Cognitive and emotional effects of learning Chinese by playing an online game

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COGNITIVE AND EMOTIONAL EFFECTS OF LEARNING CHINESE
BY PLAYING AN ONLINE GAME

by

Shuyi Guan

A Dissertation
Submitted to University at Albany, State University of New York
In Partial Fulfillment of
The Requirements for the Degree of
Doctor of Philosophy

School of Education
Department of Educational and Counseling Psychology
2015
ABSTRACT

The present study essentially is about examining the cognitive and emotional effects of learning Chinese as a second language through playing an online game. With the development of Internet technology, online games have been used for learning widely all over the world. Extensive studies have examined the potential cognitive and emotional effects of using games to improve learning abilities. However, little is known about the pattern of online game-based learning and the special effects of online game-based learning on Chinese language acquisition.

The present study aims to answer three questions: (1) Is online game-based learning effective for improving Chinese language knowledge; (2) Is there any pattern of online game-based learning to improve students’ Chinese language knowledge; (3) Is online game-based learning enjoyable and motivating for students leaning Chinese language?

A total of 108 international students who were learning Chinese in a two-year college in Beijing participated in the study. In the class, students were asked to take a pretest of Chinese language. After that, students were introduced about game Zon, asked to log in game Zon and complete the assigned tasks. At the end of the class, students were asked to perform the posttest and complete a survey. The text chats among students when they were completing the tasks online were recorded. Quantitative methods, such as descriptive statistics, paired-samples t-test, ANCOVA, and ANOVA, were used to analyze quantitative data; qualitative methods, such as discourse analysis, were used to analyze qualitative data.
The results showed that online game-based learning had positive effects on improving students’ Chinese language knowledge. Further examination of their learning activities revealed that students improved their Chinese language knowledge through collaborative interactions with peers. In addition, students’ attitude towards online game-based learning reflected that they were enjoyed and motivated.

Findings of the study provide empirical evidence to help understand the cognitive and emotional effects of online game-based learning. In addition, the study helps to testify theories of Sociocultural Theory and Input, Output, Interactive Hypotheses.
ACKNOWLEDGEMENTS

A zillion of thanks to all the members of my committee: to Dr. David Dai for his insightful wisdom for the work on the dissertation; to Dr. Jianwei Zhang for his insightful comments and valuable advice for my dissertation; to Dr. Zheng Yan for his unlimited time, immense patience and generous supports for my dissertation. My sincere appreciations go to all of the committee members for their guidance and support during this research.

I would like to convey my special gratitude for my advisor and my dissertation chair Dr. Zheng Yan. His guidance has made this a thoughtful and rewarding journey. During the last several months before my defense, once a week, we had meetings over Skype at night. Sometimes, it had been midnight after the meeting, even during summer time. He was very patient and supportable not only for the dissertation, but also for other times of my life.

Over the past five years in the doctoral program, I have received support and encouragement from a great number of individuals. I take this opportunity to express gratitude to the entire faculty in our program, especially Dr. Joan Newman, for her patience, motivation, and immerse knowledge.

I also want to acknowledge all the instructors and students who participated in this study. It was their cooperation that made this study possible. Thank Sung-Yong Park and Yong-June Chung for their help of translation.

Last but not the least, I would like to thank my family: my parents, who have always supported, encouraged and believed in me and who unselfishly take care of my son; my husband, Leyuan, without whose supports spiritually and financially, this study would not have been
completed. A special thanks to my dear son Keller, who was born before this dissertation was completed and who spent many time with my parents to allow me to focus. I am deeply sorry for the time we spent apart. He is my biggest motivator and I wish I could be his model.
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Chapter 1

Introduction

What is the Present Study?

The present study essentially is about examining the effects of learning Chinese as a second language through playing an online game. The area of online game-based learning has exploded during the past decade. The potential of online gaming to improve learning has been examined in extensive literature (e.g., Aldrich, 2009; Prensky, 2001, 2006). Within the literature, research has involved with Internet-based gaming that is designed specifically for language learning (e.g., Li & Topolewski, 2002; Mich, Betta, & Giuliani, 2004). Researchers call those serious games (Johnson, 2010), which means the purpose of playing the games is to improve learning. While some of the literature indicates that game-based learning can be integrated in the computer assisted language learning class effectively (e.g., Sykes, Oskoz & Thorne, 2008; Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011), others argue that technological limitations make such a learning tool inappropriate for formal second language learning (Murphy, 2009; Cunningham, Fagersten, & Holmsten, 2010). Given this ambivalence, the aim of this study is to assess the cognitive effectiveness (students’ linguistic development gains) of integrating online language learning games in the second language learning classroom, and to evaluate the emotional effectiveness (students’ attitudes) about such a learning approach.

To contextualize the present study, the following section of this paper will provide (1) a brief overview of the game Zon, and (2) the input-process-outcome model (Garris, Ahlers, &
Driskell, 2002) with the basic concepts of the present study.

**The game Zon.** Since 2006, the Confucius Institute at Michigan State University has been working on Zon — a program that uses online games to help students learn about Chinese language and culture. For the present study, the online Chinese learning oriented game Zon was utilized as the instrument for a one week teaching experiment. One of the most important learning features of Zon is that constructivist approaches such as problem-based learning and task-based learning are applied, and those situated problems and tasks are related to players’ authentic experiences and interests. This is also helpful for in class teaching because teachers can choose a scene that is related to their learning goals for a specific lesson.

Another important learning behavior in the game Zon is to interact with other game players online. Throughout each scene, players can engage with various elements of the environment, but they can also speak and send text messages with other players in that scene or elsewhere in Zon. This allows players to learn from both the designed game elements and other players. In this way, Zon is designed to provide social and environmental scaffolds to support player learning. This is a kind of peer learning activity, which requires both collaboration and interaction. It can help the learner support one another’s learning. A collaborative, interactive, constructivist online learning environment, as opposed to a passive learning environment, is found to be better able to help students learn more actively and effectively (Ruey, 2010).

**Basic concepts of the present study.** Learning is comprised with three components that are “skill, metaskill, and will” (Mayer, 1998, p.51). In other words, there are three components of learning: learning outcomes, metacognition, and motivation. The present study was aimed at
examining the learning outcomes, the pattern of the online game-based learning, and students’
attitude towards online game-based learning.

To better understand this study, a model (see Figure 1.1) is used to illustrate the elements
of input, process, and outcome of game-based learning in Zon. The model also shows the process
and key variables of the study.

First, there are two elements of input that are instructional content and game
characteristic. Instructional content in the game Zon can be seen as the extension of the
knowledge learned in class, which included learning new words, elaborating on new grammar
and sentence structure. Substantial literature has examined the effect of game characteristics on
instruction. The literature summarized game characteristics into six dimensions, which are
fantasy, rules, sensory stimuli, challenge, mystery, and control (Garris, Ahlers, & Driskell, 2002).
For the present study, the characteristics of game Zon include (1) fantasy, which can be found in
the context, themes, and characters; (2) rules and goals that direct the progress of playing the
game; and (3) challenge because optimal level of difficulty can be found within one theme.

Second, the gaming process, or the game-based learning process, contains three elements:
learner, other role players (peers playing the game simultaneously), and non-player characters
(game characters that are already embedded in the game). The learner has interactions with both
role players and non-player characters in the game, and there are also interactions between peers
and non-player characters.

Third, there are considerable studies attempting to classify the types of learning outcomes.
For instance, Kraiger, Ford, and Salas (1993) synthesized the studies related to learning
outcomes and proposed three major types of learning outcomes. These include skill-based, cognitive, and affective outcomes. For the present study, the cognitive outcomes of students’ Chinese language knowledge and the emotional outcomes of students’ attitude towards online game-based learning were examined.

![Game Model Diagram]


**Research questions.** Three research questions were addressed in the present study: (1) Is online game-based learning effective for improving Chinese language knowledge; (2) Is there any pattern of online game-based learning to improve students’ Chinese language knowledge; (3) Is online game-based learning enjoyable and motivating for students leaning Chinese language?
Theoretical Underpinnings of the Present Study

**Sociocultural theory.** The present study helped to testify Vygotsky’s (1978) sociocultural theory by providing new empirical evidence in a specific context of second language acquisition. In the meantime, the theory helped to pose significant questions that could be investigated empirically (National Research Council, 2002). The landscape of second language instruction has transformed itself since the 1970s under the influence of the sociocultural theory (Vygotsky, 1978). This has generated a wide-spread belief in the necessity of learners’ exposure to authentic or natural language in the process of language acquisition (Mori, 2002).

According to Vygotsky (1978)’s sociocultural theory, knowledge construction is both individually constructed and socially mediated. One of the big problems for most of the second language learners is that they learn the language in a formal education environment, but seldom have opportunities to use the language to communicate with other people in an authentic context. Socially mediated activities can provide language learners such opportunities to use the target language in an authentic context. As shown in Figure 1.2, there are two types of mediated activity (Vygotsky, 1978) that are sign and tool. The tool’s function is to “serve as the conductor of human influence on the object of activity; it is externally oriented” (Vygotsky, 1978, p.55). The sign, on the other hand, is internally oriented and is aimed at mastering oneself. In the present study, the game Zon can be seen as the tool and the Chinese language can be seen as the sign as it changes nothing in the object of understanding the language. Although they are essentially different, the mastering of nature (sign or the language) and the mastering of behavior (tool or playing the game) are closely connected.
One of the most important concepts in sociocultural theory applied to second language learning is Zone of Proximal Development (ZPD). ZPD is defined as “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers” (Vygotsky, 1978, p. 86). In other words, when students have interaction with peers, they have opportunities to speak the target language with people whose language level is higher than them. In this case, they will be influenced by the more experienced people. Learners also co-construct knowledge and understandings with peers who have ability levels similar to their own.

By drawing from the sociocultural theory, in the current study, the tasks in the online game will be a little beyond students’ current ability in order to provide scaffolding for Chinese language learning. The interactions among peers during the gaming process can help students do something beyond their independent effort.

**Input, Output and Interaction Hypothesis.** There are three well-known hypotheses in theories of second language acquisition, which are the Input Hypothesis (Krashen, 1982), Output
Hypothesis (Swain & Lapkin, 1995), and Interaction Hypothesis (Long, 1977).

Based on Krashen’s theory, acquisition “requires meaningful interaction in the target language in which speakers are concerned not with the form of their utterances but with the messages they are conveying and understanding” (Krashen, 1981, p.1). In addition, language is acquired by receiving comprehensible input that just beyond the learner’s current level of mastery (Krashen, 1994), which is very similar to Vygotsky’s ZPD concept.

The Output Hypothesis developed by Merrill Swain questioned Krashen’s Input Hypothesis. The Output Hypothesis claims that comprehensive input is not the only sufficient way for language acquisition as stated by Krashen. Instead, when there is a gap in learning the linguistic knowledge, learners are able to modify their output so that they learn something new about the language (Swain & Lapkin, 1995).

The Interaction Hypothesis claims that the language acquisition is more effectively developed when learners are in an interactive environment by negotiating for meaning (Ellis, 1997). That is, when learners say something wrong or others cannot understand, learners may receive feedback on the sentences and grammar by negotiating with peers.

Based on the above three language acquisition theories, the knowledge of a language, especially grammar and pragmatics, needs to be developed and practiced in interactive and authentic environments. For instance, compared with just remembering the rules of grammar, modern teachers are likely to introduce a new rule of grammar indirectly by presenting sentences in which the new grammar occurs. Students are expected to notice the point and then manipulate it and try to make it automatic.
For the current study, the application of the Input and Output hypotheses was reflected when students learned Chinese in the authentic context under the online game environment (e.g., the tasks embedded in the game) to have real-world problem solving experience. The online communication tools in the game (e.g., text chat) provided extensive opportunities for purposeful real-time interaction among peers. This is guided by the Interaction Hypothesis that meaningful learning interactions between learners can help improve learners’ learning outcomes.

**Scientific Contributions of the Present Study**

The present empirical study made two scientific contributions to the current understanding of learning Chinese as second language through playing online games among international students: (1) examined the cognitive effects of online game-based learning on Chinese language development, and (2) investigated students’ attitudes toward online game-based Chinese language learning.

First, compared with traditional second language teaching methods, technological changes have shifted language teaching from structural and sequential to interactive and communicative modes (Kern & Warschauer, 2000). There are substantial studies on the effectiveness of learning a second language by playing games (e.g., Cheng, Kuo, Lou, & Shih, 2012; Bacon & Ault, 2009; Lai, Leung, Hu, Tang, & Xu, 2010; Waters, 2007), and some of those studies show its effectiveness compared to the more traditional methods of delivery (e.g., Warschauer, 1995/1996; Blake, 2000).

Second, extensive research has shown that students have a positive attitude towards online game-based learning, and they are more motivated in the online collaborative learning
environment. For example, Ruey (2009) did a case study to support the idea that a collaborative, constructivist online learning environment, was found to be better able to help students learn more actively and effectively compared to the traditional learning environment.

