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Effects of Quizlet-Based Learning Activities on American High School Students' Beliefs and Confidence in Learning Chinese as a Foreign Language

Lih-Ching Chen Wang
Cleveland State University
Eddie T. C. Lam
Cleveland State University
Zhenzhen Hu
Greater Dayton Chinese School

Though it is not easy for Western learners to master, the Chinese language has gain its popularity in the United States in recent years. Modern digital instructional technologies can address some of the issues in learning difficulties of the language. This study examined the effects of Quizlet-based learning activities on the attitudes, beliefs, and confidence of urban American high school students (N = 56) in learning Chinese as a second language. Results of the mixed-design ANOVA indicated that students in the experimental group reported a significantly (p < .05) more positive attitude toward learning Chinese as a second language than the control group. Though both groups expressed less confidence in their ability in reading, listening, speaking, and learning Chines vocabularies, the experimental group lost lesser degree of confidence in those areas. It is concluded that these Quizlet-based learning activities had a significantly positive effect on students' beliefs and confidence in learning Chinese. Future studies should include a larger sample size that covers each grade level of the high school as well as using other gamification-oriented learning tools to compare their effectiveness on students' confidence in learning Chinese.

Key words: Mandarin Chinese, second language acquisition, confidence, gamification, mixed-design ANOVA

INTRODUCTION

The number of students studying Chinese in American K-12 public schools tripled between 2004-2005 and 2007-2008 (Gao, 2019), and it continued its momentum between

Lih-ching Chen Wang, Professor of Educational Technology, Department of Curriculum and Foundations, Cleveland State University; Eddie E. C. Lam, Associate Professor, Department of Health and Human Performance, Cleveland State University; Zhenzhen Hu, M.S., Greater Dayton Chinese School. Corresponding Author: Eddie T. C. Lam, can be reached at t.lam@csuohio.edu
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2008 and 2017 (American Councils for International Education, 2017). The cumulative effect was an increase from approximately 20,000 students to more than 227,000 students, an 11-fold increase in 13 years. In fact, Chinese is now the third most common language spoken by students in American schools, after Spanish and Arabic (Office of English Language Acquisition, 2019). However, learning Chinese successfully is challenging for non-tonal speakers due to a number of reasons. Some of these reasons are rooted in the structure of the language, such as the Chinese characters are a fusion of sound (tone), form, and meaning, and need to be taught as such rather than as isolated components (Zhan & Cheng, 2014). Other reasons are based more in the perceived difficulty (e.g., communication anxiety) of the language (Basith et al., 2019). Given the challenges of learning Chinese for Western audiences, it is not surprising that educators have sought the assistance of modern digital technologies in teaching Chinese as a foreign language.

Since the mid-20th century, educators have experimented with different kinds of technology aids to help improve their students' learning acquisition (Heinich et al., 2002). Instructional technology has the potential to support classroom instruction and improve students' performance (Collins & Halverson, 2009; Zucker, 2008) and provides many more interactive and collaborative chances for students (Borokhovski et al., 2016). As such, new technology provides more opportunities for students who may not be good at learning the traditional ways to succeed in their academic learning (Debevec et al., 2006). It should be noted that instructional technology brings with it benefits for teachers as well as students. These benefits appear in areas such as decreased workload and increased ease of implementing differentiated instruction (Lu et al., 2014).

Given that many students have traditionally viewed foreign language acquisition as a boring process, it is no surprise that language educators have been eager to explore the potential of technology in language learning. Research in this area not only confirms that technology-assisted language learning can be as effective as teacher-delivered instruction, and can "enhance the quality of input, authenticity of communication, and provide more relevant and useful feedback" (Zhao, 2003, p. 21), but it also supports the use of technology to enhance student motivation and interest in learning a foreign language (e.g., Fazal et al., 2017; Panagiotidis et al., 2018). In 1999, Adair-Hauck and colleagues conducted a program evaluation project that assessed the integration of technology-enhanced language learning (TELL) and found that the multimedia tasks helped the students in writing, reading, and listening, but less so in speaking. Besides, they found that the writing scores on the five achievements tests of the experimental group as a whole were significantly higher than those of the control group. However, an unexpected consequence was that the TELL components promoted positive and spontaneously occurring collaboration among students outside the classroom (Adair-Hauck et al., 1999).

To date, there has been a tendency of Chinese language teachers to use different technologies for teaching different aspects of language. Zhan and Cheng (2014) reported that multimedia tools and animations played important roles in two areas: (a) the mastering of Chinese characters (character recognition, stroke order, and sequence), and (b) the building associations among phonetic, semantic, and orthographic components of Chinese characters. They also noted that the advent of more modern mobile technologies such as tablets and smartphones "have allowed learners to study Chinese characters in a more personalized, interactive, and communicative way" (p. 158). One of the most popular multimedia tools that is used for language teaching is the Quizlet, which is a free online interactive learning tool that includes flashcards as well as study and game modes. Quizlet is widely used for teaching foreign second languages, particularly English (Çinar & Arı, 2019; Dizon, 2016; Hikmah, 2019; Sanosi, 2018; Setiawan & Wiedarti, 2020). However, very few studies investigate the effects of using the Quizlet in teaching Chinese as a second language and the perception of using the Quizlet by users. Therefore, the purpose of this

study was to examine the effects of Quizlet-based learning activities on the attitudes and beliefs of urban American high school students towards learning Chinese as a second language as well as on their confidence in their own ability of learning Chinese.

