of each student's work. Parents were also surprised at and happy with the outcome of the writing workshop. Those artifacts represented the progress students made in this learning process and also the satisfactory and successful outcomes.

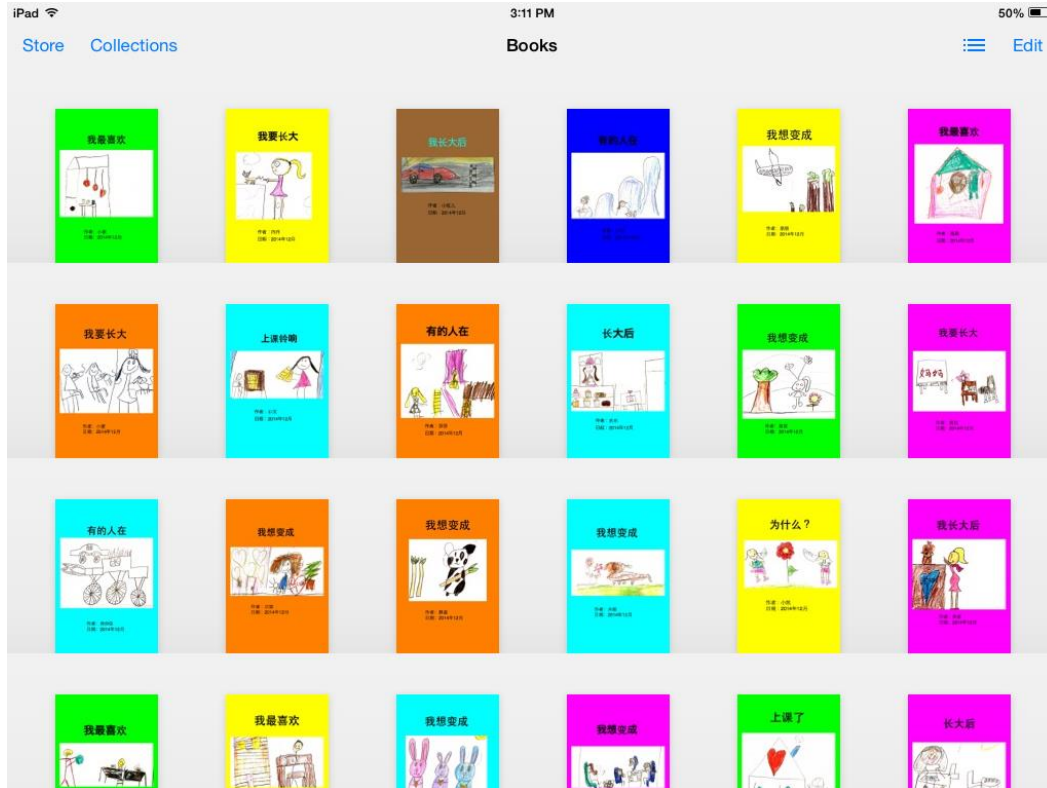**Fig. 6.** Examples of students' writing.

Fig. 7. Classroom library of e-books.

4. Discussions

This research study sought to find out whether the 21st century writing workshop had an effect on students' ability and attitude towards writing for those who were enrolled in the Chinese language immersion program. The findings on these second grade students showed significant increase in students' Chinese writing ability, engagement and motivation. In addition, the results also showed evidence of improvement on students' speaking, reading, and listening skills as language learners. This echoes with the results of much research on the benefits of using iPads in the classroom and language learning (Lys, 2013; Mango, 2015; Wang, Teng, & Chen, 2015).

Some students showed negative attitudes during stage one and stage two because they were not interested in the topics they had chosen, they felt frustrated coming up with writing ideas, they lacked knowledge of Chinese character stroke order writing rules, and they could not read some new Chinese characters that were not introduced. Despite those reasons, the students enjoyed the writing workshop with the integration of iPads and apps. In stage three, the students demonstrated positive/motivated attitudes and reactions to learning. They also demonstrated their improvement of and ability to writing in Chinese through the writing workshop and their published digital storybooks.

The survey results also indicated a statistically significant positive attitude towards writing Chinese in various situations including at home or school after the 21st century writing workshop. It is apparent that students enjoy learning Chinese in a hands-on learning environment with the use of iPads and interesting learning activities.

As the result of these positive findings, there are important implications for world language and immersion school Chinese teachers. First, the positive responses on the survey about the increase and improvement on attitude towards Chinese writing imply that if teachers adapt this 21st century writing workshop design in their classroom, there will be a positive effect on students' motivation and engagement toward Chinese writing. Second, the workshop showed positive results not only in improving students' Chinese writing ability, but also in improving students' reading, speaking, and listening skills. At the same time, students build up communication skills based on the three modes "Presentational mode", "Interpretive mode", and "Interpersonal mode" for language learning. Finally, the publications of students' writing become the new e-books for classroom library. Students enjoy reading their own and peers'

written stories. The publications could also serve as students' e-portfolio. It is a good evidence to show students' growth to the parents during the parent-teacher conferences.

In terms of practical implications, the findings of this study supported that the 21st century writing workshop could have an effect on students' ability and attitudes towards writing. Without doubt, appropriate apps can be easily found and carried child-friendly features that support and scaffold children's learning. However, the most important concept of Bogard and McMackin's (2012) 21st century writing workshop is to integrate easy-to-use technology into stages of the writing process in order to enhance how elementary students plan, write, and create digital stories. Although there are increasingly evidences that mobile technology could support literacy learning, teachers who like to integrate technology into teaching should remind themselves that "the only defensible rationale for making mobile learning part of pedagogy is because it enhances student learning" (Kinash, Brand, & Mathew, 2012). Moreover, technologies should be used as transformative tools that scaffold, support, and extend students' ability with writing. Although current studies (AbuSaaleek, 2014; Jarvis, 2015; Pegrum, 2014) discovered that mobile assisted language learning (MALL) is equally capable of supporting more innovative constructivist, collaborative, and learner-centered instruction, achieving its full potential on facilitating student learning is more a matter of pedagogy than technology (Burston, 2014). Our findings provided empirical support for the educational and practical value on literacy learning, moreover, the research designs also provided guidance to teachers who plan to design and teach literacy effectively.

5. Conclusion

Learning Chinese is not easy and many learners feel frustrated, especially in writing. The results of this study indicated that the writing barrier decreased for the second-grade students

after they participated in the technology integrated 21st Century Writing Workshop. Students were able to produce more Chinese writing while enjoying themselves during the writing workshop process. The integration of iPads plays an important role in making learning Chinese more fun and engaging. The design of technology integrated writing workshop successfully changed students' attitudes towards learning writing in Chinese and further led to a better learning outcome. If teachers utilize appropriate technology (e.g., iPads) and plan well on the integration part and activities, students will find learning more fun and engaging, and will receive a better learning outcome in learning Chinese language, especially in writing. This study's technology integrated 21st century writing workshop model could serve as a good example for Chinese language teachers working in K-12 schools.

Although the study indicated positive results, there were several limitations of the study. First, due to the small number of students participating in the study, generalization could be limited. Second, the study was conducted over a short period of time. It is highly recommended that future studies take place over the course of the entire school year, which might yield more accurate results. Third, there is a possibility of bias in the study due to the fact that only one person conducted observations. A different perspective that collects qualitative data from other points of view is also recommended. Finally, there is difficulty in collecting accurate surveys from such young participants. It is possible that students did not understand the survey or accidently marked the survey answers wrong. Also, due to the young age of the participants, the survey was on purpose designed to be simple and could not include too many questions. It is suggested the same study be conducted for older students to see whether there is a difference in results.

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