However, online programs for Chinese language learning have not fully caught up with recent advances. Most Chinese language learning programs are still didactic and not much fun (Lin et al, 2008). In addition, to date, there is only limited empirical research on integrating online games into language learning projects for non-native Chinese learners. Among those few studies carried out focusing on learning Chinese by playing games, most of them are about examining the effect of online game-based learning on Chinese language learning (e.g., Wang, 2010; Wang & Chen, 2007) or students’ motivation and attitude of learning Chinese with the help of online technologies (e.g., Hao et al, 2010; Huang, Lin, & Chiang, 2010). There are relatively few studies focusing on the pattern of how online game-based learning improves Chinese language acquisition. Thus, this study made empirical contributions to not only the evidence of the effects of learning Chinese by playing online games and students’ attitude toward this, but also understanding the pattern of how online game-based learning improves Chinese language acquisition.

**Definitions of Major Terms**

**Cognitive effect.** The cognitive effect, in this study, refers to the effect of online game-based learning on Chinese language knowledge acquisition.

**Emotional effect.** The emotional effect, in this study, refers to students’ attitude towards online game-based learning.
**Chinese language knowledge.** In this study, Chinese language knowledge refers to the knowledge of Chinese grammar, vocabulary and pragmatics.

**Students’ attitude.** An attitude can be defined as a positive or negative evaluation of a particular entity (Eagly & Chaiken, 1998). In this study, students’ attitude refers to their positive or negative evaluation of the online game-based learning experience.
Chapter 2

Review of the Literature

The area of online games used for learning has exploded in substantial research during the past decade. There is a need to study what makes online game-based learning such a special learning place for millions of people today. Research about online game-based learning is extensive and ranges from studies of math and science (e.g., Jones & Kalinowski, 2007; Klisch, Miller, Wang, & Epstein, 2012; Maloy, Edwards, & Anderson, 2010), language (e.g., Hao et al, 2010; Liang, 2012; Peterson, 2010a; Stanley & Mawer, 2008; Thorne, 2012), college students (e.g., Ebner & Holzinger, 2007; Sadiq, 2010) and K-12 students (e.g., Kaufman, Sauve, & Renaud, 2011; McFarlin, Weintraub, Breslin, Carpenter, & Strohacker, 2011; Horn, 2010). Furthermore, the potential of gaming to improve learning abilities has also been examined in literature (Aldrich, 2009; Prensky, 2001, 2006). Within the literature, research has involved Internet-based gaming that is designed specifically for language learning (Li & Topolewski, 2002; Mich, Betta, & Giuliani, 2004). Researchers also call those “serious games” for second language teaching and learning (Johnson, 2010). This literature review will focus on research reporting on online game-based learning in second language acquisition.

Online Games for Learning

It is a common sense that students love computer games especially online games. Therefore, it is important to combine education and fun. An online game for learning is a kind of educational game that leads to effective learning performance. Basically, there are two kinds of online games based on the purpose of the game design. One is a commercial online game, and
the other is an instructional game, also referred to as a serious game. Research in cognitive
science showed that good commercial games are designed around a good theory of learning, and
can engage deep learning (Gee, 2003). However, the main purpose of commercial online games
is for fun (e.g., World of Warcraft), although some of them (e.g., EnglishBaby!, LiveMocha)
provide academic tips in taking advantage of social media opportunities for independent learning
(Meskill, Guan, & Ryu, 2012).

Instructional online games, on the other hand, create formal learning environments for
learners in cyberspace. “A good instructional game, like many good commercial games, should
be built around what I call authentic professionalism” (Gee, 2005, p. 31). In other words, in such
games, knowledge and skills can be distributed between the virtual characters and the real-world
players in a way that allows the players to experience first-hand how other players think, behave,
and solve problems (Gee, 2005). Good online games distribute authentic professional expertise
between the non-player character and the real-world human player.

Another characteristic of instructional online game compared with other kinds of online
game is that it provides formal learning environments. Although other online learning tools like
Blackboard, wikis, blogs, voice boards have been widely used in blended and fully online
courses, instructional online games tends be more leisurely and responses planned (Meskill,
Guan, & Ryu, 2012). Among those online games, Second Life is one of the most popular games
that have been used in formal learning. Research has shown that learners participating in
language learning tasks in Second Life reported positive outcomes in terms of productive
language use (Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011; Peterson, 2010;
Deutschmann, Panichi & Molka-Danielsen, 2009). Besides Second Life, many other instructional online games including Zon are also used in various subjects, such as second language, science, mathematics, and literacy.

**MMORPG for Second Language Learning**

Massively Multiplayer Online Role-Playing Games (MMORPG) was emerged in the late 1970s. It is a kind of online games that has unique affordances to serve as a situated learning environment to effectively facilitate learning (Eseryel, Ge, Ifenthaler, & Law, 2011). With the development of computer and Internet technology, modern MMORPG games incorporate a number of features to let players engage in real-time communication, role-play, and character customization by typing commands (Peterson, 2010b).

MMORPG involves multiplayers in a richly complicated virtual world populated by other role-players and non-player characters (characters set up by the game). The most popular one of these games is called World of Warcraft (WOW), in which players choose a character to role-play and advance in level by completing quests set by the game. Usually, players have to join in an association with other players in order to complete the quests and advance to the next level. This type of game will lead to social interaction and collaborative activities among players.

MMORPG is fun, but second language educators have used the games for a more educational purpose. Most of the MMORPG games have a theme, and second language educators can use the games as a platform to build tasks that can engage students to practice language. Among those Internet-based MMORPG games, formal educational games, or instructional games, utilize game design techniques to promote learning (Johnson, 2010). It can
also support game play in the form of simulated conversations with non-player characters and promote collaborative learning among game players within a game scenario context (Johnson, 2010). Zon (Enterzon.com) is an example of an educational MMORPG game that can be applied to learning.

Playing online MMORPG games could be beneficial to second language learning because theories of second language acquisition stress the important role played by interaction and collaboration among students in language learning (Peterson, 2010). The interaction during language learning enables the resolution of a communication problem related to unknown vocabulary or content. It focuses learner attention on problems in their linguistic output, and then promotes language development by fostering an ability to notice problematic language utterances (Ellis, 2005). Thus, compared to traditional drill-and-practice learning, collaborative learning embedded in online multiplayer games has potential advantages for second language acquisition.

**Task-Based Learning in Online Games**

Traditional educators remain focused on content and what to teach. With the fast and extensive development of Internet technologies, the traditional content-centered approach to learning fails to engage today’s learners who are digital native or net generations. Task-based learning via online games is one of the most effective ways to meet the needs of technology age as well as today’s learners who are a grown-digital-generation (Leung & Zheng, 2012).

Extensive research has been done to address the principles and advantages of task-based learning in online games. For example, An and Bonk (2009) summarized 12 key principles that are common to the simulations and game-based learning literature. The learning principles are
scaffolding, problem, exploration, context, interaction, agency, learning through doing, pause to reflect, learning through failure adaptivity, character, and engagement. Based on these principles, the main advantages of task-based learning in online games have been addressed by researchers.

First, online games provide information needed for completing the task “just in time,” which is right when learners need it (Gee, 2007a). Online games force players to respond and make decisions immediately.

Second, online game-based learning environments can provide a set of complex, useful and challenging tasks for students to practice what they have learned. The problems in the task can help students think critically and work with peers or other resources to complete the task rather than simply memorizing the information (Gee, 2007b; Squire, 2005).

Third, online game-based learning can also provide students an authentic context where meaningful learning occurs (Lave & Wenger, 1991). Especially for second language learning, context is more important than content since the purpose of learning a second language is to use it in real life communication.

In addition, to complete the tasks embedded in online games, students have to be collaborative. The importance of collaboration and interaction for learning has been highlighted by many researchers (e.g., Vygotsky, 1978, Piaget, 1977, Brown & Duguid, 1989). Especially in MMORPG games, players cooperate and interact with other people online to complete a task together, and they also form communities where they share and exchange their knowledge.

In summary, traditional education focuses on knowing rather than doing, on memorizing facts rather than practicing. On the other hand, task-based learning in online games integrates
knowing and doing in the situated, authentic online environment (Shaffer, Squire, Halverson, & Gee, 2005). Tasked-based learning in an online game environment enables students to learn through doing by letting them perform and practice. This is especially important for second language learners, who can develop transferable knowledge and skills by practicing newly learned words and grammars in an authentic situation (Squire, 2005).

Cognitive Effects of Online Game-Based Learning on Second Language Acquisition

Online game-based learning is designed to reach a balance between entertainment and learning, and enable the players to apply their knowledge to a real environment (Chen, Kuo, Lou, & Shih, 2012). The cognitive effects of online game-based learning on second language acquisition have been examined in substantial studies.

Researchers and scholars have found that online game-based learning has the potential to provide effective and powerful learning environments in which students can develop essential skills of learning, such as critical thinking and problem solving skills (e.g., Prensky, 2001; Shaffer, Squire, Halverson, & Gee, 2005). Also, there are many studies aimed at assessing the effectiveness of online game-based learning. Most of the research has shown positive results of the online game-based learning experience (e.g., Chiang, Lin, Cheng, & Liu, 2011). For instance, a study of an online competitive game-based learning system for junior high school students found that most students are satisfied with the online competitive game-based learning system, and this learning process is effective for junior high school students’ learning (Chen, Kuo, Lou, & Shih, 2012).

For second language learners, through collaboration on solving task-based problems,
their knowledge of pragmatics, syntax and semantics can be enhanced (Zheng, Young, Wagner, & Brewer, 2009). In addition, experimental studies also suggest that online instructional games show great promise for vocabulary acquisition (Rankin, McNeal, Shute, & Gooch, 2008). For example, in a study (Yip & Kwan, 2006) of the usefulness of online games in vocabulary learning, students learning some vocabulary from online games outperformed the control group in the posttest.

However, some research found that face-to-face instruction is more favorable in terms of linguistic development than online instruction. For example, a study (Wang, 2010) comparing students’ online utterances and offline interactions showed that online language learning promoted social interaction among students and their engagement; however, it did not automatically facilitate students in their adoption of active learning strategies and did not find positive outcomes in terms of linguistic development. In addition, there are empirical studies which show that the potential of online game-based learning is unrealized due to a lack of empirically-validated design frameworks, which are built on students’ cognitive and emotional outcomes in relation to the new technology age skills (Eseryel, Ge, Ifenthaler, & Law, 2011).

**Emotional Effects of Online Game-Based Learning on Second Language Acquisition**

Online game-based learning environment with educational components provides students with more in-depth and meaningful knowledge acquisition (Chen, Kuo, Lou, & Shih, 2012). Research showed that students learn more effectively if they can direct their own learning and have a feeling of ownership of the learning process (Savery, 1998). Thus, students’ attitudes towards online game-based learning can be used to explain the learning outcomes.
Research has shown that students like and enjoy learning languages by playing online games. Many studies (e.g., Yip & Kwan, 2006) on the learning outcomes of online game-based learning also examined students’ general attitudes towards online game-based learning. For example, in Yip and Kwan’s (2006) study, students generally preferred online learning supplemented with digital educational games to conventional activity-based lessons.

Engagement and motivation are fundamental elements for digital game-based learning (Prensky, 2001). The engaging learner-centered nature of gaming generates a high degree of motivation, which is a key factor for successful language learning (Bryant, 2008; Gee, 2003). However, simply adding game elements to learning content does not guarantee engagement (An & Bonk, 2009). There are three main factors that increase students’ motivation of learning in online games. First, challenge is one of the top ranking motivations for playing computer games in general (Hainey, Connolly, Stansfield, & Boyle, 2011). Second, online games elicit learners’ engagement because they are the center of the game, and every change of the game story is determined by them (Jensen, 2002). Third, the attractive elements of Internet games, such as avatars, sounds and images, are combined to engage students and foster their concentration, interest, and social skills (Raessens & Goldstein, 2003).

Affective factor including feeling comfort and confidence is another element for effective online game-based learning. For instance, a study (Zheng, Young, Brewer, Wagner, 2009) on the affective factors in ESL in an online instructional game, Quest Atlantis (QA), showed that online games provided a space for ESL learners to increase confidence and comfort for learning English.
**Motivation of the Present Study**

The present study is about an educational online game, called Zon, on facilitating Chinese as second language learning and students’ attitude toward an online game-based learning process. The study examined how the online game-based learning could facilitate Chinese language skills acquisition and whether students felt motivated, satisfied, and engaged in the online game-based learning process.

According to the literature review of related studies, there are three major reasons that drive me to do the present study. Firstly, much of the research (e.g., Cunningham, Fagersten, & Holmsten, 2010; Mich, Betta, & Giuliani, 2004) of game-based learning in second language learning focuses on English as a second language. In contrast, few articles have investigated game-based learning in Chinese or other second languages. Learning Chinese is becoming more and more popular around the world. It is reported that over 3,000 universities in 109 countries and more than 500 Confucius Schools provide students with Chinese courses (Chiu, 2011). Thus, it is necessary to have more empirical studies in this field be done on Chinese as a second language and at the same time testify the existing theory and research that are based on English learning.

Secondly, most of the existing studies in this field used quantitative method to explore learning outcomes and emotional impacts of online game-based learning. Researchers (e.g., Chen, Kuo, Lou, & Shih, 2012) have given suggestions for future studies that a qualitative approach with in-depth questions should be employed to the online game-based learning in order to understand students’ opinions and improvements in detail.
Thirdly, instructional online games have been widely used in second language learning. Researchers have explored how informal game play can be effective for formal learning (e.g., EnglishBaby!, LiveMocha, etc.), but there is a lack of research on how formal educational games are used in formal learning environments (Kirriemuir & McFarlane, 2006).

