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Student perceptions of a mobile augmented reality game and willingness to communicate in Japanese

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Pepperdine University

Graduate School of Education and Psychology

STUDENT PERCEPTIONS OF A MOBILE AUGMENTED REALITY GAME AND

WILLINGNESS TO COMMUNICATE IN JAPANESE

A dissertation submitted in partial satisfaction

of the requirements for the degree of

Doctor of Education in Learning Technologies

by

Andrea Misao Shea

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Martine Jago, Ph.D. – Dissertation Chairperson

This dissertation, written by

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under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

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ABSTRACT

Communication is a key component in learning a second language (L2). As important as the *ability* to communicate in the L2 is the *willingness* to use the L2 or, what has been identified in the literature as *Willingness to Communicate* (WTC). Language is best learned when situated in, and based on, real-life experiences. Technological tools such as virtual worlds, mobile devices, and augmented reality (AR) are increasingly used to take language learning outside of the classroom. The affordances (e.g., portability, engagement, context-sensitivity) of these tools may have an impact on the following WTC antecedents: perceived competence, reduced L2 anxiety, security, excitement, and responsibility. The nature of this impact suggests that an AR mobile game may positively affect students' WTC. The purpose of this case study was to examine student perceptions regarding the use and design qualities of an AR mobile game in the language learning process and the effect of these qualities on student perceptions of their WTC. Nine students in a second-year Japanese language class at an institute of higher education in California participated in the study by playing an AR mobile game for three weeks. Data were collected through a demographic survey, game-play observations, game artifacts in the form of images and audio, game log data, and interviews. Findings suggest that AR mobile games can provide a viable means to take language learning outside the classroom and into self-selected spaces to affect positively students' WTC. From this investigation, it is evident that AR mobile language learning games can: (a) extend learning outside the classroom, (b) reduce L2 anxiety, and (c) promote personalized learning.

Chapter 1: Introduction

As the global playing field becomes flatter, opportunities for people to collaborate transnationally in academic, scientific, and manufacturing projects are becoming more numerous. Friedman (2007) describes the concept of "flatness" as "how more people can plug, play, compete, connect, and collaborate with more equal power than ever before" (p. 2). Preparing the workforce through the inclusion of globalization in higher education is now paramount. Proficiency in a foreign language is a necessary and important element of globalization studies (Brustein, 2007). Yankelovich (2005, p. 4) identified "the need to understand other cultures and languages" as one of five trends to be embraced in higher education circles by the year 2015 in order for the United States to keep up with, and adapt to, the outside world. In this respect, there is no denying that learning a foreign language is an essential means for today's learners to become citizens of the world.

Context

Communication is a key component in learning a second language (L2). However, as important as the *ability* to communicate in the L2 is the *willingness* to use the L2 or, what has been identified in the literature as *Willingness to Communicate* (WTC). WTC in an L2 has been defined as a learner's "readiness to enter into discourse at a particular time with a specific person or persons, using a L2" (MacIntyre, Dörnyei, Clément, & Noels, 1998, p. 547). In other words, WTC is the likelihood of a person initiating communication in an L2 with others in a specific situation. Research has shown that learners who demonstrate a higher level of WTC have increased frequency and greater amount of L2 usage (Clément, Baker, & MacIntyre, 2003; Hashimoto, 2002; MacIntyre & Charos, 1996; Yashima, Zenuk-Nishide, & Shimizu, 2004).

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Language is best learned when situated in, and based on, real-life experiences (Dewey, 1938; Lave & Wenger, 1991). Indeed, research has shown that in order to be effective, language learning cannot take place solely within the confines of a classroom; it is most successful when used in real-life situations, ideally in a country where the language is spoken (Inozu, Sahinkarakas, & Yumru, 2010; Ogata & Yano, 2004; Riney & Flege, 1998). First language (L1) acquisition typically takes place at an early age in the home environment. However, learning a foreign language (L2) in a country where it is not designated as an official language can be a challenge. Even in a country as linguistically diverse as the United States, it can be difficult to find opportunities to practice a foreign language outside of the classroom in authentic situations. A number of technological tools have been used to take language learning outside of the classroom: (a) virtual worlds, (b) mobile devices, and (c) augmented reality (AR).