REVIEW OF LITERATURE

We live in an era where technology is a part of the daily reality of teaching across a wide range of disciplines, and language learning is no exception (e.g., Rahimi & Hosseini, 2011; Panagiotidis et al., 2018). Technologies have become an integrated part of pedagogy and classroom activity in the 21st century (Okojie et al., 2006). Language learning in general, and second language acquisition (SLA) in particular, has partaken fully of this trend. For example, from a meta-analysis regarding research on technology-enhanced language learning published from 1990 to 2015, Chang and Hung (2019) found that technology integration has a remarkable positive effect on students' second language acquisition. It seems that the potential of technology in enhancing the teaching and learning of Chinese characters is unlimited (Zhan & Cheng, 2014).

GAMIFICATION

Newer generations of learners are accustomed to using smart devices to connect to the internet (Sanosi, 2018), and one popular approach to using technology in instructional settings is gamification. There is evidence to support the notion that gamification can have a positive effect on students' motivation and engagement in learning. For example, for students who lack motivation to learn or have difficulty in engaging in the instruction process, "gamification" as an ideal strategy to improve the learners' motivation and engagement (Kumar & Khurana, 2012; Lee & Hammer, 2011). Learning a foreign language is a complex activity that involves both the affective and cognitive components. There is evidence that gamification can affect both cognitive and affective factors in learning as well (e.g., Domínguez et al., 2013). A student's confidence level is one affective component that has a direct effect on her or his ability to progress in learning a foreign language. Göksün and Gürsoy (2019) promoted gamified learning activities since they challenged the students, and the reward system increased student motivation in the course. Lu et al. (2014) pointed out that it can help motivate beginning learners to learn complicated Chinese characters effectively and enjoyably. Özturk and Korkmaz (2020) found that gamification had a positive effect not only on student attitudes toward a social studies class, but also on student academic performance in that class. Aljraiwi (2019) observed that gamification helps promote learning motivation. A meta-analysis by Boudadi and Gutiérrez-Colón (2020) found that the relationship between gamification and motivation to be "predominantly positive" (p. 66) but few studies addressed the area of second language acquisition and limited evidence at best of solid correlations between gamification, motivation, and cognitive processes.

QUIZLET GAMIMFICATION SOFTWARE

Many different programs have been used for gamification. One popular example is the Quizlet (https://quizlet.com/), which has been evaluated by a number of different studies in language learning. Dizon (2016) found that the Quizlet was a useful approach to studying second language (L2) vocabulary in the classroom setting, and "the learners in the study viewed the program as a useful and easy to use method for studying vocabulary and indicated that they would like to continue using it in the future" (p. 52). Dizon (2016) also discovered that the students preferred using their smartphones (illustrating the shift towards mobile technology) and most students spent a significant amount of time using Quizlet outside of class, further demonstrating its value as a L2 tool. Sanosi (2018) stressed that

Quizlet can provide an ideal environment for active learning both inside and outside the classroom. Specifically, the live learning mode within the classroom provides effective collaborative experience to students who find themselves obliged to share information and exchange answers to the vocabulary questions with a competitive spirit with other groups of students. Therefore, Sanosi concluded that Quizlet was a "good candidate" for vocabulary instruction and learning, and it is useful to both teachers and students because of those features that allowed different learners to perform different vocabulary learning tasks, to assess their own vocabulary acquisition, and to gamify the vocabulary learning process.

On the other hand, Anjaniputra and Salsabila (2018) found that Quizlet increased students' persistence and engagement in the [language] learning process. Hikmah (2019) also observed that Quizlet could be used to train four discrete language skills: listening, speaking, reading, and writing, and found that Quizlet effectively helped create a more nonthreatening classroom atmosphere, improved students' confidence in their language learning abilities, and helped combat student boredom. Besides, Çinar and Arı (2019) uncovered that students who were given Quizlet developed their vocabulary skills more than those who were not given Quizlet, and they recommended that Quizlet be used in foreign language teaching as a "student-centered, effective, and permanent teaching technique" (p. 72). Likewise, Zhou (2016) also discovered notably positive effects on student motivation and vocabulary acquisition when using a variety of Quizlet-based activities in a Chinese-as-a-second-language classroom, though some students in the study expressed dislike for the competitive nature of certain activities.

BELEFS ABOUT CHINESE LEARNING

In a Chinese-as-a-second-language classroom, students' beliefs about learning Chinese and confidence in their ability to learn Chinese are critical. As pointed out by Ye (2013), it is important for the instructors to understand that students' beliefs about language learning (either preconceived or constructed during the learning process) since it may influence their attitudes, motivation, and behaviors during the language acquisition process. Yang (2014) also found that most of the learners in Chinese as a second language believed that "it is essential to know the pronunciation of words and that repetitive practice would be useful . . . the phonetic elements fail to provide useful information to assist in retaining and retrieving meaning . . . learners recognized the value of character learning and preferred writing drills to structure analysis . . . most participants tended to adopt communicative and meaningful learning strategies" (p. 798).

Confidence in the Ability to Learn Chinese

In a language classroom setting, students will judge their own language abilities and competencies while they are engaging in their assigned tasks. Once they have gained the self-confidence to believe that they can learn, they are more actively participated in the learning process and make greater efforts to achieve a better learning outcome (Bandura, 1993). More recently, Li and Kanea (2017) applied holistic learning strategies to build learners' confidence and sense of achievements while they learned Chinese as a second language. In doing so, the researchers helped to sustain and enhance the students' Chinese learning experience.

Due to its character-based writing system and tonal nature, the Chinese language is a relatively difficult foreign language for most learners, which might lead to higher levels of anxiety. As Luo (2014) pointed out, speaking has been recognized as the most anxiety-provoking among the four skills (i.e., listening, speaking, reading, and writing). As Chinese as a foreign language learners' self-perceptions of language learning ability and achievement were reported to be negatively correlated with their anxiety levels, it may be

helpful if Chinese teachers could encourage the students and build up their confidence in Chinese classes (Luo, 2014).