Due to the three reasons above and the unique affordances of the online learning environments, little is known about how effective online game-based learning integration is in Chinese as second language learning classrooms. In order to address this gap, the aim of this study was to investigate Chinese language learners’ learning outcomes and their affective aspect during online game-based learning process by conducting a mixed method research.
Chapter 3
Method

This chapter will specify and justify the research design, participants, sample size, measures, procedure, and data analysis that were used in this study.

Research Design

Mixed-method research that crosses the quantitative-qualitative boundary was used in the present study to examine the three research questions. An increasing number of educational researchers are turning to mixed methods to answer more sophisticated research questions and to capture the same setting with different methodological lenses (Check & Schutt, 2012). For the present study, there are two main reasons for mixing different types of data and analysis.

The first reason for mixing both quantitative and qualitative methods in one research is to take advantage of the unique strengths of each methodological approach when engaged in different stages of the research process (Tashakkori & Teddlie, 2010). Quantitative data based on instruments such as pretest, posttest, and surveys demonstrates quantitatively the effectiveness of the intervention. The qualitative data, on the other hand, gives depth and meaning to the “numbers” in an impactful way.

Another reason for mixing quantitative and qualitative methods is to add unique insights about the learning process that cannot easily be obtained from the primary method used in an investigation (Check & Schutt, 2012). In most of the mixed-method research, quantitative method is seen as the primary method (e.g., Sadaf, Newby, & Ertmer, 2013; Gray, & Smyth, 2012; Clarke & Kinne, 2012). Thus, the mixed method approach typically involves the use of
qualitative data to gain insight into the meaning of quantitative results or to support such results (Gay, 1996).

These two reasons for mixing methods have led the present study to the concurrent procedure design (Creswell, 2003). In this design, both quantitative and qualitative data were collected at the same time during the study, and then were integrated in the interpretation of the overall results. The concurrent data collection procedure had been chosen in this study for two reasons. First, the participants were required to play the game in a class only once. The game was not regularly embedded in the curriculum. Second, the quantitative and qualitative data had to be collected as closely as possible to make the two kinds of data comparable (Jiang et al., 2010). The concurrent design usually takes a shorter data collection period as compared to the sequential approach.

Specifically, concurrent triangulation design, which is the most common and well-known approach to mixing methods (Creswell, 2003), was used in this study. The purpose of this kind of design is “to obtain different but complementary data on the same topic” (Morse, 1991, p.122) to best address the research questions. By using this design, researchers can bring together the different strengths of quantitative methods (e.g., large sample size, trends, generalization) with those of qualitative methods (small group, details, in depth) (Creswell & Plano Clark, 2007). The specific procedure of the concurrent triangulation design for the current study followed the model in Figure 3.1.
Figure 3.1. Concurrent triangulation design: validating quantitative data model. It was adapted from “Designing and Conducting Mixed Methods Research,” by J. W. Creswell and V. L. Plano Clark, 2007, p. 63. Copyright 2007 by Sage.
Participants

The data were collected in December 2012 in Civil Aviation Management Institute of China, Beijing. Participants were 108 international students from Korea, USA, Japan, Russia, and other countries. The participants were beginning level Chinese learners, who had been learning Chinese for less than four semesters. Table 3.1 summarizes multiple characteristics of the participants.

Table 3.1

*Participant Characteristics*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Participants (N = 108)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>71</td>
</tr>
<tr>
<td>Male</td>
<td>37</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Younger than 18</td>
<td>4</td>
</tr>
<tr>
<td>18-25 years old</td>
<td>31</td>
</tr>
<tr>
<td>26-30 years old</td>
<td>29</td>
</tr>
<tr>
<td>30 or older</td>
<td>44</td>
</tr>
<tr>
<td>Nationality</td>
<td></td>
</tr>
<tr>
<td>Korean</td>
<td>47</td>
</tr>
<tr>
<td>American</td>
<td>16</td>
</tr>
<tr>
<td>Japanese</td>
<td>8</td>
</tr>
<tr>
<td>Russian</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>31</td>
</tr>
<tr>
<td>Not reported</td>
<td>1</td>
</tr>
<tr>
<td>First language</td>
<td></td>
</tr>
<tr>
<td>Korean</td>
<td>49</td>
</tr>
<tr>
<td>English</td>
<td>25</td>
</tr>
<tr>
<td>Japanese</td>
<td>8</td>
</tr>
<tr>
<td>Russian</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
</tr>
<tr>
<td>Not reported</td>
<td>1</td>
</tr>
<tr>
<td>Number of semesters learning Chinese</td>
<td></td>
</tr>
<tr>
<td>Less than one semester</td>
<td>45</td>
</tr>
<tr>
<td>1-2 semesters</td>
<td>44</td>
</tr>
</tbody>
</table>
3-4 semesters  17  15.7
5 semesters or more  2  1.9

Self-evaluated Chinese proficiency

- Poor  55  50.9
- Conversational  48  44.4
- Fluent  4  3.7
- Excellent  1  .9

Self-evaluated computer skills

- Poor  5  4.6
- Basic  41  38.0
- Good  54  50.0
- Excellent  8  7.4

Hours spent on Internet per day

- Less than one hour  35  32.4
- 1-4 hours  69  63.9
- 5-10 hours  3  2.8
- 11 hours or more  1  .9

Post Hoc Power Analysis

Post hoc power analysis was used to decide whether the sample size was large enough. Post hoc power analysis tests the power of an observed effect based on the sample size and parameter estimates (e.g., mean and standard deviation) derived from a given data set (Lenth, 2007). For the present study, post hoc power analysis with the program G*Power (Erdfelder, Faul, & Buchner, 1996) was conducted to find out whether the design of the study had enough power. A post hoc power analysis was conducted for the paired-samples t-test of the pretest and posttest scores. The effect size $d$ of the $t$-test (two tails) was .51 (a medium effect, according to Cohen, 1977). The power to detect an effect of this size in the paired-samples $t$-test was determined to be 1.0, which is a very high power. So the sample size of 108 is sufficiently large for the present study.
Institutional Review Board

This study holds minimal risk to the participants. Their participation contributed to the knowledge that may be beneficial to second language learners. The survey did not contain any identifier except for the experimenter-created ID number. Therefore, no person could know who made which response. In addition, this study did not include any participants who would require special protection. The present study had been approved by IRB (Protocol Number 13014-00).

Instrument

The online game Zon was employed as the instrument of the online game-based learning for the present study. The participants played the online game Zon in class, and completed several tasks assigned by the instructors when they were in the online game environment. There are several embedded Chinese learning tasks in the game Zon. Zon provides about eighty learning units at five different Chinese levels.

In the present study, tasks in Level one and Level two were selected according to the scenarios that were used in a certain class. For example, for the scenario of shopping for clothes, tasks in the shop were selected for students to complete. When students in the online scenario of shopping for clothes, they could do multiple learning activities in the “shop” in the game environment. If students want to learn the language used in a specific situation or any culture aspect of China in that scenario, they could watch a video clip by clicking the “learn” button on the area for which they want to learn. For example, if a student wants to know the custom of shopping for groceries in China, he or she goes to a market according to the map, and clicks the “learn” button, and then a video clip will turn up as the following description:
Video 1: Chāoshì Gòuwù

Shopping for Groceries

Let’s take a look at a lady’s shopping experience in a Sam’s club in China.

This video clip is from Everyday Chinese, published by Foreign Language Teaching and Research Press, China.

In Zon, students can also engage in a situated learning environment by completing the tasks. For instance, when students “enter” the lobby of a hotel, they can go to the business center, and then click the “engage” button to “talk with” the receptionist. The game will show a conversation as on Figure 3.2:

![Figure 3.2. The engagement learning task in a hotel in Zon.](image)

Another important learning task in the game Zon is to interact with other game players online. There is a group management in the main menu, and students can join a class, club and a group to talk, discuss or play together with their peers online. As shown in Figure 3.2, there is a column “my groups”, where students can chat or complete the tasks with group peers online (see
an example in Figure 3.3).

Figure 3.3. An example of text chat in the game.

Measures

Chinese language quizzes. Chinese language quizzes were conducted to test students’ Chinese language knowledge using written language. The pretest and posttest were conducted in the beginning and at the end of the class in order to assess students’ learning performance. The study was conducted in 11 different classes in the same week. Some of the classes used the same Chinese language quiz because they were classes in the same grade. According to the topics of the lessons and the class grades, the game tasks were grouped into six scenarios, which were shopping, hobbies, marriage, comparison, time, and habit. Thus, there were six different Chinese language quizzes according to the content of the scenarios. Appendix A includes the quizzes used for the pretests and posttests. Each of the quizzes contained five multiple choice questions about the Chinese language knowledge included in each scenario. Six teachers created the quizzes and they often used them in their normal classes.
The survey on students’ attitude. The paper-based survey (see Appendix B) measuring participants’ attitude towards online game-based learning consisted of three sections. Section 1 contained nine questions about students’ demographic information, including gender, age, nationality, first language, number of semesters learning Chinese, self-evaluated Chinese proficiency, HSK test (a standard test to test Chinese proficiency for Chinese language learners) score, self-evaluated computer skill, and number of hours using Internet per day.

Section 2 included eight five-point Likert scale questions to measure students’ attitude towards online game-based learning. The questions were about satisfaction (questions a, c, and e), comfort (questions b and g), enjoyable experience (questions d and f), and motivation (question h). The five-point Likert scale is from strongly disagree (1 point) to strongly agree (5 points). The content of the Likert scale questions was constructed and revised based on the literature review (Hao et. al., 2010). Internal reliability of the five-point Likert scale questions on students’ attitude was examined. Cronbach’s alpha was .91, which indicated a high level of internal consistency for the questionnaire. Section 3 measured participants’ in depth view of online game-based learning experience by asking three open-ended questions: (1) What do you feel about the online game-based learning experience; (2) How do you think playing the online game improved your Chinese in general; and (3) How do you think playing the online game improved your Chinese listening, speaking, reading, and writing? The purpose of the first question was to get the general idea of students’ attitude towards online game-based learning experience. Question 2 was about in which way online game-based learning impacted on Chinese language learning. The last question asked in detail about the effect of game-based learning on listening, speaking, reading, and writing.
Procedure

In the fall semester of 2012, a total of 108 international students from 11 classes in Civil Aviation Management Institute of China participated in the study. The participants were learning Chinese language in Elementary level classes in that college, which means they have learned Chinese for less than four semesters.

I first discussed with the teachers about the content that would be covered in both the face-to-face class and the online session. In the face-to-face class, teachers taught the lessons using traditional teaching methods that included explaining the meaning of the words, reading the text, and then doing exercises. After the face-to-face class, the teacher made a quiz of multiple choice questions according to what had been covered in the face-to-face class. During the online session after the face-to-face class, students were asked to take the pretest, and then I introduced the game Zon to students, and asked them to log in the game Zon and complete the assigned task online. The online tasks included learning the materials in the game, interacting with the virtual players, answering the questions embedded in the game, and chatting with peers as role-players online. For example, the topic could be about shopping for groceries in the “365 Convenient Store”, which is a virtual scenario in Zon. Students would use their computers to log into the game, and go to a market according to the map, click the “learn” button, and watch the video clip that turned up. Then students could go to a cashier, and click the “engage” button to “talk with” the cashier. Students could also “chat” or “talk with” other game players who were close to them, and completed the assigned tasks as a role player. For example, for the scenario of shopping, one student could be a customer, and the other student was a seller. They would use the chat window to practice Chinese on this topic by playing as the role they chose.

Those learning activities were authentic, and students were solving real-world problems.
The teacher would give students tasks that were based on the newly learned knowledge and went a little bit beyond students’ current ability. Meanwhile, students had to interact with their group peers to complete the required task. When students finished their tasks, they had to press the Print Screen key to print out records of their activities and chatting results on the game. Then students were asked to do the posttest, and complete the survey. Afterwards, I saved a record of students’ text chat on a flash drive for further analysis.

**Data Analysis**

For the current study, both quantitative and qualitative data analysis methods were used to examine the three research questions. Discourse analysis of chat text and method for open-ended questions were used to analyze qualitative data. I used the following sequence to analyze the quantitative data: (1) I treated missing data; (2) I checked the data using descriptive statistics; (3) I created new variables by calculating the existed variables for better analysis and interpretation; and (4) I analyzed the data using paired-samples \(t\)-test, ANCOVA, descriptive statistics, ANOVA, and discourse analysis. I used SPSS 16.0 (IBM Corporation, 2007) for all of the quantitative data analysis. The significance level was set at \(p < .05\) for all statistical analysis, as is standard practice.

**Missing data.** There were 108 students who participated in the present study, and 105 of them completed all of the quantitative questions. One of the missing data was the question about nationality, and the other two missing data were about students’ attitude. Since the missing data about nationality was unrelated to the value of other variables in the analysis, it was missing at random (Allison, 2011), which means there was no systematic bias on the results. Also, since there are only three missing data in a 108 data set, deleting them will not influence the sample size. Thus, the method I used was listwise deletion, which is to simply omit these three cases.
Descriptive data. To check if the values of the variables were within the reasonable range and if the means and standard deviations were plausible (Tabachnick & Fidell, 2007), descriptive statistics such as frequencies, means, standard deviations, and distributions were done before I started the data analysis for each research question. It was found that all of the values of the variables were within the reasonable range and the means and standard deviations were plausible. I also used descriptive analysis to find the descriptive results of students’ attitude for Research Question 3.