Virtual worlds, such as Second Life, have been used as extensions of language classrooms in lieu of language learners being physically present in countries where the target language is the official language (Jauregi, Canto, de Graaff, Koenraad, & Moonen, 2011; O'Brien & Levy, 2008; Yu, Song, Resta, Chiu, & Jang, 2013). Virtual worlds are computer-generated three-dimensional simulations in which users are represented on-screen by personal avatars, and the users can communicate with others through gestures, text, and voice. Studies suggest that experiences in virtual worlds enhance participants' awareness of the target language, and participants have expressed positive attitudes toward language learning in virtual worlds (Peterson, 2010; Wehner, Gump, & Downey, 2011; Zheng, Young, Brewer, & Wagner, 2009).

The mobile device is another technological tool that has been used to take language learning beyond the classroom. Cell phones, personal digital assistants (PDAs), and more recently, smartphones and tablet computers can enhance language lessons. Mobile technologies

afford several characteristics that make them an ideal platform for language learning: portability, social interactivity, context sensitivity, connectivity, and individuality (Klopfer, Squire, & Jenkins, 2002). Studies show how mobile devices have been used for language learning through dictionary lookups (Meurant, 2007; Petersen & Markiewicz, 2008), review exercises (Lin, Kajita, & Mase, 2007), vocabulary exercises via text messaging and email (Kiernan & Aizawa, 2004; Levy & Kennedy, 2005; Thornton & Houser, 2005), podcasts (Abdous, Camarena, & Facer, 2009), and e-books (Fisher et al., 2009).

A third technology tool is AR, which brings elements of the virtual world into the real world through the use of mobile devices. Although numerous studies have been conducted separately on mobile devices and virtual worlds for language learning (Abdous et al., 2009; Meurant, 2007; Peterson, 2010), little research has been done on using the real world, augmented by mobile technology, for language learning. Within a virtual world, the learner is immersed in an environment that exists fully on a computer, whereas in AR, students interact with the real world using mobile computers that can determine their location to facilitate location-based learning. AR enhances the real world through the use of location-based technologies such as *markerless* Global Positioning System (GPS) receivers or *marker-based* strategically-placed 2D barcodes (also known as Quick Response or QR codes). These markers are computer-generated codes that can be included on physical items such as posters, business cards, and merchandise (Johnson, Levine, Smith, & Stone, 2010). See Figure 1 for an example of a 2D barcode. Many mobile devices contain software that enables the scanning and interpretation of these codes, which then redirects the user to a website or displays other content, such as images or contact information. Student-owned mobile devices such as smartphones and tablet computers that contain GPS or 2D barcode-scanning software are now becoming ubiquitous on college

campuses (Zickuhr, 2011), making the mobile device an excellent platform for AR software and taking language learning outside of the classroom.

Figure 1. Example of a 2D barcode.

AR technology has been in existence for approximately 20 years as documented in Azuma's (1997) seminal paper on early AR systems. These early systems were used in disciplines such as medicine, robotics, entertainment, manufacturing, and military navigation and required cumbersome head-mounted displays (Caudell & Mizell, 1992). More recently, mobile AR applications for learning have been developed and used mainly in the area of science inquiry (Bressler, 2012; Mathews, Holden, Jan, & Martin, 2008; Squire & Jan, 2007; Squire & Klopfer, 2007). The few studies that have been conducted on AR language learning used 2D barcode (Liu, Tan, & Chu, 2007) or RFID (Radio Frequency IDentification) technologies (Ogata & Yano, 2004) rather than the markerless automatic location detection that comes with GPS or through Wi-Fi positioning. One notable exception is the *Mentira* project which used the Wi-Fi positioning technology on Apple iPods (Holden & Sykes, 2011). *Mentira* was created for use in upper division Spanish classes at the University of New Mexico using an AR game development platform called ARIS (Augmented Reality for Interactive Storytelling: http://arisgames.org/). However, the Wi-Fi positioning technology, although more accessible than 2D barcode or RFID technologies, is not as reliable or accurate as GPS because of variability in Wi-Fi signal strength (Klopfer, 2008), and reliance on the integrity of Wi-Fi database entries.