CONFIDENCE IN LEARNING CHINESE VOCABULARY

Although learning vocabulary is very important in any language learning, learning Chinese vocabulary is very challenging for most of Chinese as a second language learners because they should learn its shapes, pronunciation, and meaning at the same time. The major challenge is that the Chinese language is a tonal language (i.e., there is no correspondence between pronunciation and writing), and there are thousands of characters one needs to learn to be fully literate in Chinese (Sung & Wu, 2011). While students in general felt that vocabulary plays a very important role in language learning, most teachers considered that teaching vocabulary was rather boring. Luckily, the use of vocabulary game competitions, such as the Quizlet, could promote engaging vocabulary learning (Zhou, 2016). Likewise, Setiawan and Wiedarti (2020) also agreed that Quizlet has positive effects on student motivation to learn foreign language vocabularies.

Chinese language is indeed very challenging to learn due to its distinctive features for native English speakers. However, in a Chinese-as-a-second-language classroom, there are limited studies that have investigated the students' beliefs about learning Chinese and confidence in their ability to learn Chinese. Since there are very few studies examine the effects of Quizlet on Chinese language learning, this particular study investigated how Quizlet-based activities affects students' attitudes toward specific aspect of learning Chinese as a second language. Specifically, this study examined whether Quizlet had a positive effect on student beliefs and their confidence in learning Mandarin Chinese as a second language by American high school students. For the purpose of this study, the following research questions were formulated:

1. Would the use of Quizlet-based learning activities make a significant difference between the experimental and control groups in their beliefs about learning Chinese?
2. Would the use of Quizlet-based learning activities make a significant difference between the experimental and control groups in their confidence in reading Chinese?
3. Would the use of Quizlet-based learning activities make a significant difference between the experimental and control groups in their confidence in listening to Chinese?
4. Would the use of Quizlet-based learning activities make a significant difference between the experimental and control groups in their confidence in speaking Chinese?
5. Would the use of Quizlet-based learning activities make a significant difference between the experimental and control groups in their confidence in learning Chinese vocabularies?

METHODS

This study was a quasi-experimental design to explore if the use of Quizlet for certain types of learning activity would affect students' confidence in and beliefs about their ability to acquire the Chinese language. A pre-survey and post-survey were used to evaluate students' confidence and beliefs before and after the period of the study. The experimental group completed in-class activities using Quizlet, while the control group completed in-class activities through traditional paper-based equivalent method. The learning content was the same for both groups. Likewise, both groups were using the same measuring instruments and provided the same amount of time to complete them.

PARTICIPANTS

The participants (N = 56) of the study were high school students in Chinese Level I classes in an urban public high school located in the Midwestern region of the United States. Twenty-eight of them (15 females and 13 males) were in the experimental group, and another 28 students (15 females and 13 males) were in the control group. The students' ages ranged from 14 to 18 years old for both the experimental group (M = 15.61 ±.99) and control group (M = 15.68 ±.91), and they were all in either Grade 9 (n = 17), Grade 10 (n = 30), or Grade 11 (n = 9). The majority of the students were African Americans for both the experimental group (71.4%) and control group (75.0%). In the experimental group, 10.7% of participants were multi-racial, 10.7% of participants were White or Caucasian, and 7.2% of participants were Hispanic. In the control group, 14.2% of participants were multi-racial, 3.6% of participants were White or Caucasian, 3.6% of participants were Native American, and 3.6% of participants were Hispanic. The language spoken in the home was reported as "English" for all students but one, who reported "Spanish".

INSTRUMENTS

Five instruments were used for the purpose of this study (see Appendix A). The first instrument (17 items) measured students' beliefs about Chinese learning and it was a shortened version of an instrument developed by Lan (2014). Sample items include: "Learning Chinese broadens my horizons," "I enjoy learning Chinese," and "Learning Chinese is helpful for my future career." The response format was based on a 5-point Likert scale (from 1 = Strongly Disagree to 5 = Strongly Agree). The scores of this scale can be ranged from 17 to 85, and the mean score of those 17 items was used for data analysis to determine students' beliefs about Chinese learning. The remaining four instruments (with five items each) were adapted from the instrument developed by the National Foreign Language Resource Center (2000). The first instrument examined students' confidence in reading Chinese, and had the following lead question for each item: "How sure that you could read a text in Chinese and . . ." (e.g., "figure out the main topic or gist"). The second instrument examined students' confidence in listening to Chinese, and had the following lead question for each item: "How sure that you could listen to Chinese and . . ." (e.g., "retell in English what you heard"). The third instrument examined students' confidence in speaking Chinese, and had the following lead question for each item: "How sure that you could speak Chinese and . . ." (e.g., "know whether the listener is understanding you correctly"). The fourth measuring instrument examined students' confidence in learning Chinese vocabulary, and had the following lead question for each item: "How sure that you could have a list of Chinese vocabulary words that you learned in class and . . ." (e.g., "use each word correctly in a sentence"). The response format for all these four instruments was based on a 100-point scale from 0 (Not Sure) to 100 (Completely Sure). The scores of each of these four scales can be ranged from 0 to 500, and the mean score of those 5 items in each scale was used for data analysis to determine students' confidence in reading, listening, speaking, and learning Chinese vocabularies.

PROCEDURES

Prior to the beginning of the study, written permission was secured from the school and from the parents of all students in the study. One of the authors of this study is a Mandarin teacher who is well-trained in the use of Quizlet. Mandarin Chinese content was selected to be identical for both the experimental and control groups; for example, one unit was based on the animals of the Chinese zodiac. For each unit, a set of flashcards, matching activities, and multiple-choice questions was created both in Quizlet and on paper.