Variable treatment. Some of the variables were calculated and recoded to create useful variables for better interpretation. Table 3.3 shows the information of new variables I created. Specifically, I added up the scores of the eight questions about attitude to get the score of students’ attitude toward game-based learning. I created the gain score and average score by doing calculation of pretest and posttest scores. I also re-categorized the variable of Chinese proficiency level.
Table 3.2

Variable Treatments

<table>
<thead>
<tr>
<th>Variables</th>
<th>Treatment</th>
<th>Instrument type</th>
<th>Question type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students’ attitude</td>
<td>Add up the scores from question a to question h</td>
<td>Section 2 in the survey</td>
<td>Five-point Likert scale questions</td>
<td>8-40</td>
</tr>
<tr>
<td>Gain score</td>
<td>Posttest minus pretest</td>
<td>Chinese language quiz</td>
<td>Multiple choices</td>
<td>0-5</td>
</tr>
<tr>
<td>Chinese proficiency level&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Section 1 in the survey</td>
<td>Multiple choices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>Poor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conversational</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluent</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>Good</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average test score</td>
<td>Calculate the average score of pretest and posttest</td>
<td>Chinese language quiz</td>
<td>Multiple choices</td>
<td>0-5</td>
</tr>
</tbody>
</table>

Note. <sup>a</sup>The Chinese proficiency level was re-categorized as poor and good (includes conversational, fluent, and excellent). The sample size in the new groups was approximately equal (the poor group was 53 and the good group was 52).

**Paired-samples t-test.** A paired-samples t-test was used to test Research Question 1 (Is online game-based learning effective for improving Chinese language knowledge?). A paired-samples t-test is one kind of the dependent-samples t-test, which assesses whether there is a significant difference between the means of two paired variables (Pagano, 2007). These two paired samples can be either the same participants tested twice or there are two groups of participants that are matched on some characteristics, such as gender and age (Hinkle, Wiersma, & Jurs, 2003). In other words, a paired-samples t-test can measure whether means from a within-subjects test group vary over 2 test conditions (Bonate, 2000). It is commonly used to
compare a sample group’s scores before and after an intervention (Girden, 1991). In the present study, the paired-samples t-test investigated whether statistically significant change had occurred from the pretest and posttest. Specifically, the main statistics I reported for interpreting the paired-samples t-test included mean, standard deviation, degree of freedom, t value, p value and the effect size.

To determine the effect size of the paired-samples t-test, I computed Cohen’s $d$, which is defined as the difference between two means divided by a standard deviation for the data (Cohen, 1988). The reason that I used Cohen’s $d$ rather than $r$ to present the effect size is because research (e.g., Dunlap, Cortina, Vaslow, & Burke, 1996) has shown that using an $r$ from a paired-samples t-test leads to an overestimation of the population effect size. According to Cohen (1988), the benchmark to determine effect size for $d$ is: $d = 0.2$ (small), $0.5$ (medium) and $0.8$ (large).

ANCOVA. ANCOVA (Rutherford, 2000) was used to further analyze if the difference of posttest score and pretest score varied between the low Chinese proficiency level group and the high Chinese proficiency level group according the self-reported Chinese proficiency level. The sample size in each group was approximately equal (the low-level group was 53 and the high-level group was 52). The purpose of using the pretest scores as a covariate in ANCOVA with a pretest and posttest design was to “(1) reduce the error variance; and (2) eliminate systematic bias” (Dimitrov & Rumrill, 2003, p.161). The main statistics I reported for interpreting the ANCOVA included sums of square, degree freedom, mean square, $F$ value, $p$ value, and Partial Eta-Squared. According to Cohen (1988), the benchmark to determine effect size for Partial Eta-Squared is: $\eta^2 = 0.02$ (small), $0.13$ (medium) and $0.26$ (large).

Discourse analysis. To answer Research Question 2 (Is there any pattern of online game-based learning to improve students’ Chinese language knowledge?), verbal discourse
analysis of the records of students’ text chat for completing the game task was conducted.

I firstly read the text chat records of the six scenarios, and found that four of them had few useful records due to the technology problem and the number of participants. To better analyze the data and get more accurate results, I picked up the two scenarios that contained enough information for analysis. Scenario 1 is about shopping for clothes, and it was for the classes in grade B. Scenario 2 is about talking about hobbies, and it was for the classes in grade C. That means students in Scenario 2 had higher Chinese proficiency level than students in Scenario 1.

To do the discourse analysis of students’ text chat records, data transformation approach (Tashakkori & Teddlie, 1998) was used to transform qualitative data into quantitative data. This involved creating codes, definitions, and examples qualitatively, and then counting the frequency of the codes occurred in the text data (Creswell, 2003). I read through the text of the two scenarios carefully to identify possible categories for coding. To understand how online game-based learning had positive effect on Chinese language learning, I developed three categories for coding. Firstly, I coded three different types of knowledge that were practiced in the gaming process, including grammar, vocabulary, and pragmatics. Secondly, I identified three types of task according to students’ activities in the game: (1) starting the conversation with small talks and greetings; (2) interpreting how to complete the task to peers and helping peers to solve technical problems; and (3) completing the assigned tasks with peers. Thirdly, I also coded the interaction among peers, which meant students helped peers to solve language problems during the gaming process. Table 3.4 presents the code, definition, and an example of each category and subcategory.
Table 3.3

*Coding Definitions and Examples*

<table>
<thead>
<tr>
<th>Major category</th>
<th>Subcategory</th>
<th>Code</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>Grammar</td>
<td>K1</td>
<td>A sentence involves the knowledge of grammar in the lesson.</td>
<td>Which kind of cloth are you <em>wearing</em> today?</td>
</tr>
<tr>
<td></td>
<td>Vocabulary</td>
<td>K2</td>
<td>A sentence involves the knowledge of vocabulary in the lesson.</td>
<td>I am a <em>seller</em>.</td>
</tr>
</tbody>
</table>
|                | Pragmatics  | K3   | A sentence involves the knowledge of pragmatics. | --Is red good on me?  
|--                        |             |      | --*Not bad.*            |
| Task           | Small talk and greetings | T1   | Starting the conversation with greetings or talking about other things irrelevant to the lesson. | Hello! Today is so cold! |
|                | Interpret task and technology problems | T2   | Interpreting how to do the task or solving the technology related problems. | We are supposed to practice shopping clothes, not going for lunch. |
|                | Complete the task | T3   | Completing the task that is assigned by the teacher. It has to contain the key knowledge of the theme. | How much is this dress? (the task is shopping for clothes) |
| Interaction    | Help from peers | I    | Helping peers when they are wrong or have questions. | --Does “xiānshēng” mean your boyfriend or husband?  
|--                        |             |      | --It means husband.     |

*Note.* The italic words in the examples are the key words pointing out the category style. For the definition of knowledge, it counted for one turn even though it was wrong on grammar, vocabulary, and pragmatics.
The pattern for analysis was calculated by the frequency and percentages of turns in each category (Hmelo-Silver, 2003). According to Hmelo-Silver, one turn means one meaning unit of the discourse in the present study. In most situations, one sentence contained one turn, but if a long sentence contained two or more independent meaning units, it was coded as two or more turns. For example, the sentence “I want to look for a teacher to teach me shadow boxing, do you want to learn together?” was coded as two turns. For all major categories, the percentages of turns included in those categories were computed. For the subcategories, percentages were computed based on total number of turns within the major category.

**Descriptive analysis and ANOVA for students’ attitude.** To answer Research Question 3 (Is online game-based learning enjoyable and motivating for students learning Chinese language?), both quantitative and qualitative data collected from the survey were analyzed. To analyze the quantitative data that were collected from the closed-ended survey, I first used descriptive data to get the mean and standard deviation of each questions. I also calculated the percentages of agreement for each of the items about attitude to check how many participants had positive attitude toward online game-based learning. To further explain students’ attitude towards online game-based learning, ANOVA was conducted to see if there were group differences among different ages. Assumptions of ANOVA, which are normality and homogeneity, had been checked. The main statistics I reported for interpreting the ANOVA included sums of square, degree freedom, mean square, F value, p value, and ω² value. For ω² value, it has been suggested that values of .01, .06 and .14 represent small, medium and large effect, respectively (Kirk, 1996). In addition, t-test was used to check if there was group difference between male and female. The assumption of homogeneity was checked.
**Analysis of the open-ended questions.** There are three open-ended questions included in the third section of the survey: (1) What do you feel about the online game-based learning experience; (2) How do you think playing the online game improved your Chinese in general; and (3) How do you think playing the online game improved your Chinese listening, speaking, reading, and writing? The responses to open-ended questions can provide a direct view into a respondent’s own thinking (Roberts, et al., 2014). In other words, open-ended questions on the survey can elaborate responses and offer insights that not captured in the closed-ended questions.

In the present study, techniques developed for analyzing qualitative data were used to analyze the responses to the three open-ended questions (Marshall & Rossman, 1989). Specifically, I used five steps to analyze the open-ended responses. Step one is that I read through all of the responses one by one carefully, and took notes of the key words and phrases that representing some patterns and common themes. In Step two, I developed coding categories (see Table 3.5) for the different themes I summarized after reading the responses. The third step was to label each response with one or more coding categories. I completed this step in an Excel spreadsheet with responses in the columns of coding categories that they belong. In Step four, I checked what categories are related, and identified the patterns and trends that emerged. The last step was to write up the analysis. I used descriptive texts incorporating narratives directly from the respondents to summarize what I had found.
Table 3.4

**Coding Categories for the Open-Ended Questions**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-coding</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>Good and funny</td>
<td>It’s funny and a good way to learn Chinese. The online game experience is helpful to review what I’ve learned.</td>
</tr>
<tr>
<td></td>
<td>Authentic, informative, and various activities</td>
<td>It is helps to understand the situation in the real world.</td>
</tr>
<tr>
<td></td>
<td>Good for young people</td>
<td>I think it’s a good idea, especially for 10-30’s age range.</td>
</tr>
<tr>
<td>Negative</td>
<td>Distract</td>
<td>It’s helpful to remove some anxiety of speaking Chinese. It’s a little bit distracted.</td>
</tr>
<tr>
<td></td>
<td>Generally not good</td>
<td>It is funny but it is not helpful for learning Chinese.</td>
</tr>
<tr>
<td></td>
<td>Difficult to use</td>
<td>It was difficult to use computer. I cannot handle computer well.</td>
</tr>
<tr>
<td>Neutral</td>
<td>Classroom experience is better</td>
<td>Interesting, but I prefer the classroom experience.</td>
</tr>
<tr>
<td></td>
<td>Not sufficient, need more activities and materials</td>
<td>I think it is a good tool to support the learning of Chinese. I don’t think I could learn Chinese from a game only.</td>
</tr>
<tr>
<td></td>
<td>Not for everyone</td>
<td>I think, that it’s a good way for learning Chinese, because it’s really interesting for me, but not for all. I think it’s a good idea.</td>
</tr>
<tr>
<td></td>
<td>Nothing special</td>
<td>There’s no difference with other learning games.</td>
</tr>
<tr>
<td>Question 2</td>
<td>Helpful</td>
<td>Helpful Reinforce and repeat</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Make learning easier and better</td>
<td>This game is very funny and interesting, and the load of learning Chinese decreased.</td>
</tr>
<tr>
<td></td>
<td>Attractive</td>
<td>If I use this program continually, my Chinese level will improve slowly but without boring.</td>
</tr>
<tr>
<td></td>
<td>Self-esteem</td>
<td>This is helpful to improve self-esteem and Chinese language skills by practicing the language I have learned before.</td>
</tr>
<tr>
<td></td>
<td>Authentic</td>
<td>This game made me to practice Chinese in real world.</td>
</tr>
<tr>
<td></td>
<td>Not helpful</td>
<td>Generally not helpful</td>
</tr>
<tr>
<td></td>
<td>Technology problems</td>
<td>May be it needs to improve the multitasking feather. Full screen capabilities, I think so that you can play it in a full screen move and maybe close up the avatar.</td>
</tr>
<tr>
<td></td>
<td>Not good for adults</td>
<td>I think it’s a good way for young students, but it’s difficult for older people.</td>
</tr>
<tr>
<td></td>
<td>Neutral</td>
<td>Same with other learning practice</td>
</tr>
<tr>
<td></td>
<td>Nothing special</td>
<td>It has an impact in learning Chinese.</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>Because it’s first time. I will continue to practice.</td>
</tr>
<tr>
<td>Question 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td><strong>Listening</strong></td>
<td>It’s helpful to listening because I can listen repeatedly. Writing and speaking is not.</td>
<td></td>
</tr>
<tr>
<td><strong>Speaking</strong></td>
<td>It’s good for speaking because I followed the pronunciation exercise, and it’s also good for writing.</td>
<td></td>
</tr>
<tr>
<td><strong>Pronunciation</strong></td>
<td>It improves proper pronunciation through listening!</td>
<td></td>
</tr>
<tr>
<td><strong>Reading</strong></td>
<td>It’s a good way to read, but it’s not useful for writing.</td>
<td></td>
</tr>
<tr>
<td><strong>Writing</strong></td>
<td>This game helps me to have chance to write.</td>
<td></td>
</tr>
<tr>
<td><strong>Vocabulary</strong></td>
<td>I can play the game every day and it helps to remember new words.</td>
<td></td>
</tr>
<tr>
<td><strong>Neutral</strong></td>
<td>There’s only Pinyin for Chinese, so it’s limited for learning Chinese. If the program includes both the Pinyin and the Chinese character, it will be more useful for me.</td>
<td></td>
</tr>
<tr>
<td><strong>Good for all</strong></td>
<td>It has a role in all the above listening, speaking, reading and writing.</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4

Results

Effective Online Game-Based Learning for Improving Chinese Language Knowledge

To answer the first research question (Is online game-based learning effective for improving Chinese language knowledge?), quantitative data were collected through pretest and posttest of students’ Chinese language knowledge. Paired-samples $t$-test was used to test whether statistically significant change had occurred from the pretest and posttest. ANCOVA was used to examine if there were group differences of the change from pretest and posttest. There were two major findings regarding the effects of online game-based learning on improving Chinese language knowledge.