The use of smartphones by college students has increased significantly in the past few years. According to eMarketer data, at the end of 2011 approximately 60% of college students owned a smartphone, which was a 30% increase from 2010 (Boyle, 2012). Students use the computing capabilities of their smartphones for various activities that range from reading books (25%) to accessing the Internet (90%). These data also showed that almost three-quarters of the students played games on their smartphones at least once a week.

It is well documented that video games are a popular pastime with college-aged adults (Jones, 2003; Lenhart, Jones, & Macgill, 2008; Ogletree & Drake, 2007). Online games are no exception. According to an eMarketer survey, approximately 45% of online gamers fall within the 18-34 year old age group (Phillips, 2011).

The amount of time that a student spends in a classroom in a typical undergraduate program is insufficient to achieve oral proficiency in a foreign language (Malone, Christian, Johnson, & Rifkin, 2003). The Foreign Service Institute (FSI) determined the amount of time it takes their students to achieve certain levels of oral proficiency in different languages. As an example, a Category I language such as French or Spanish takes 575-600 class hours to achieve level 3 (general professional proficiency) on the Interagency Language Roundtable (ILR) scale. At the opposite end, a Category III language such as Arabic or Japanese, which is considered to be exceptionally difficult for native English speakers, takes 2200 class hours to achieve ILR level 3 (Malone & Montee, 2010). According to Malone et al. (2003), the typical undergraduate foreign language program after two years offers only 180 class hours. Even if the number of hours were to be doubled to reflect a four-year language program, there would still be a great deficiency in the number of classroom hours compared to the number of hours required for

proficiency. Hence, in order to move closer to proficiency, students would benefit by spending more hours outside of the classroom improving their oral skills.

Given the popularity of smartphones and online games among college students, the benefits of AR technology in situated learning, the importance of WTC in an L2, and the hours of study required to become proficient in a language, there appears to be a need to explore the efficacy of the application of the combined technologies of AR, mobile devices, and games in support of WTC in language learning outside of the classroom.

In the U.S., Japanese language learning is categorized as Foreign Language (FL) learning in which students are exposed to the Japanese language mainly in the classroom because it is not the official language of the U.S. This stands in contrast to Second Language (SL) learning in which students are exposed to the target language (TL) both inside and outside of the classroom. For example, non-Japanese students who study Japanese in Japan would be considered SL learners. AR can bring the experience of FL learning closer to that of SL learning by simulating the experiences that SL learners enjoy by simply being in the TL country.

The delivery mode of an FL class at the university level is typically not conducive to situated learning: the instructor is often the only native speaker with whom the students interact. Moreover, this interaction tends to be in a lecture format and does not necessarily include social engagement. In a mobile AR game, however, places on campus such as a bookstore, coffee shop, or fast-food restaurant similar to those that a student may encounter in Japan can be used as learning locations. The students will be able to interact appropriately with non-player characters (NPCs) such as fast-food clerks or other customers.

This study was conducted with Japanese language students at a public university in California. To ensure confidentiality, the university will be referred to as California University

(CU) throughout this dissertation. Names of buildings and locations on the campus have also been changed or rendered unreadable for confidentiality purposes. The Japanese language program at this university is part of the East Asian language department. The department awards both major and minor degrees in the Japanese language. The university requires all Bachelor of Arts candidates to complete three courses in one foreign language and Bachelor of Science candidates as required in their major program. In the Spring 2013 quarter, there were approximately 300 students enrolled in Japanese language classes at this university.

The Japanese language classes are held Monday through Friday for 50 minutes per session. A typical class consists of 25 students and is taught by one instructor. The classes are taught in a traditional, lecture-based format.