At the beginning of the study, students in the experimental (Quizlet) and control (paper) groups filled out the pre-survey developed by the authors. All the students attended a 53-minute Chinese learning class each day (Monday to Friday) throughout the entire study. Students were assigned to the experimental or control group by class; in other words, at any given time, all students in the room were either in the experimental group or in the control group. During the first portion of each class, the teacher provided identical instruction to students in both groups. During the latter portion of the class, which was devoted to practice with the day's content, students in the experimental group completed the flashcards, matching activities, and multiple-choice questions within Quizlet on individual laptop computers. Students in the control group completed the same activities in paper form. At the end of the study, all students completed the post-survey immediately after reviewing all the learning content.

STATISTICAL ANALYSIS

The data were analyzed by IBM SPSS: Version 25 (IBM, 2019). The Box's Test was used to test the null hypothesis that covariance matrices of the dependent variables are equal across the two independent groups (i.e., experimental and control groups). The Levene's Test was used to examine the equality of the error variances of the dependent variables. Mixed-design factorial 2 (Transition) × 2 (Group) repeated measures analysis of variances (ANOVAs) were used to examine the effect of development (i.e., Transition: within-group factor) and the differences between the experiment and control groups (i.e., Group: between-group factor) on the following dependent variables regarding learning Chinese as a second language: Belief, Read, Listen, Speak, and Learn (Vocabulary). Univariate ANOVAs were employed to compare mean differences of the pretest and posttest scores between the experimental and control groups (between group differences). Paired t-tests were utilized to compare the pretest and posttest scores of each group (within group differences). The level of statistical significance was set at $p < 0.05$. Unless otherwise indicated, all data are presented as mean ± standard deviation.

RESULTS

The following section presents the results of the measuring instruments that evaluated students' beliefs about Chinese learning as well as their level of confidence in their ability to read, listen to, speak, and learn Chinese vocabularies.

COMPARISON OF PRETEST AND POSTTEST SCORES WITHIN GROUPS

A comparison of the pretest and posttest scores within each group indicated that the experimental group had significantly ($p < .001$) higher posttest score in Beliefs, but had significantly ($p < .001$) lower posttest scores in listening, speaking, and learning Chinese vocabularies as well as significantly ($p < .01$) lower posttest scores in listening to Chinese. Meanwhile, a comparison of the pretest and posttest scores of the control group showed that they had significantly ($p < .01$) lower posttest score in Beliefs and reading Chinese as well as significantly ($p < .001$) lower posttest scores in listening to Chinses and leaning Chinese vocabularies (see Table 1).

Table 1. *Comparison of Pretest and Posttest Scores Within Groups*

	Experimental Group ($n = 28$)			Control Group ($n = 28$)		
	Pretest	Posttest	*p*	Pretest	Posttest	*p*

Beliefs	2.68	3.06	<.001***	2.97	2.88	.001**
Reading Chinese	36.39	34.99	.233	35.43	32.31	.006**
Listening to Chinese	69.58	69.09	.003**	63.84	62.18	<.001***
Speaking Chinese	61.44	59.83	<.001***	59.96	59.17	.108
Learning Chinese Vocabulary	45.26	34.60	<.001***	40.41	32.06	<.001***

Note: *$p < .05$; **$p < .01$; ***$p < .001$

COMPARISON OF PRETEST AND POSTTEST SCORES BETWEEN GROUPS

A comparison of the pretest scores between the experimental and control groups indicated that the experimental group had significantly ($p < .001$) lower mean score in Beliefs ($M = 2.68 \pm .24$) than the control group ($M = 2.97 \pm .24$). However, the experimental group had significantly ($p < .01$) higher mean score in Listening to Chinese and Learning Chinese Vocabulary scores than the control group. In terms of protest scores, the experimental group had significantly ($p < .05$) higher mean score in Beliefs ($M = 3.06 \pm .29$) than the control group ($M = 2.88 \pm .27$). The same is true for Listening to Chinese, where the experimental group had significantly ($p < .001$) higher mean score than the control group (see Table 2).

Table 2. *Comparison of Pretest and Posttest Scores Between Groups*

	Pretest			Protest		
	EG	CG	*p*	EG	CG	*p*
Beliefs	2.68	2.97	<.001***	3.06	2.88	.018*
Reading Chinese	36.39	35.43	.655	34.99	32.31	.335
Listening to Chinese	69.58	63.84	.001**	69.09	62.18	<.001***
Speaking Chinese	61.44	59.96	.283	59.83	59.17	.701
Learning Chinese Vocabulary	45.26	40.41	.006**	34.60	32.06	.327

Note: EG = Experimental Group; CG = Control Group; *$p < .05$; **$p < .01$; ***$p < .001$

BELIEFS ABOUT CHINESE LEARNING

This scale examined students' beliefs about Chinese learning. Results of the Box's Test were not significant ($F = 2.179$, $p = .088$), indicating equality of covariance matrices of the

dependent variables between the two comparing groups. Likewise, results of the Levene's Test showed that both the pretest ($F_{(1,54)}$ = .012, p = .913) and posttest ($F_{(1,54)}$ = .121, p = .729) were not significant, indicating the error variances of those two dependent variables are equal across groups. The outcomes of the mixed-design factorial ANOVA revealed that both the Transition × Group interaction ($F_{(1,54)}$ = 93.780, p < .001; partial eta squared = .620, power = 1.000) and main effect of Transition ($F_{(1,54)}$ = 35.594, p < .001; partial eta squared = .380, power = 1.000) were significant, both with a large effect size and power. However, the main effect of Group was not significant ($F_{(1,54)}$ = .717, p = .401). As shown in Figure 1, the experimental group had significantly higher posttest attitude scores (M = 3.06, ±.29) than their pretest scores (M = 2.68, ±.24) while the condition of the control group was just the opposite.