Assumption checking for main findings. Two assumptions of paired-samples $t$-test had been checked before interpreting the results (Tabachnick & Fidell, 2007). First, the boxplot (see Figure 4.1) of the differences between the posttest and pretest scores showed that there was an outlier that was more than two standard deviations higher than the mean. However, when run analysis both with the outlier and without it, the answers (e.g., $t$ value and $p$ value) were the same. Thus, there was no outlier that had significant effect on the results.
Second, the distribution of the differences between the posttest and pretest scores was approximately normally distributed. The P-P plot (see Figure 4.2) showed that the data points all fell very close to the ideal diagonal line, which meant the sampling distribution was normal (Field, 2013).
Main findings on the difference of posttest and pretest. Results of the paired-samples $t$-test showed a statistically significant difference in the mean test score before and after playing the game (see Table 4.1). The mean Chinese language quiz score after playing the game ($M = 4.67, SD = .63$) was about .56 points (out of 5 points) higher than before playing the game ($M = 4.11, SD = 1.08$), $t (104) = 7.45, p < .05, d = .52$. The results suggested that posttest score was significantly higher than pretest score with a medium-sized effect size.
Table 4.1
Results of Paired-Samples t-test and Descriptive Statistics for Comparing Pretest and Posttest of Students’ Chinese Language Knowledge

<table>
<thead>
<tr>
<th>Outcome</th>
<th>N</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Cohen's d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td></td>
<td>105</td>
<td>4.11</td>
<td>1.08</td>
<td>4.67</td>
</tr>
</tbody>
</table>

* p < .01
Assumption checking for further findings. To further analyze if the difference of posttest score and pretest score varied between the low-level Chinese proficiency group and the high-level Chinese proficiency group, ANCOVA with pretest as the covariate, gain score as the dependent variable, and Chinese proficiency level as the independent variable, was performed. The regular assumptions for linear model, such as normality, homogeneity (Levene’s test was not significant at $p < .05$ level) and independent had been checked. Two important additional considerations for ANCOVA had also been checked (Field, 2013): (1) independence of the covariate; and (2) homogeneity of regression slopes. To test the independence of the covariate, an ANOVA with pretest as the outcome and students’ Chinese proficiency level as the predictor was run. The results showed that the means for pretest scores were not significantly different in low-level and high-level groups, $F(1, 103) = .78, p > .05$, partial $\eta^2 = .008$. This suggested that the pretest scores were roughly equal across the two groups, which was appropriate for using the pretest score as a covariate in the analysis. In addition, the homogeneity of regression effect was checked, and the covariate (pretest score) was linearly related to the dependent variable (gain score), $F(1,104) = 207.62, p < .05$, partial $\eta^2 = .67$.

Further findings on group differences. The results of ANCOVA showed that there was no significant difference of the gain score between low-level Chinese proficiency group and high-level Chinese proficiency group after controlling for the effect of pretest score, $F(1, 104) = .28, p > .05$, Partial $\eta^2 = .01$. This indicated that students’ Chinese proficiency level did not significantly influence on the gain score with a very small effect size.
Table 4.2

Results of ANCOVA with Chinese Proficiency Level as the Independent Variable, Gain Score as the Dependent Variable, and Pretest Score as the covariate

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall model</td>
<td>40.25</td>
<td>2</td>
<td>20.12</td>
<td>102.10*</td>
<td>.00</td>
<td>.67</td>
</tr>
<tr>
<td>Pretest score</td>
<td>40.13</td>
<td>1</td>
<td>40.13</td>
<td>207.62*</td>
<td>.00</td>
<td>.67</td>
</tr>
<tr>
<td>Chinese proficiency level</td>
<td>.06</td>
<td>1</td>
<td>.06</td>
<td>.28</td>
<td>.60</td>
<td>.01</td>
</tr>
<tr>
<td>Total</td>
<td>59.96</td>
<td>104</td>
<td>.06</td>
<td>.28</td>
<td>.60</td>
<td>.01</td>
</tr>
</tbody>
</table>

* p < .05.

In summary, results for Research Question 1 showed that posttest score was significantly different from pretest score. The mean of posttest score was about half standard deviation higher than the mean of pretest score. Furthermore, there was no significant difference of the gain score between high-level group and low-level group in terms of Chinese proficiency after controlling for the effect of pretest score.

**Demonstrated Patterns of Online Game-Based Learning**

To answer the second research question (Is there any pattern of online game-based learning to improve students’ Chinese language knowledge?), qualitative data of students’ text-based chat during the game were collected and analyzed using discourse analysis (Creswell, 2003). Three major findings about knowledge of Chinese language, tasks completed in the game, and interactions among students, are summarized and interpreted in the following. For each of the findings, I first use a table to show where game-based learning improved Chinese language learning, and then list examples to interpret how students learned during the text chat in the game.
**Knowledge.** According to the discourse analysis about the three categories of grammar, vocabulary, and pragmatics (see Table 4.3), it was found that grammar was the highest in percentage of the three categories (47% in scenario 1, and 53% in scenario 2). In other words, students practiced grammar mostly during playing the game compared with vocabulary and pragmatics.

Table 4.3

*Category Frequencies and Percentages for Knowledge*

<table>
<thead>
<tr>
<th>Coding categories</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Within category %</td>
</tr>
<tr>
<td>Number of turns</td>
<td>34</td>
<td>125</td>
</tr>
<tr>
<td>Grammar</td>
<td>16</td>
<td>47%</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>8</td>
<td>24%</td>
</tr>
<tr>
<td>Pragmatics</td>
<td>10</td>
<td>29%</td>
</tr>
</tbody>
</table>

The following are the examples of students’ discourse that help to explain the pattern of how students improved their Chinese language knowledge. This includes examples and explanations of learning pattern of grammar, vocabulary, and pragmatics, respectively.

**Grammar.** Overall, there were two main findings about the grammar knowledge: (1) the Chinese grammar knowledge had been improved by collaborative activities between peers; and (2) students had opportunities to reinforce knowledge of grammar by repeating what they have learned. In the following text, I will elaborate these two findings with examples of participants’ discourse.

As shown in Table 4.4, Student1 firstly used “you ma”, which was wrong in grammar, to express the meaning of “is it ok?” Student 2 used “xing ma (is it ok)” and “hao ma (is it ok)” to
answer student 1’s question, which was correct in grammar. At the end of this dialogue, Student 1 revised his/her grammar with help of student 2’s sayings. This example showed that the student realized the grammar mistake he/she made and corrected it through collaborative discussion with peers.

Table 4.4

Example 1: How Students Corrected Their Grammar Mistakes through Collaborative Discussions

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>Corrected text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ni gei wo hen pianyi.</td>
<td>Ke yi ma?</td>
<td>Please give me a cheaper price.</td>
</tr>
<tr>
<td>1</td>
<td>You ma?</td>
<td>Ke yi ma?</td>
<td>Is it ok?</td>
</tr>
<tr>
<td>2</td>
<td>99kuai</td>
<td></td>
<td>99 RMB (Chinese currency).</td>
</tr>
<tr>
<td>1</td>
<td>?</td>
<td></td>
<td>?</td>
</tr>
<tr>
<td>2</td>
<td>Xing ma?</td>
<td></td>
<td>Is it ok?</td>
</tr>
<tr>
<td>1</td>
<td>Pa bai kuai hao ma?</td>
<td>Ba bai kuai hao ma?</td>
<td>How about 800 RMB?</td>
</tr>
<tr>
<td>2</td>
<td>Hao de.</td>
<td></td>
<td>Ok.</td>
</tr>
<tr>
<td>1</td>
<td>Ke yi ma?</td>
<td></td>
<td>Is it ok?</td>
</tr>
<tr>
<td>2</td>
<td>Ke yi!</td>
<td></td>
<td>Ok!</td>
</tr>
</tbody>
</table>

Another main finding of grammar knowledge is that students had opportunities to reinforce knowledge of grammar by repeating what they have learned. As shown in Table 4.5, students used the syntax about comparison (e.g., as well as, be better than) repeatedly to complete the task of talking about hobbies with peers. They have learned this in normal face-to-face class, and they reinforced the knowledge in the online game by repeating it again and again in different context.
Table 4.5

*Example 2: How Students Reinforced Their Knowledge of Grammar by Repeating What They had Learned*

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>Corrected text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>中国的有名的打篮球队员是谁?</td>
<td>中国的有名的篮球队员是谁?</td>
<td>Who is the most famous basketball player?</td>
</tr>
<tr>
<td>4</td>
<td>是姚明.</td>
<td></td>
<td>It is Yaoming.</td>
</tr>
<tr>
<td>4</td>
<td>你打得比姚明好吗?</td>
<td>Do you play basketball better than Yaoming?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>他肯定比我好.</td>
<td>He must be better than me.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>哈哈。。你也挺棒的.</td>
<td>Haha. You play very well too.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>打篮球我肯定不如你,因为我不懂打.</td>
<td>I don’t play basketball as well as you because I don’t know how to play basketball at all.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>我读中文读的不如你好,对吧?</td>
<td>我读中文读得不如你好,对吧?</td>
<td>My Chinese is not as good as yours, am I?</td>
</tr>
<tr>
<td>4</td>
<td>哪里,你中文说得也不错.</td>
<td>No, you speak Chinese very well too.</td>
<td></td>
</tr>
</tbody>
</table>

Vocabulary. The results showed that students’ vocabulary knowledge had been improved with help from peers during the gaming process. As same as knowledge of grammar, students reinforced the new words they learned by repeating them in the chat with peers. Table 4.6 presented an example of how students learned the new word with help of peers, and Table 4.7 presented an example of how students reinforced the new words by repeating them in the chat.
Table 4.6

Example 3: How Students Learned New Words by Practicing with Peers in the Text Chat

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>我不喜欢做饭，但是我每天做.</td>
<td>I don’t like cooking, but I cook everyday.</td>
</tr>
<tr>
<td>5</td>
<td>因为我的先生每天要吃饭.</td>
<td>Because I have to cook for my “xiansheng”.</td>
</tr>
<tr>
<td>6</td>
<td>你的先生意思是你男朋友还是老公?</td>
<td>Does “xiansheng” mean your boyfriend or your husband?</td>
</tr>
<tr>
<td>5</td>
<td>是老公的意思.</td>
<td>It means husband.</td>
</tr>
</tbody>
</table>

In Example 3 (see table 4.6), Student 6 did not know what the word “xiansheng (husband)” in Student 5’s sayings meant and was confused at the beginning of the conversation. He/she figured out that it might mean boyfriend or husband according to the context. Then Students 5 helped him/her and confirmed that it meant husband. At the end of the conversation, Student 6 learned the new word in the conversation with peers.

Table 4.7

Example 4: How Students Reinforced the New Words by Repeating Them in the Text Chat

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>Corrected text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>你的爱好是什么?</td>
<td></td>
<td>What is your hobby?</td>
</tr>
<tr>
<td>8</td>
<td>我的爱好是看电影.你呢?</td>
<td></td>
<td>My hobby is watching movies, how about you?</td>
</tr>
<tr>
<td>7</td>
<td>我的爱好是做饭.</td>
<td></td>
<td>My hobby is cooking.</td>
</tr>
<tr>
<td>8</td>
<td>你喜欢什么样的菜?你喜欢什么样的菜?</td>
<td></td>
<td>What kind of dish do you like?</td>
</tr>
<tr>
<td>7</td>
<td>中国的菜.</td>
<td>中国菜.</td>
<td>Chinese dish.</td>
</tr>
</tbody>
</table>
In Example 4 (see Table 4.7), “爱好 (hobby)” is one of the key words in the task. In the conversation between peers, they repeated the word “hobby” several times in order to complete the task about talking about their hobbies. That reinforced their knowledge of the new word.

*Pragmatics.* The practice of pragmatics has to been done under conversations among people. The results of analysis for students’ verbal discourse showed that under the environment of online game-based learning, students applied their pragmatics skills in the authentic conversation with their gaming partners. Although the conversations with the knowledge of pragmatics embedded in it did not happen in the real life, but they did happen among real people synchronously under an authentic communication environment. Example 5 (see Table 4.8) gives an example of how students practiced their pragmatics skills in the online chat. As we can see from Example 5 below, Student 9 asked if red cloth fitted him/her. Student 10 used “not bad” to answer it. In this context, Student 10 chose the suitable word to describe his/her opinion and at the meanwhile respect Student 9’s taste of color.