In a 2012 survey of students who use the computer rooms at this university, 49.2% of the respondents indicated that they owned a smartphone. This is an increase from 34.9% in the previous year, based on data from a similar survey. An informal survey administered as part of a pilot study for an AR mobile game in the Spring 2013 quarter to students in an intermediate Japanese course found that 66% of the students owned smartphones and 63% of the students played video games on either their smartphones or computers.

Purpose Statement

The purpose of this study was to examine student perceptions regarding the use and design qualities of an augmented reality mobile game in a Japanese language course at an institute of higher education in California. This study explored if and how the game's use and design qualities affected students' perceptions of their Willingness to Communicate in Japanese.

Research Questions

This study addressed the following research questions:

1. How do students participating in a second-year Japanese language course at a California public university describe the ways in which playing a mobile AR game influenced their WTC in the Japanese language?

2. What characteristics of a mobile AR game do students participating in a second-year Japanese language course at a California public university attribute to influencing their WTC in the Japanese language?

The individual student cases formed a multiple case study, which yielded greater insight into AR mobile language learning experiences through both individual and cross-case analysis (Miles & Huberman, 1994; Yin, 2009). According to Miles and Huberman (1994), reasons for using cross-case analysis include enhancement of generalizability and "to deepen *understanding and explanation*" (p. 173, emphasis in the original). They further state that "Multiple cases not only pin down the specific conditions under which a finding will occur but also help us form the more general categories of how those conditions may be related" (p. 173).

Delimitations

Delimitations of the research included the study location, timeframe, and sample. The study took place at an institution of higher education in California during the Fall 2013 quarter. All students enrolled in four sections of a second-year Japanese language class were considered eligible to participate in this study.

Limitations

A limitation of this study was the sample size. As it was a requirement to have access to an iPhone, this disqualified students who did not own smartphones or those who had other types

of smartphones such as Android or Blackberry devices. Another limitation was that the participants were volunteers. Students who were not technologically savvy may have decided not to volunteer because of the technological nature of the study. Since the study also investigated WTC, students who did not feel comfortable communicating in Japanese may not have volunteered to participate in the study. Therefore, the students who participated in this study may not have been representative of other students enrolled in the course.

Timing and schedules were also limitations. Since this university runs on a quarter system, there was only a small window of time that could be used for this study that did not impinge on the students' final exam schedules.

Assumptions

It was assumed that all participants in this study would be truthful and candid in their responses in the survey and interview questions. The researcher selected the topic of inquiry. However, for the purpose of this study, researcher bias was eliminated as much as possible. To ensure objectivity, the Pepperdine Graduate and Professional Schools Institutional Review Board (IRB) assessed research design and data collection strategies. This study also assumed that language learning could be enhanced by technology.

Terminology

The following definitions of key terms and concepts will be used throughout this paper.

2D barcode. An optically encoded machine-readable 2-dimensional representation of data. The data are usually retrieved with an optical scanner or camera.

Augmented reality (AR). "A situation in which a real world context is dynamically overlaid with coherent location or context sensitive virtual information" (Klopfer & Squire, 2008, p. 205).

Global Positioning System (GPS). An electronic navigation system that determines the user's location within approximately three meters. GPS only works outdoors and in locations where the device has line-of-sight view of multiple GPS satellites (http://www.gps.gov/).

iOS. Operating system for Apple mobile devices such as the iPhone, iPod Touch, and iPad (http://www.apple.com/ios/).

Marked AR. AR that uses 2D barcodes or RFID tags to provide location-specific information as input to the application running on a mobile device (Pence, 2011).

Markerless AR. AR that uses the physical location data from a GPS receiver on the mobile device as input to the application running on a mobile device (Pence, 2011). Wi-Fi positioning systems provides similar functionality.

Massively Multiplayer Online Role-Playing Game (MMORPG). A genre of online games in which many players interact with fictional characters and each other in a virtual world.

Non-player character (NPC). A fictional character generated and controlled by gaming software.