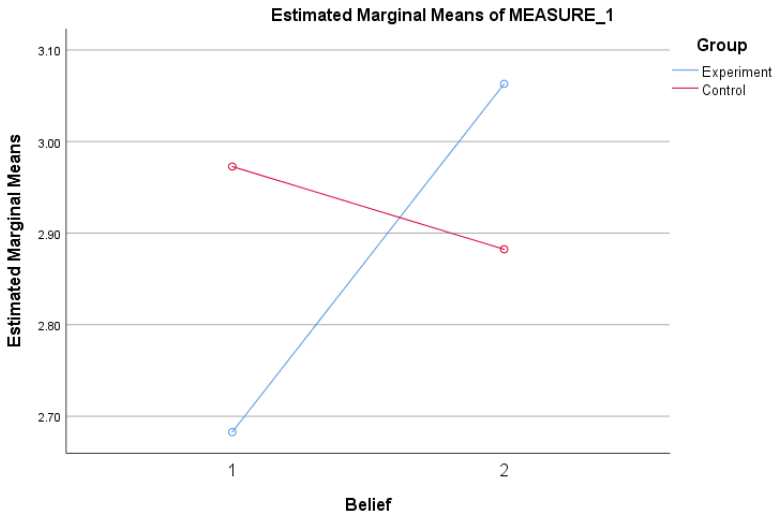

Figure 1. The Transition × Group Interaction on the Beliefs About Chinese Learning

CONFIDENCE IN ABILITY TO READ CHINESE

Results of the Box's Test was not significant (F = 4.579, p = .003), indicating equality of covariance matrices of the dependent variables between the two comparing groups. Results of the Levene's Test showed that the pretest was significant ($F_{(1,54)}$ = 6.380, p = .015) while the posttest was not significant ($F_{(1,54)}$ = .027, p = .870), indicating equality of the error variances of the posttest scores only. The outcomes of the mixed-design factorial ANOVA showed that the Transition × Group interaction was not significant ($F_{(1,54)}$ = 1.241, p = .270). Likewise, the main effects of Group were not significant (F[1,54] = .604, p = .440). However, the main effect of Transition was significant with a large effect size and power ($F_{(1,54)}$ = 8.510, p = .005; partial eta squared = .131, power = .828). This demonstrated that the mean post-Reading scores (M = 33.65 ±10.30) of the students were significantly (p < .05) lower than their mean pre-Reading scores (M = 35.91 ±7.92), while there was no significant (p > .05) difference between the experimental and control groups (see Figure 2).

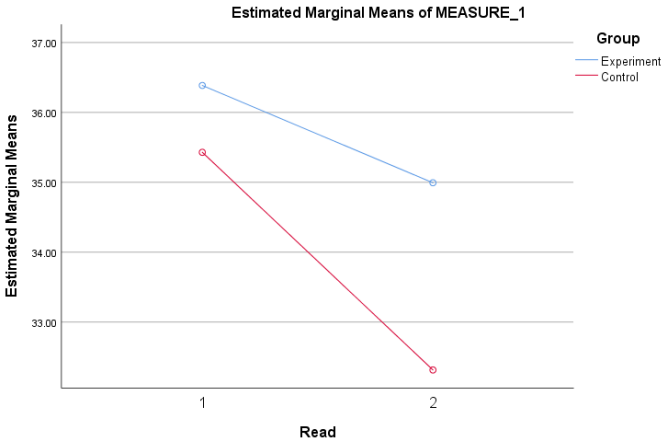

Figure 2. The Transition × Group Interaction on the Confidence in Reading Chinese

CONFIDENCE IN ABILITY TO LISTEN TO CHINESE

Results of the Box's Test were significant (F = 13.032, p < .001), indicating the covariance matrices of the dependent variables are not equal between the two comparing groups. Results of the Levene's Test showed that both the pretest ($F_{(1,54)}$ = 10.211, p = .002) and posttest ($F_{(1,54)}$ = 17.648, p < .001) were significant, indicating that the error variance of the dependent variables are not equal across groups. The outcomes of the mixed-design factorial ANOVA showed that the Transition × Group interaction was significant with a somewhat large effect size and power ($F_{(1,54)}$ = 7.758, p = .007; partial eta squared = .125, power = .807). Likewise, the main effects of Group ($F_{(1,54)}$ = 15.924, p < .001; partial eta squared = .253, power = .992) and Transition ($F_{(1,54)}$ = 26.307, p < .001; partial eta squared = .335, power = 1.000) were significant, both with a large effect size and power. As shown in Figure 3, the mean post-Listening score (M = 65.63 ±6.99) of the students was significantly (p < .05) lower than their mean pre-Listening score (M = 66.71 ±6.71), and such difference was mainly caused by the students in the control group. Meanwhile, the control group had significantly (p < .05) lower Listening scores than the experimental group.