Table 4.8

*Example 5: How Students Practiced Their Pragmatics Skills in the Online Chat*

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>我穿红色衣服.</td>
<td>I’m wearing red clothes.</td>
</tr>
<tr>
<td>9</td>
<td>红色合适吗?</td>
<td>Is red good on me?</td>
</tr>
<tr>
<td>10</td>
<td>还可以.</td>
<td>Not bad.</td>
</tr>
</tbody>
</table>
**Tasks completed in the game.** As shown in Table 4.9, the types of tasks completed in the game were completing the task (47% for Scenario 1 and 55% for Scenario 2), small talk and greetings (34% for Scenario 1 and 36% for Scenario 2), and interpretation of tasks and technologies (19% for Scenario 1 and 10% for Scenario 2). There was no obvious difference between the two scenarios in terms of the percentages of coding categories. Students spent about one third of turns on small talk and greetings (34% in Scenario 1 and 36% in Scenario 2). In Example 5 (see Table 4.10), students introduced themselves to each other before doing the task. Although this is not required for completing the task, students could benefit from it in terms of practicing the language knowledge they have learned in an authentic conversation environment. For instance, in Example 5, students reviewed how to say “what is your name” in the text chat with peers.

<table>
<thead>
<tr>
<th>Coding categories</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Frequency</td>
</tr>
<tr>
<td><strong>Number of turns</strong></td>
<td>91</td>
<td>157</td>
</tr>
<tr>
<td><strong>Small talk and greetings</strong></td>
<td>31</td>
<td>56</td>
</tr>
<tr>
<td><strong>Interpret task/technology</strong></td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td><strong>Complete the task</strong></td>
<td>43</td>
<td>86</td>
</tr>
</tbody>
</table>
Table 4.10

*Example 6: Small Talk and Greetings between Students*

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Wo jiao piao xin, ni ne?</td>
<td>My name is Piaoxin, how about you?</td>
</tr>
<tr>
<td>12</td>
<td>Wo jiao wangzi.</td>
<td>My name is Prince.</td>
</tr>
<tr>
<td>11</td>
<td>王子！王子很 cool.</td>
<td>Prince! Prince is cool.</td>
</tr>
<tr>
<td>12</td>
<td>Piao xin ye hen cool.</td>
<td>Piaoxin is cool too.</td>
</tr>
<tr>
<td>11</td>
<td>谢谢！</td>
<td>Thanks!</td>
</tr>
</tbody>
</table>

**Interaction.** The discourse analysis results showed that there were some observed interactions between peers (8% of the total turns in Scenario 1 and 4% in Scenario 2). These interactions between peers were mainly about how peers help each other to learning Chinese during completing the task. Students benefited from their interactions and it helped them to complete the task successfully. In Example 6, Student 13 talked about looking for a teacher to teach them shadow boxing, but Student 14 did not understand what he/she said. Then Student 13 used another way to explain his/her meaning, and Student 14 got the correct meaning finally.
Table 4.11

Example 7: How Students Helped Each Other to Learn Chinese Interactively

<table>
<thead>
<tr>
<th>Student</th>
<th>Original text</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>我想请一个老师教我学习太极拳，你也想一起吗?</td>
<td>I want to look for a teacher to teach me shadow boxing, do you want to learn together?</td>
</tr>
<tr>
<td>14</td>
<td>不明白</td>
<td>I don’t understand.</td>
</tr>
<tr>
<td>13</td>
<td>请一个老师教我们学习太极拳，好吗?</td>
<td>Let’s look for a teacher to teach us shadow boxing, ok?</td>
</tr>
<tr>
<td>14</td>
<td>好好.</td>
<td>Good.</td>
</tr>
</tbody>
</table>

In summary, the results to address Research Question 2 (Is there any pattern of online game-based learning to improve students’ Chinese language knowledge?) showed in three ways. First, students improved their knowledge of Chinese language through collaboration, reinforcement, repeating, and authentic environment. The results also showed that students practiced grammar mostly during playing the game compared with vocabulary and pragmatics. Second, by completing the assigned tasks, students not only learned the Chinese language knowledge embedded in the tasks, but also practiced the knowledge they had learned (e.g., how to express greetings) in an authentic environment. Third, although the interactions between peers accounted for a small proportion in the total turns, it helped them to understand each other’s sayings and learned from each other.

Enjoyable and Motivated Online Game-Based Learning

To answer Research Question 3 (Is online game-based learning enjoyable and motivating for students leaning Chinese language?), I used both quantitative results (descriptive
statistics and ANOVA) and qualitative results (analysis of the responses of open-ended questions).

**Main findings.** The descriptive results of students’ attitude are shown in Table 4.12. As shown in the table, all the average scores of the eight items were above 3.5 point based on the 5 Likert score of the survey. These findings showed that participants had above-neutral (more than 3 point) levels of attitude towards the online game learning experience. In addition, the highest score (3.94) was for “The online game leaning experience was easy for me,” and lowest score (3.58) was for “I’m satisfied with the way that the online game supported my Chinese learning.” The difference of them was .46, which showed there was no huge difference among the scores. Furthermore, as shown in the table, the total percentages of “agree” and “strongly agree” were all larger than 50, which means more than half of the participants agreed or strongly agreed with the eight items.

Table 4.12

<table>
<thead>
<tr>
<th>Item</th>
<th>Agreement (%) of agree or strongly agree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy enough to play</td>
<td>76.2</td>
<td>3.94</td>
<td>.81</td>
</tr>
<tr>
<td>A good way to learn</td>
<td>74.3</td>
<td>3.85</td>
<td>.80</td>
</tr>
<tr>
<td>Enjoyable</td>
<td>60.0</td>
<td>3.64</td>
<td>.86</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>59.0</td>
<td>3.77</td>
<td>.90</td>
</tr>
<tr>
<td>Happy to learn online</td>
<td>58.1</td>
<td>3.74</td>
<td>.89</td>
</tr>
<tr>
<td>Motivated</td>
<td>58.1</td>
<td>3.67</td>
<td>.87</td>
</tr>
<tr>
<td>Comfortable</td>
<td>58.1</td>
<td>3.62</td>
<td>.92</td>
</tr>
<tr>
<td>Support learning</td>
<td>53.3</td>
<td>3.58</td>
<td>.97</td>
</tr>
</tbody>
</table>
**Group differences of the attitude.** ANOVA was conducted to see if there were group differences in age and *t*-test was used for gender. For ANOVA, two assumptions of ANOVA, which are normality and homogeneity, were checked. The Shapiro-Wilk scores for groups of younger than 18, 18-25 years old, 26-30 years old, and 30 or older were all insignificant (p > .05), which means for those four groups, the dependent variable, “students’ attitude”, was normally distributed. Levene’s test score was also insignificant (p > .05), indicating that the variances in the four groups are equal. ANOVA results showed that there were significant differences among the four age groups (see Table 4.13), \( F(3, 101) = 6.64, p < .05, \omega^2 = .19 \). The results suggested that students’ attitude varied among different age groups with a large-size effect size. Post Hoc analysis using the Scheffé post hoc criterion for significance indicated that the average score of students’ attitude was significantly lower in the 30 years or older group (\( M = 27.46, SD = 5.89 \)) than in the 18-25 years old group (\( M = 32.84, SD = 4.14 \)), \( p < .05 \).

Comparisons between other groups (younger than 18 and 26-30 years old) were not statistically significant.

Table 4.13

**Results of ANOVA for Students’ Attitude Scores in Four Different Age Groups**

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>( F )</th>
<th>( p )</th>
<th>( \omega^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>510.94</td>
<td>3</td>
<td>170.31</td>
<td>6.64*</td>
<td>.00</td>
<td>.19</td>
</tr>
<tr>
<td>Within groups</td>
<td>2591.25</td>
<td>101</td>
<td>25.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3102.19</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* \( p < .01 \).
For the t-test that examined if students’ attitude was different between male and female, the assumption of homogeneity was checked, and Levene’s score was insignificant (p > .05), indicating that the variances between groups were equal. The results showed that there was no significant difference of students’ attitude between male and female. That means students’ attitude towards online game-based learning was not significantly related with gender.

Results of the open-ended questions. To further exam students’ attitude towards online game-based learning, students’ answers of three open-ended questions were analyzed. In the following text, I summarized the themes merged from the answers of each question, and listed example answers for the themes.

The first open-ended question was about the overall attitude of the online game-based learning experience (What do you feel about the online game-based learning experience?), more than half (38 out of 58) of the respondents showed positive attitude. There were three major themes merged from participants’ answers of this question. The most prevalent theme raised by respondents was that they felt online game-based learning is fun and is good for learning. The following comments from respondents are some examples that illustrated this point:

“It’s funny and a good way to learn Chinese. The online game experience is helpful to review what I’ve learned”.

“Learning with game makes me feel very funny and it’s good for learning. So I like it”.

“This is a good way to study easily and it’s funny”.

“It is a good chance for me to learn Chinese pleasantly”.
“It is very fun to learn Chinese online because sometimes it can be often boring. Study in class is very good but this various activity adds more fun”.

Being authentic and informative was another common theme raised by students to demonstrate their attitude towards the online learning experience.

“This program helped me to understand specific situation”.

“It was good because I experience various activities”.

“It is helps to understand the situation in the real world”.

“It’s informative and very helpful”.

“I like because I can make a relationship with the other ones and learning Chinese”.

A few respondents reported that this is especially good for young people to learn Chinese.

“I think it's a good idea, especially for 10-30’s age range”.

“I think this is a good program for children because it's funny and attractive”.

However, there were a few negative responses raised by students. Some of the students felt that it was difficult to control the gaming process and it might distract learning. There were also some neutral voices from students saying that it was not good for everyone, or they did not see the advantages compared with classroom learning.

For the second open-ended question (How do you think playing the online game improved your Chinese in general?), most of the respondents (44 out of 56) thought the online learning experience was helpful for their Chinese learning. There were six major themes merged from participants’ answers of this question. The most prevalent theme (22 out of 44
responses) rose by respondents was that they felt online game made learning easier and better.

The following comments from respondents are some examples that illustrate this point:

“This game is very funny and interesting, and the load of learning Chinese decreased”.

“It’s helpful to improve Chinese by playing online game rather than book”.

“Simple and comfortable”.

“I like playing games so I learned this very fast and easily”.

“I learn new useful words quickly”.

Another important theme raised by students is that the online gaming reinforced learning by repeating what they’ve learned before.

“Helps reinforce what I have already learned in class”.

“This game made me sustain my memory. The repeated learning is good”.

“This game made me to review what I’ve learned repeatedly”.

“I think it helped me practice some of the Chinese sentences that I have learned in my classes”.

Also, students felt that they benefited from online gaming because it provided an authentic learning environment.

“I think I will handle well similar situation in real life because I learned some very important and useful words that I will need in real world”.

“This game made me to practice Chinese in real world”.

“With real life situation, it helps to practice useful sentences. Repetitive listening and practice probably would improve my Chinese”.

60
In addition, a few students said the online game is attractive and then they would like to learn more.

“If I use this program continually, my Chinese level will improve slowly but without boring”.

“I’m curious of this game, so I can focus on it and learn”.

“It is helpful to get some curiosity of Chinese language, so it’s attractive”.

There was one student mentioned that this is good for his/her self-esteem:

“This is helpful to improve self-esteem and Chinese language skills by practicing the language I have learned before”.

A few negative and neutral attitudes were about the technology problem and age issue:

“I think it’s a good way for young students, but it’s difficult for older people”.

“I will try my very best. I want to learn Chinese, but not easy for me”.

The third question was about in which part the online game improved Chinese knowledge (How do you think playing the online game improved your Chinese listening, speaking, reading, and writing?). According to the amount of responses from most to least, the order was listening (15), reading (10), speaking (6), and writing (5). In other words, students benefited more from input (listening and reading) than output (speaking and writing). The following are some examples of comments from the respondents on listening, reading, speaking, and writing, respectively:

“It’s helpful to listening because I can listen again and again. Writing and speaking is not.”
“It improved my reading abilities with the new vocabulary”.

“It’s good for speaking because I followed the pronunciation exercise”.

“This game helps me to have chance to write”.

In addition to listening, reading, speaking, and writing, there were two students mentioned that game-based learning helped them on vocabulary:

“This helps to improve vocabulary learning”.

“I can play the game everyday and it helps to remember new words”.

Also, there were two other students commented that it was good for improving pronunciation:

“It improves proper pronunciation through listening”!

“It is good to learn listening and pronouncing”.

Some of the students did not point out in which part online game-based learning improved Chinese language knowledge, but they gave comments on how online game-based learning helped them to improve Chinese language learning. In addition to the themes that summarized from the first two open-ended questions, e.g., situated environment and authentic learning, these students suggested that online game-based learning helped them on long term memory of Chinese language. The following are some examples that illustrated this point:

“Visual stimulus is good for memorize the language for a long term”.

“This game is helpful of long term memory using visual and audio”.

“This game helps to remember the language in a long term because of the visual activities and the listening exercise”.
“I think it helps me in my daily learning not to forget what I learned use in conversation.”

In summary, most of the participants presented above-neutral attitude levels towards the online game learning experience. Further examination of the group differences showed that younger students liked the online game-based learning experience more than older students. In addition, students listed their positive attitudes towards online game-based learning, considering online game-based learning authentic, informative, attractive, funny and easy to learn. However, there were also negative attitudes like distracting, technology problems and age issue.
Chapter 5
Discussion

The major purpose of the present study was to test the learning outcomes and students’ attitude of online game-based learning. The results of the present study, in general, showed that online game-based learning was effective for improving students’ Chinese language knowledge; students benefited from the online game-based learning by completing tasks collaboratively with peers; and the participants agreed that they enjoyed learning Chinese by playing the online game.