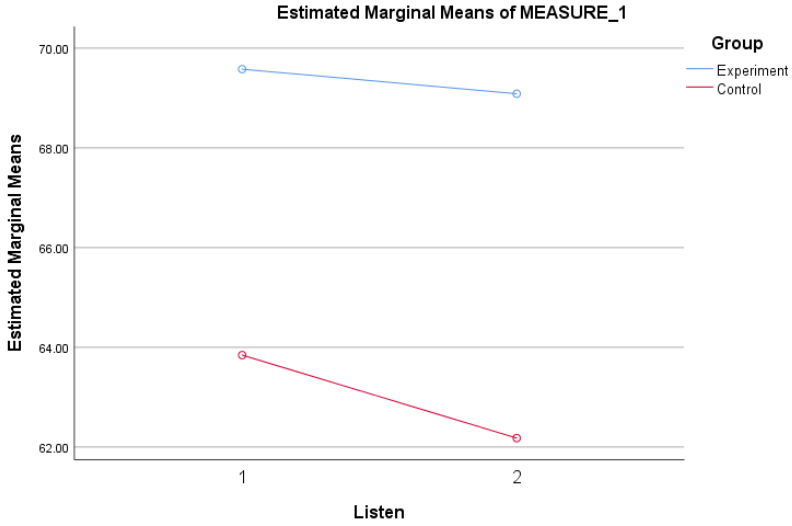

Figure 3. The Transition × Group Interaction on the Confidence Listening to Chinese

CONFIDENCE IN ABILITY TO SPEAK CHINESE

Results of the Box's Test were not significant (*F* = 1.696, *p* = .166), indicating the covariance matrices of the dependent variables are equal between the two comparing groups. Results of the Levene's Test showed that both the pretest ($F_{(1,54)}$ = .936, *p* = .337) and posttest ($F_{(1,54)}$ = .218, *p* = .642) were not significant, indicating that the error variance of the dependent variables are equal across groups. The outcomes of the mixed-design factorial ANOVA showed that the Transition × Group interaction was not significant ($F_{(1,54)}$ = 1.787, *p* = .187). Likewise, the main effects of Group ($F_{(1,54)}$ = .498, *p* = .483) was not significant. However, the main effect of Transition was significant with a large effect size and power ($F_{(1,54)}$ = 15.349, *p* < .001; partial eta squared = .216, power = .976). As depicted in Figure 4, all the students at the end of the teaching study had significantly (*p* < .05) lower mean Speaking scores (*M* = 59.50 ±6.33) than in the very beginning (*M* = 60.70 ±5.11).

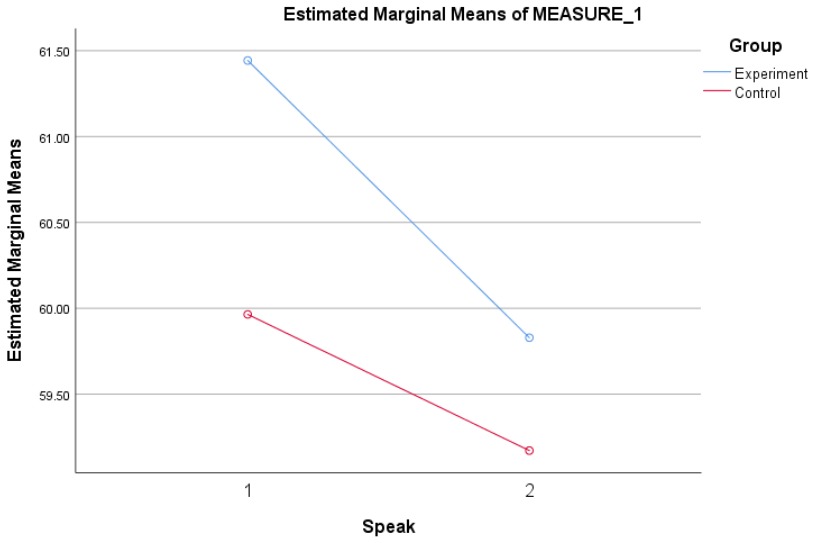

Figure 4. . The Transition × Group Interaction on the Confidence in Speaking Chinese

CONFIDENCE IN ABILITY TO LEARN CHINESE VOCABULARY

Results of the Box's Test were not significant (*F* = .220, *p* = .883), indicating the covariance matrices of the dependent variables were equal between the two comparing groups. Results of the Levene's Test showed that both the pretest ($F_{(1,54)}$ = .211, *p* = .731) and posttest ($F_{(1,54)}$ = .486, *p* = .489) were not significant, indicating that the error variance of the dependent variables were equal across groups. The outcomes of the mixed-design factorial ANOVA showed that the Transition × Group interaction was not significant ($F_{(1,54)}$ = .824, *p* = .368). However, both the main effects of Group ($F_{(1,54)}$ = 4.363, *p* = .041; partial eta squared = .065, power = .504) and Transition ($F_{(1,54)}$ = 55.985, *p* < .001; partial eta squared = .495, power = 1.000) were significant (with a medium effect size and power as well as a large effect size and power, respectively). This showed that the mean post-Learning scores (*M* = 33.33 ±9.63) of the students were significantly (*p* < .05) lower than their mean pre-Learning scores (*M* = 42.84 ±6.74), while the experimental group had significantly (*p* < .05) higher Learning scores than the control group (see Figure 5).

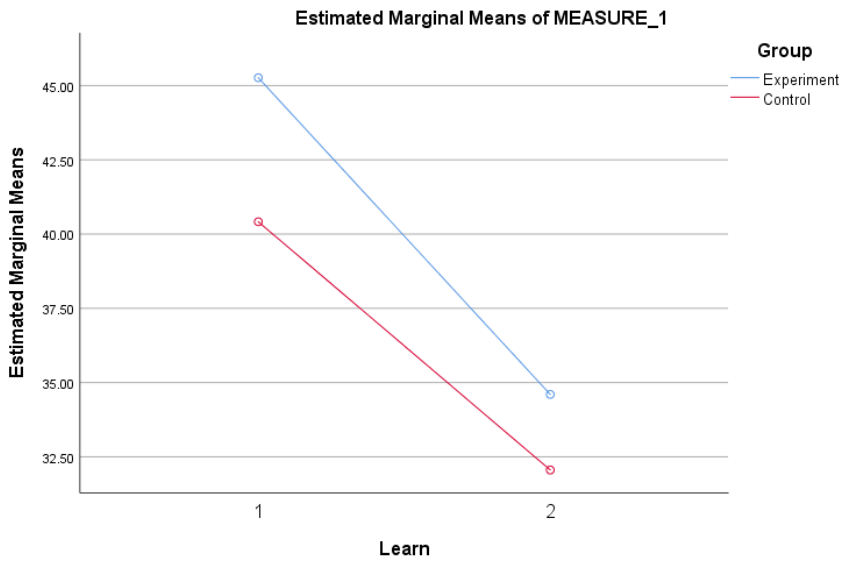

Figure 5. The Transition × Group Interaction on the Confidence in Learning Chinese Vocabulary

DISCUSSION

This section discussed the findings regarding the students' beliefs about Chinese learning as well as their level of confidence in their ability to read, listen to, speak, and learn Chinese vocabularies.