This chapter consists of five sections. Firstly, I will summarize and discuss the findings of the study on the learning outcomes of online game-based learning. Secondly, I will summarize and discuss the findings of the study on students’ attitude towards online game-based learning. Thirdly, I will discuss the empirical and theoretical contribution and practical implication of the present study. Fourthly, I will acknowledge the limitations of this study. Finally, I will point out recommendations for future research.

Learning Outcomes and Processes of Online Game-Based Learning

The effects of online game-based learning on Chinese language acquisition were found in three ways. First, it was found that online game-based learning was effective for improving the score of students’ Chinese language quiz. The results showed that students’ quiz scores after playing the game were higher than before playing the game. In other words, through playing the online game, students improve their performance on the test that measured vocabulary and grammar knowledge related to the language used in the six scenes of the game. This finding
supports those of many other studies (e.g., Chen, Kuo, Lou, & Shih, 2012), which found that learners’ Chinese language knowledge was improved after using online games to learn the language. These studies have tended to examine the general effect rather than the effect to the specific kind of knowledge of online Chinese language learning. The findings of the present study on the differences of posttest and pretest further supports the effectiveness of online game-based Chinese learning by showing that students’ vocabulary and grammar knowledge were improved after practicing the language knowledge in the related scenes of the online game.

Second, for the purpose to further clarify how online game-based learning influenced students’ language learning, the pattern of online game-based learning process has been demonstrated by analyzing students’ text chat in the game. The transformation of qualitative data into quantitative data revealed where the improvements happened. It has been shown that among the three major categories of Chinese language knowledge, grammar was practiced mostly compared with vocabulary and pragmatics. In addition, it has been shown that their grammar, vocabulary and pragmatics knowledge was improved through interactive activities between peers, e.g., corrected the grammar problems with help from peers and reinforced the new words they learned by repeating them in the chat with peers. Other studies (e.g., Zheng, Young, Wagner, & Brewer, 2009) also demonstrate that language knowledge, like pragmatics, grammar and semantics were enhanced during the intercultural interaction when playing online games. However, these studies have only examined the effect of intercultural interaction of online game-based learning but not the learning process. The present study not only addressed
that the language knowledge was improved through interaction among peers, but also went beyond and looked into the learning process of how the interactions made learning happen. The present study was dedicated to make deeper and more comprehensive understandings of online game-based learning process. Through looking into the learning process, we see that the online game was supportive for Chinese language (especially grammar and vocabulary) learning by providing learners multiple interactive opportunities to get massive input and modify output with help from peers whose knowledge are better than them.

Third, the present study also checked the group differences of the effectiveness of online game-based Chinese language learning. Further examination of the gain scores between the two groups of students according to their Chinese proficiency did not find any difference between them. In general, there was no significant difference of the effect of online game-based learning on Chinese language acquisition among students with different levels of Chinese proficiency. In addition, the results of discourse analysis revealed that there was no obvious difference between the two scenarios in terms of the pattern of Chinese language knowledge practice. This and the quantitative findings above together revealed that, for the relationship of online game-based learning and Chinese language learning outcomes, there was no significant difference among students with different levels of Chinese proficiency. In other words, the effectiveness of online game-based Chinese language learning did not vary according to students’ Chinese proficiency level. The online game-based Chinese language learning outcomes did not rely on learners’ Chinese language skills. Despite the different levels of the students’ Chinese language proficiency, their learning outcomes were improved after learning and playing in the online
game. However, there is no existing research on the group differences of learning outcomes of online game-based learning with which to compare this finding. Previous research in this field focused on the general outcomes of learning rather than group differences. Further research about group difference of online game-based learning for second language acquisition is needed to validate and extend the knowledge.

Putting the three findings above together, we see that for Chinese as a second language acquisition, online game-based learning is effective for improving the learning outcomes, especially for grammar and vocabulary. Additionally, the online game-based learning involves in an authentic and interactive process. According to Krashen (1982), the acquisition of a language is a natural process. In other words, language learners need to participate in natural communicative situations to acquire the language knowledge. This explains why the online game was effective for Chinese as a second language learning through an authentic and interactive learning process.

Students’ Attitude towards Online Game-Based Learning

The major finding of the present study on students’ attitude towards online game-based learning is that most of the participants had positive attitudes towards the online game learning experience. The finding supports other related studies (e.g., Connolly, Stansfield, & Hainey, 2011) that students’ attitudes towards online game-based learning were positive with evidence suggesting that they had motivational experience in the learning process. The present study is consistent with those findings and is aimed to make progress in this direction. Specifically, the present study extended the understandings of students’ attitude towards online game-based
Chinese language learning in two ways.

First, besides motivation and satisfaction that most of the existing studies focus on, the present study included other aspects of students’ attitude towards online game-based Chinese language learning. More than half of the participants agreed or strongly agreed that they were satisfied with the online game-based learning experience; they felt comfortable in the online game environment; they enjoyed learning Chinese language that way; they were motivated of learning Chinese language via the online game; they felt online game-based learning is fun and attractive; they liked learning Chinese language in the authentic and informative environment of the online game; they felt online game-based learning made learning easier and better; and they thought online game-based learning reinforced learning by repeating what they have learned before. Those findings of students’ attitude are more comprehensive and have reached several aspects of attitude. The reason of studying students’ attitude is for better understanding how online games support language learning. It is well known that online game is motivating and attractive, thus students like to spend time on learning the language in the platform provided by online games. This study shows us more details of students’ attitude that are directly related to learning. For instance, they like learning Chinese by playing the game because it is authentic and informative; the game makes learning easier and better since it gives learners opportunities to reinforce what they have learned.

Second, the present study examined group differences of the attitude towards online game-based learning. There were previous studies on age difference of attitude towards online game-based learning (e.g., Yee, 2006), the present study further found that younger students
showed more positive than older students in terms of their attitude towards the online
game-based learning experience. For example, there were students reported that online
game-based learning is not good for everyone, but it is good for young people to learn Chinese.
However, there were studies (e.g., Balarabe, 2006) found that attitude of online game-based
learners are not necessarily influenced by age differences. The explanation for the finding of the
present study is that the young generation (the younger participants in the present study were
born after the year of 1990) grew up in the environment with modern Internet technologies.
They have been called “digital native”. Compared with older generation, they are more likely to
accept online game as a learning tool and have more positive attitude towards it.

Contributions and Implications

**Empirical contributions.** Cognitive and emotional effects of game-based learning have
extensively been studied. However, this study makes three specific empirical contributions to
this field and help advance the current scientific understanding of effects of game-based
learning on students.

First, this study used a mix-method research design to address the research questions,
instead of using only quantitative methods as many studies have done (e.g., Suh, Kim, & Kim,
2010) in the field. Quantitative methods in this study gave an average-based overview of the
effects of online game-based learning and students’ attitude toward it. Qualitative methods used
in the study (e.g., discourse analysis), on the other hand, added in-depth insights about the
research questions that cannot be obtained from the quantitative methods.

Second, this study further examined the group differences of cognitive and emotional
effects of online game-based learning. For the cognitive effects, I further examine the significant difference of the quiz scores gained after playing the online game among the two groups of students with low and high Chinese proficiency levels. It is found that students’ quiz scores improved after playing the online game, no matter with their previous Chinese proficiency level. For the emotional effects, I further examined students’ attitude varied among two different age groups and found that students of 18-25 years old had significant higher positive attitude towards online game-based learning than that of students of 30 years or older. Previous studies in this field primarily have focused on the overall effects of online game-based learning in the entire target populations, but this study was the first to find that there were age differences of students’ attitude towards online game-based learning.

Third, this study demonstrated the patterns of online game-based Chinese language learning process. Previous empirical studies in the field mainly examined the cognitive effects (e.g., Chiang, Lin, Cheng, & Liu, 2011) and/or emotional effects (e.g., Yip & Kwan, 2006), and a large portion of those studies were about English as second language learning (e.g., Zheng, Young, Brewer, Wagner, 2009). My study was the first in this field revealing empirically how the cognitive effects of online game-based learning of Chinese language took place. It was found that students improved their knowledge of Chinese language through collaboration, reinforcement, and repeating in the authentic environment embedded in the online game.

**Theoretical contributions.** The empirical findings concluded in this study provide evidence to further understand how the various affordance of the game Zon supports input, enable opportunities of output and authentic language interactions among peers in the context
of game scenarios. First, the present study provided empirical evidences to better understand
the relationship of Input and Output hypothesis. The Output Hypothesis (Swain & Lapkin, 1995)
questioned Krashen’s Input Hypothesis that comprehensive input is not the only sufficient way
for language acquisition, learners learn something new about the language when they are able
to modify their output. One of the big problems for second language learners is that they can get
enough language input from classrooms, textbooks, and the sayings form other people, but
seldom have opportunities to use the language, which is the output of the language. The online
game playing combine input and output together in the scenarios that embedded in the game.
On the one hand, the various affordance of the game Zon provided learners massive input of
Chinese language knowledge so that they were immersed in the language acquisition
environment. On the other hand, students also have many opportunities to modify their output,
such as interacting with the virtual players and chat with the real players in the game. Output
Hypothesis (Swain & Lapkin, 1995) claims that, in addition to the comprehensive input,
students improve language by modifying their output so that they learn something new about
the language. When students in the present study made conversations in the online game, they
realized their mistake of language and revised it with help of peers (see Example 1 in Table 4.4
for an example). In this way, the game Zon enabled opportunities of improving output
production in the context of online game scenarios. Overall, the online game provided learners
opportunities to combine the advantages of both input and output for improving their Chinese
language knowledge.

Second, the present study provided empirical evidences to better understand
Interaction Hypothesis (Ellis, 1997). The main idea of Interaction Hypothesis is that when learners say something wrong or cannot understand something, they may receive feedback or correct it by interacting with peers. Findings of the present study provided evidence that students improved their language knowledge by interacting with peers that might have higher Chinese level than them (see Example 3 in Table 4.6 for an example). In other words, online game-based learning provided learners such a convenient and synchronous environment to interact with learners who had various levels of Chinese language knowledge. Among those peer learners, there were some ones having better Chinese language knowledge so that they could give useful feedback to peers who had interaction with them. That learning process made the language acquisition more efficient and motivating. Additionally, the idea of Interaction hypothesis existed in the 1980s, and was well known since 1990s. At that time, Interaction hypothesis states that the development of language proficiency is promoted by face-to-face interaction and communication (Johnson & Johnson, 1999). Nowadays, with the widely use of Internet technology, the efficient interaction and communication is not necessary to be face-to-face. The online game-based learning is synchronous and authentic so that language learners can interact with other learners all over the world.

**Practical implications.** The present study has two major practical implications for online game-based learning and Chinese language acquisition. First, it underlined the possibility of online game-based learning effectively facilitating second language acquisition. Specifically, the learning outcomes were improved after playing the online game for both of the students with higher-level Chinese proficiency and lower-level Chinese proficiency. In other
words, students benefited from the online game-based learning no matter of their Chinese proficiency levels. Thus, Chinese language teachers can include multiple level students in the same online scenario but assign them different tasks according to students’ Chinese proficiency levels. In this way, the online game can provide effective environment for students to learn from peers whose Chinese language knowledge are better than them. In addition, the knowledge of grammar was particularly improved, while the improvement of vocabulary and pragmatics were also addressed by the participants. Furthermore, students benefited more from input (listening and reading) than output (speaking and writing) in the online learning process. Based on these findings, Chinese language teachers and students can consider using online games to help Chinese language learning, especially for learning grammar and improving listening and reading abilities. Instructional game designers and teachers could consider adding supplemental learning materials for developing students’ speaking and writing abilities, which are the output productions. Also, in addition to improving grammar knowledge, teachers and students need to add more tasks on improving vocabulary and pragmatics knowledge in order to develop the language abilities comprehensively. At the meantime, teachers can design various learning activities in the platform of the online game to provide students sufficient interaction opportunities.

Second, the findings of the present study demonstrated students’ attitude of the online game-based learning. Most of the participants reported positive attitude towards the online game-based learning experience. More than half of the participants felt motivated, enjoyed, and comfortable in the online game-based learning environment. With these positive results, the
online instructional games that designed for second language learning will help a broad range of language learners to engage online game-based learning together when they bond with each other in the game. At the meantime, they will feel so motivated and enjoyed that they would like to learn the language through playing the online game for a long term. This suggests teachers and parents that online games can motivate students especially for those who are hard to insist on learning the language for a long time. However, comparing the attitude among different age groups found that younger students showed more positive than older students. Younger generation is more likely to use the online game smoothly and successfully compared with older generation. Based on these findings, second language educators and learners should consider apply online game-based learning into their normal teaching and learning process to motivate students. For instance, after the face-to-face classes, teachers can use the online game as a supplemental tool to assign students practices based on what they have learned from the lectures. However, it should be acknowledge that the online game-based learning may not be good for every student, especially for adult students. That is, teachers can consider provide more interactive activities for younger students and more input materials for older students when they learn the language in the online game.

Limitations

Three major limitations reduced the internal and external validity of the present study. First, one major limitation of the present study is that there was no control group used in the design. It would be better if there was a control group that did not use online game-based learning to compare with the treatment group. The control group could give reliable baseline
data to compare the results with and could help reduce experimental errors and experimenter bias (Shadish, Cook, & Campbell, 2001). Nevertheless, the present study used the pretest and posttest to compare the cognitive effect of online game-based learning, which is a repeated measure that adds more confidence about the research findings.

The short duration of the study is another possible limitation of intervention studies such as the present study. The participants played the game for about one hour and completed the quizzes and surveys within thirty minutes. The duration of the study was about one and a half hours. If the participants could experience online game-based learning for a longer time, then not only short-term learning outcomes but also long term learning outcomes can be assessed.

The measures used to measure Chinese language variables represent another potential limitation to the validity of the findings. The Chinese language quizzes were created by the teachers of each of the classes participating in the study. These quizzes were closely related to the content covered in both the formal teaching and in the online game, but there was little information available about the reliability and validity of the quizzes.

**Future Research**

The present study was an attempt to examine the cognitive and emotional effects of learning Chinese in an online game-based learning environment, and to explore how this online learning process changed students’ learning outcomes. The empirical results in this study provides a comprehensive base for future research in game-based second language learning with quantitative and qualitative evidence of the cognitive effect, the pattern of online game-based learning, and students’ attitude towards it. In future research, besides further effort
to overcome the existing limitations of the study, specifically, I will conduct case studies for in-depth examinations of online game-based learning for second language acquisition for the following considerations.

First, according to Cohen, Manion and Morrison (2007), case study is described as a “powerful method in observing effects and determining the impacts of causes and effects in real contexts” (p. 253). The research purposes of doing my future case study (1) to better understand both specific processes and complex effects of online game-based learning, which is related to Research Question 2 of the present study and (2) to check individual differences of online game-based learning, which is to further understand group differences that have been examined in the present study.

Second, the case study data will be collected in the same college where the present study was conducted. Three to five international college students who are in the elementary level of Chinese language will be recruited for the case study. For better understand the individual differences of online game-based learning, participants will be students with different genders, mother languages, Chinese proficiency levels, and degrees of attachment to games.

Third, the participants will be asked to do a pretest about shopping for groceries, which will also be the topic of the gaming section. Then the students will log in Zon, and enter the “365 Convenient Store” in Zon to play the game. The activities in the gaming section will be as same as the gaming activities for the data collected for the present study. A screen recording software, Camtasia Studio (TechSmith Corporation, 2015), will be used to record students’ gaming activities, including interacting with the virtual players and texting with peers. At the
meantime, the students’ activities (e.g., movement, gestures, and oral discourse) will be videotaped. After that, students will be asked to do the posttest and complete the survey as well. Last, a video-stimulated recall interview (Lyle, 2003) will be conducted with the students to investigate students’ learning process during playing the game. To do the video-stimulated recall interview, the students will be interviewed while they are watching the videotape of their gaming activities. The video helps to stimulate students’ recall of their actions during the gaming and learning process. The video can be paused anytime when students are asked to analyze their activities.

Fourth, after data collection, the pretest and posttest scores will be compared to see if online game-based learning is effective for improving Chinese language knowledge and if there are individual differences in the improvement; the video-stimulated recall interviews will be analyzed to better understand the dynamic learning process happened during playing the online game and the individual differences in the process; the answers to the survey will be analyzed to find out if there are individual differences in students’ attitude towards online game based learning. As a result, while the data collected in the case studies will be used address the same three research questions in the present study, the future case studies will provide the unique and rich individual-level empirical data to demonstrate the dynamic and complex process of game-based Chinese language learning of diverse learners in the real-life classroom.
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APPENDICES

Appendix A: The Chinese Language Quizzes

Quiz for Scenario 1

姓名________

1. 这件衣服________肥。
   A. 有点儿      B. 一点儿

2. 这件衣服太大了，换一件小________的。
   A. 有点儿      B. 一点儿

3. 这件衣服很合适，____肥____瘦。
   A. 不……不……         B. 又……又……

4. 安妮：谢谢你！
   林月：你____客气了。
   A. 很      B. 太

5. 这件衣服颜色和样子____合适。
   A. 都      B. 也
Quiz for Scenario 2

姓名____________

1. 我的________是下棋。
   a. 爱好       b. 喜欢

2. 我觉得中国的象棋_______有意思。
   a. 常常       b. 非常

3. 我喜欢_______中国画儿。
   a. 画         b. 写

4. 我现在在学习________太极拳。
   a. 玩儿       b. 打

5. 我想_______一位中国老师教我中国画。
   a. 叫         b. 请
Quiz for Scenario 3

姓名___________

1. 左右握右手，________不会让你的心颤抖，________拿重的东西的时候，左手累了，

你会换到右手上。

   a. 虽然。。。但。。。  b. 不但。。。而且。。。

2. 吃饭的时候，大家谈起夫妻_______的感情问题。

   a. 中间  b. 之间

3. 握着老婆的手，就像左手握右手，一点儿________都没有。

   a. 感觉  b. 觉得

4. 天冷的时候，你会________把左手和右手握在一起取暖。

   a. 不自觉地  b. 自觉地

5. 大家都说小芳的理解_______深刻______独特。

   a. 一边一边  b. 既。。。又。。。
Quiz for Scenario 4

姓名__________________

1. 你打得好，我打得好，我______你打得好。
   A. 不如      B. 比

2. 大卫打得也______棒的。
   A. 非常      B. 挺

3. 我觉得他没有你打得______好。
   A. 很      B. 这么

4. 游泳我________不如你，因为我刚学会。
   A. 肯定      B. 一定

5. 麦克：你打得真棒！
    山本：________，你打得也不错啊。
   A. 哪里      B. 那里
Quiz for Scenario 5

姓名__________

1. 我今天迟到了，因为我 8 点______起床。
   a. 才  b. 就

2. 我起床太晚了，没________吃早饭。
   a. 来得及  b. 来不及

3. ________你迟到了，今天下雪堵车了。
   a. 原来  b. 怪不得

4. 我一般早睡早起，晚上十点______睡觉了。
   a. 才  b. 就

5. 你快去上课吧，______迟到了。
   a. 不  b. 别
Quiz for Scenario 6

姓名__________

1. 他晚上睡得太晚，上课的时候________有些困。
   a. 难免               b. 避免

2. 你每天熬夜，_______生病不可。
   a. 非               b. 一定

3. 听你这______话的意思，好像你不喜欢足球啊！
   a. 遍               b. 番

4. 我的身体很好，熬夜________生病。
   a. 至于               b. 不至于

5. ________你不喜欢足球，为什么还跟我们一起评论比赛呢？
   a. 既然               b. 虽然
Appendix B: Survey Questionnaires

Survey Questionnaire in English

Questionnaire of Online Game-based Learning Experience

I. Please check or write down your answers to the following nine (9) questions.

1. Your gender _____Male     _____Female

2. Your age
   _____Younger than 18
   _____18-25 years old
   _____26-30 years old
   _____30 or older

3. Your nationality? __________

4. What’s your first language? __________

5. How many semesters have you been learning Chinese in a formal class?
   _____Less than one semester
   _____1-2 semesters
   _____3-4 semesters
   _____5 semesters or more

6. How do you evaluate your Chinese proficiency?
   Poor               Conversational   Fluent   Excellent

7. Have you ever taken HSK? ______
   If yes, what was the HSK score you got? ______

8. How do you evaluate your computer skills?
   Poor                Basic            Good      Excellent

9. How many hours per day do you spend on using Internet?
   _____Less than one hour
   _____1-4 hours
5-10 hours
11 hours or more

II. Please recall the experience when you played or learned on the game of ZON. Please circle the number that most match your experience on the game in the following eight (8) questions.

1 = Strongly Disagree 2 = Disagree 3 = Neither Agree nor Disagree 4 = Agree, 5 = Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>a. I am satisfied that I learned from this experience.</td>
<td></td>
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<tr>
<td>b. I felt comfortable in the online game environment.</td>
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<tr>
<td>c. The online game was a good way to learn Chinese.</td>
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<tr>
<td>d. I liked learning Chinese via the online game.</td>
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</tr>
<tr>
<td>e. I’m satisfied with the way that the online game supported my Chinese learning.</td>
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<tr>
<td>f. I enjoyed learning Chinese language that way.</td>
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<tr>
<td>g. The online game learning experience was easy for me.</td>
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<tr>
<td>h. I’m motivated of learning Chinese via the online game.</td>
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</table>

III. Please write down your thoughts to the following three questions.

1. What do you feel about the online game-based learning experience?

2. How do you think playing the online game improved your Chinese in general?

3. How do you think playing the online game improved your Chinese listening, speaking, reading, and writing?

Thank you for your participation!
I. 请写下或者选择您对以下9个问题的答案。

1. 你的性别 ______男 ______女

2. 你的年龄
   ______18岁以下
   ______18-25岁
   ______26-30岁
   ______30岁以上

3. 你的国籍是？ ______

4. 你的母语是？ ______

5. 你在正规的课堂里学习过几个学期的汉语？
   ______不到一学期
   ______1-2个学期
   ______3-4个学期
   ______5个学期以上

6. 你怎么自我评价你的汉语水平？
  很差 可交流的 流利 非常好

7. 你参加过汉语水平考试（HSK）吗？ ______
   如果是，你的HSK成绩是多少分？ ______

8. 你觉得你的电脑操作水平怎么样？
  很差 基础 不错 非常好

9. 你每天花多少小时上网？
   ______不到一小时
   ______1-4个小时
   ______5-10个小时
   ______11小时以上
II. 请根据您玩游戏ZON的经历，在以下8个问题中圈出最适合您的看法的数字。
1 = 非常不同意 2=不同意 3=既不同意也不反对 4=同意 5=非常同意

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</thead>
<tbody>
<tr>
<td>a. 我很满意我在这个游戏经历中学到的。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. 我在这个网络游戏环境中感觉很舒服。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. 这个网络游戏是一个很好的学习汉语的方式。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. 我喜欢通过网络游戏学习汉语。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e. 我很满意这种通过网络游戏辅助我的汉语学习的方式。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f. 我在这种学习汉语的过程中感到很开心。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. 对我来说，这种网络游戏学习汉语的方式比较容易。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h. 网络游戏提高了我学习汉语的积极性。</td>
<td>1</td>
<td>2</td>
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<td>4</td>
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</tbody>
</table>

III. 请写下您对以下3个问题的想法。
1. 你对这种通过网络游戏学汉语的经历有什么体会和看法?

2. 你认为网络游戏如何提高了你的整体汉语水平?

3. 你认为网络游戏如何提高了你的汉语听，说，读，写能力?

谢谢您的参与!
Survey Questionnaire in Korean

[설문지] 온라인 게임을 통한 학습 효과

1. 아래 9가지 질문에 대한 답을 적으시오.

1. 성별 ______남 ______여

2. 나이
   ______18세 미만
   ______18-25세
   ______26-30세
   ______30세 이상

3. 국적 ______

4. 모국어 ______

5. 정식으로 중국어를 배운 지 몇 학기가 되었습니까?
   ______한 학기 이하
   ______1-2 학기
   ______3-4 학기
   ______5 학기 이상

6. 당신의 중국어 수준은 어느 정도입니까?
   부족함 보통 잘함 매우 잘함

7. HSK 시험을 본 적이 있습니까? ______
   본 적이 있다면, 당시 HSK 몇 급을 받으셨습니까? ______

8. 당신의 컴퓨터 실력은 어느 수준입니까?
   컴퓨터에 대하여 잘 모르기
   기본적인 것만 사용 가능
   잘하는 정도
   매우 잘함

9. 하루 중 인터넷 사용에 몇 시간을 사용하십니까?
   ______한 시간 미만
   ______1-4 시간
II. 존 (ZON) 게임을 배웠거나 놀았던 기억을 떠올려 보십시오 그리고 아래 8가지 질문에 대한 답을 적으십시오.

1 = 매우 아니다  2 = 아니다  3 = 보통이다  4 = 그렇다  5 = 매우 그렇다

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<tbody>
<tr>
<td>a. 이런 경험을 한 것에 대해 만족한다</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b. 나는 온라인 게임을 하는 것이 편했다</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c. 온라인 게임을 중국어를 배우기 좋은 방법이라고 생각한다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d. 온라인 게임을 통하여 중국어를 배우는 것이 좋았다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>5</td>
</tr>
<tr>
<td>e. 온라인 게임이 나의 중국어 실력을 향상시킨 것에 대해 만족한다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f. 나는 이런 방법을 통해 중국어를 배우는데 만족한다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g. 온라인 게임의 경험이 나에게는 쉬웠다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h. 앞으로도 온라인 게임을 통해 중국어를 배우는 것이 기대된다.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tbody>
</table>

III. 아래 3가지 질문에 대한 당신의 생각을 적으십시오.

1. 온라인 게임을 통한 학습 경험에 대해서 어떻게 생각하는지 당신의 생각을 적으십시오.

2. 온라인 게임을 하는 것이 어떻게 당신의 중국어 실력을 향상시켰다고 생각하는지 적으십시오.

3. 온라인 게임이 어떻게 당신의 중국어 듣기, 말하기, 읽기, 쓰기를 향상시켰다고 생각하는지 적으십시오.

참여해 주셔서 감사합니다!