BELIEFS ABOUT CHINESE LEARNING

The significant interaction in this study showed that the experience of the experimental group affected those students' beliefs about learning Chinese differently than the experiences of the control group. At the end of the study, students of the experimental group had significantly more positive beliefs toward the learning of Chinese than in the beginning. However, the situation of the control group is just the opposite – the students had significantly more negative beliefs toward the learning of Chinese (see Figure 1). This demonstrates that the experience of the experimental group had a significantly more positive effect on their attitudes toward learning Chinese than that of the control group. Since the difference in the experiences between these two groups was the presence or absence of Quizlet gamification, we believe that the difference can be attributed to this intervention factor. Thus, it appears that the answer to research question #1 is affirmative and that effect is positive: students who involved in the Quizlet-based learning activities showed a significantly more positive set of beliefs about learning Chinese than those without those activities.

CONFIDENCE IN THE ABILITY TO READ CHINESE

The only significance found was the main effect of Transition, which indicated that both the experimental and control groups exhibited lower scores at the end of the research study. However, further examination of those within group differences (see Table 1) showed that only the control group exhibited significant ($p < .01$) differences, but not the experimental group. In other words, Quizlet gamification-based learning activities had no effect on the confidence of the experimental group in reading Chinese at the end of the study, while the experience of the control group resulted in significantly lower confidence

level in their ability to read Chinese. Therefore, the answer to research question #2 is that Quizlet-based learning activities do not make a significant difference between the experimental and control groups in their confidence in reading Chinese.

CONFIDENCE IN THE ABILITY TO LISTEN TO CHINESE

The significant Transition × Group interaction showed that the trends in the listening scores of the students for both the experimental and control groups were not the same over time. The significant main effects further illustrated the differences between the experimental and control groups during the entire study. Specifically, students in both the experimental and control groups had less confidence in listening to Chinese at the end of the study than in the very beginning. However, students in the control group had far less confidence in listening to Chinese than the experimental group even at the beginning of the study, and the gap widened by the end of the teaching study (see Figure 3). Mandarin Chinese has, relatively speaking, a very limited number of sounds and syllables, which makes it easy to mix things up and the number of homophones or near-homophones (words that sound the same or almost the same) is very large compared to English (Linge, 2021). Therefore, listening to Chinese is much harder than speaking, reading, or writing Chinese since people feel that everything sounds the same. As students in this research study moved further into the semester and encountered more new Chinese vocabularies, they found that Chinese was harder to master than they had expected. What appears to have happened in this particular situation is that the group experiencing the Quizlet activities lost significantly less confidence than the control group. Therefore, the answer to research question #3 is that Quizlet-based learning activities do make a significant difference between the experimental and control groups in their confidence in listening to Chinese (i.e., they minimize students' loss of confidence in understanding spoken Chinese).

CONFIDENCE IN THE ABILITY TO SPEAK CHINESE

With a little bit of surprise, the students in the experimental group had significantly less confidence in their ability to speak Chinese at the end of the study than at the beginning, while the control group made no significant difference in the level of confidence in their ability to speak Chinese. In spite of this, no significant difference was found between the experimental and control groups (see Table 1). Similar to the reasons in listening to Chinese, students need to learn more new vocabularies towards the end of the semester and they have less confidence in their ability in speaking Chinese. Therefore, the answer to research question #4 is that Quizlet-based learning activities do not make a significant difference between the experimental and control groups in their confidence in speaking Chinese.

CONFIDENCE IN THE ABILITY TO LEARN CHINESE VOCABULARY

The non-significance of the Transition × Group interaction revealed that the trends in the Learning scores of the students for both the experimental and control groups were similar over time. However, the mean posttest scores of both groups were significantly lower than their mean pretest scores. This suggests that students in both groups had significantly less confidence in their ability to learn Chinese vocabularies at the end of the study than they were at the beginning. Based on these findings, the answer to research question #5 is that the experimental treatment makes no significant difference between the experimental and control groups in their confidence in learning Chinese vocabularies.

SUMMARY

Five research questions were proposed in this study to examine the effectiveness of the Quizlet-based learning activities in learning Chinese as a foreign language by native Americans. The outcomes showed that Quizlet makes a significant difference between the experimental and control groups in their beliefs about learning Chinese and their ability to listen to Mondrian Chinese (i.e., positive for research questions #1 and #3), but it has not impact on reading/speaking Chinese or learning Chinese vocabularies (i.e., negative for research questions #2, #4, and #5). Overall, Quizlet-based learning activities not only enhance learners' positive attitude in learning Chinese, but they can also tackle the most difficult aspect of the learning process – the learners' confidence in the ability to listen to Chinese.

CONCLUSION

This study focused on an exploration of how certain computer-based learning activities would affect students' beliefs about learning Chinese as well as their confidence in their own ability to master specific components of Chinese. The results are mixed, and bring into focus the question of how the confidence of native English speakers might typically vary over time as they encounter progressively more difficult foreign language content in their efforts to master Mandarin Chinese. The computer-based learning activities had no significant effect on students' level of confidence in their ability to read/speak Chinese or to learn Chinese vocabularies. However, the Quizlet-based learning activities had a significantly positive effect on students' beliefs about learning Chinese and their level of confidence in their ability to listen to Mondrian Chinese when compared to the more traditional learning activities experienced by the control group.

LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study is conducted in only one school in the Midwestern region of the United States, so it may not be generalized to other schools in other regions. In addition, the sample size is 56 (which is larger than a lot of studies), yet future studies should include a larger sample size that covers each grade level of the high school. Besides, follow-up studies using samples of students with different demographic characteristics would be an obvious starting point for clarifying the nuances of what are clearly not simple effects. Only Quizlet is used as the intervention tool in this study, future studies should include other gamification-oriented learning tools to compare their relative effects on students' confidence in learning Chinese.

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APPENDIX

QUESTIONNAIRE FOR LEARNERS OF CHINESE AS A SECOND LANGUAGE

Section I: Beliefs About Chinese Learning*

Directions: The following are a few statements about how you feel about learning Chinese language and culture. Please indicate the extent to which you disagree or agree with each statement using a 5-point Likert scale (e.g., 1 = Strongly Disagree, 5 = Strongly Agree). Circle the number that best describes you. There is no right or wrong answer.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. I find great pleasure in learning Chinese.	1	2	3	4	5
2. If I can speak Chinese, I can find more interesting and better jobs.	1	2	3	4	5
3. The language tasks in our Chinese lessons are interesting and helpful.	1	2	3	4	5
4. Learning Chinese broadens my horizons.	1	2	3	4	5
5. Chinese will makes me more competitive in the job market.	1	2	3	4	5
6. I enjoy learning Chinese.	1	2	3	4	5
7. I am interested in Chinese culture, history and/or literature.	1	2	3	4	5
8. My interaction with the teacher in Chinese class is important to me.	1	2	3	4	5
9. I would like to travel to a Chinese-speaking country, such as Taiwan or China.	1	2	3	4	5
10. After I finish this class, I will keep learning Chinese, because studying Chinese is important to me.	1	2	3	4	5
11. Learning Chinese helps me understand Chinese-speaking people and their way of life.	1	2	3	4	5
12. If I can speak Chinese, I can travel more for official purposes.	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
13. I think learning Chinese will enable me to get a better education opportunity.	1	2	3	4	5
14. I plan to continue studying Chinese for as long as possible.	1	2	3	4	5
15. I want to use Chinese to work and communicate with Chinese speakers.	1	2	3	4	5
16. Learning Chinese makes me feel successful.	1	2	3	4	5
17. Learning Chinese is helpful for my future career.	1	2	3	4	5

* This questionnaire was modified from Lan (2014).

Section II: Confidence in Ability to Learn Chinese**

Directions: How confident are you about learning and using Chinese? Reading, listening, and speaking are activities you do to learn and use Chinese. This questionnaire describes different kinds of tasks you might do in Chinese. For each kind of task, you are going to rate how sure you are that you could work on a language task *like the one described* and do what you are supposed to do in a reasonable amount of time.

The rating scale goes from 0 to 100. Marking a higher number means you are more sure that you could do the activity, while marking a lower number means you are less sure that you could do it. Please mark how you *really* feel about your capability to do a language task like the one described. **There are no right or wrong answers. There are only answers that tell how you actually feel.**

Reading Chinese: Reading is a frequent activity you use for learning and using Chinese. You may often read texts such as dialogues, stories, and advertisements in Chinese as part of classwork or on your own. Please **circle the number** on the line at the right that shows how sure you are that you could read a text in Chinese and . . .	
1. figure out the main topic or gist.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
2. answer questions about very specific information.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
3. figure out the meanings of words or phrases you don't understand.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
4. retell in English what you read.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
5. use a Chinese text to accomplish a task in real life (e.g., read a menu to order a meal).	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
Listening to Chinese: You may often listen to people speaking Chinese--your teacher, classmates, and native speakers (in person, on videotapes, and on cassettes), and you want to make sure you understand them. Please **circle the number** on the line at the right that shows how sure you are that you could listen to Chinese and . . .	

1. understand the gist of what you hear.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
2. understand details.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
3. figure out the meanings of words or phrases you don't understand.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
4. retell in English what you heard.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
5. use the information heard in Chinese to accomplish a task in real life (e.g., understand directions to a train station).	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure

Speaking Chinese:

Part of learning and using Chinese is being able to speak it. In class you may have to answer questions, talk to classmates, and give information about yourself. Outside of class you might have conversations with native speakers and friends.

Please **circle the number** on the line at the right that shows <u>how sure you are</u> that you could speak Chinese and . . .

1. communicate the main point(s) of what you want to say.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
2. give supporting details and explanations at a listener's request.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
3. solve communication problems when you don't know how to say something or when the listener doesn't understand.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
4. know whether the listener is understanding you correctly.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
5. accomplish a task in real life (e.g., asking the price of an item in a store).	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure

Learning Vocabulary:

Learning new words is a major part of learning Chinese. You may have to learn vocabulary given to you by your teacher. You might also learn words that you want to know.

Please **circle the number** on the line at the right that shows <u>how sure you are</u> that you could have a list of Chinese vocabulary words like you have in class and . . .

1. learn what each word means.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
2. use each word correctly in a sentence.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
3. hear or read sentences with these words and understand the meaning of the sentences.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
4. remember the meaning of each word a month later.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure
5. understand or use the word in a real life setting.	**0**------10------20------30------40------**50**------60------70------80------90------**100** Not Sure — Somewhat unsure — Kind of sure — Very sure — Completely sure

** This questionnaire was adapted from National Foreign Language Resource Center (2000).