Personal Digital Assistant (PDA). A palm-size mobile computer, typically with a touch-screen interface.

Short Message Service (SMS). System that allows mobile phone users to send and receive text messages.

Smartphone. A mobile phone that has advanced features such as a camera, GPS, Internet access, and the capability to run software applications. Smartphones typically have touch screens.

Tablet computer. A mobile computer that is larger than a mobile phone but smaller than a laptop. Tablet computers typically have touch screens.

Virtual world. "Persistent, avatar-based social spaces that provide players or participants with the ability to engage in long-term, coordinated conjoined action" (Thomas & Brown, 2009, p. 37). Avatars interact with other avatars as they navigate through the virtual world (Williamson, 2009).

Wi-Fi. A short-range wireless computer network. Wi-Fi often serves as a gateway to the Internet.

Wi-Fi Positioning. Technique used to approximate a device's position by referencing known Wi-Fi access points.

Importance of the Study

The contribution of AR mobile games to the language learning experience, especially in the area of WTC, needs to be examined. In this study, students who are not exposed daily to Japanese speakers were able to interact with a Japanese-speaking and writing NPC in the virtual environment of the game, thus also increasing their time spent in language learning outside of the classroom. AR allows students to experience situated learning, which occurs through social engagement in context and not simply through the acquisition of knowledge (Lave & Wenger, 1991).

Studies of language learning have been conducted in the areas of virtual worlds and mobile learning (Abdous et al., 2009; Meurant, 2007; Peterson, 2010), however little research has been carried out using the real world for language learning, augmented by mobile technology. An investigation that bridges the gap between these two areas of research was necessary.

This study targeted WTC in the Japanese language; however, it is anticipated that the outcome will contribute to a deeper understanding of how mobile AR game-based learning might be used to foster learning in other languages.

Little research to date has been done on the use of mobile AR technology to situate language learning, specifically in the area of WTC in the real world, outside of the traditional higher education classroom. This study contributes to the body of knowledge on language learning and andragogy but may well also contribute to second language acquisition and pedagogy.

Organization of the Study

This study is organized into five chapters, a reference, and appendices. Chapter 1 introduced the study. It included the context of the study, purpose statement, research questions, delimitations, limitations, assumptions, terminology, and importance of the study. Chapter 2 presents a review of the related literature on the conceptual areas of situated learning, mobile learning, video games and language learning, virtual worlds, augmented reality, andragogy, second language acquisition, and willingness to communicate in a second language. Chapter 3 describes the research design and methodology of the study. In Chapter 4, the data findings are presented. Chapter 5 offers an analysis of the findings, a presentation of conclusions, and recommendations for further research.

Chapter 2: Conceptual Foundation

The main conceptual areas for this study are situated learning, mobile learning, video games and language learning, virtual worlds, augmented reality (AR), and willingness to communicate (WTC) in a second language. Each of these components contributes to an understanding of the need for an exploration of mobile AR games in foreign language learning.

Language Learning

As this study focuses on the language learning experience of college-aged students, the area of *andragogy* needs to be outlined. Malcolm Knowles defined *andragogy* as the "art and science of helping adults learn" (1980, p. 43). This concept is in contrast to the term *pedagogy*, which is the art and science of teaching children. Knowles stated that adult learners: (a) are self-directed, (b) can draw on life experiences, (c) have social roles that affect their learning needs, and (d) have immediate need for application of knowledge.

There are many schools of thought regarding how the first language (L1) is acquired. Many educators would agree that this phenomenon occurs naturally in a home environment (Lightbown & Spada, 2006). Second Language Acquisition (SLA) occurs when a learner lives in the country where the target language (TL) is spoken. This is in contrast to Foreign Language (FL) learning in which the learner lives in a location where the TL is not generally spoken (Oxford & Shearin, 1994). SL learners have the benefit of experiencing the TL both inside and outside of the classroom. FL learners, on the other hand, typically experience the TL only in a classroom environment.

In an attempt to bring FL learning closer to that of SL learning, Terrell (1982, p. 121) promoted the concept of a "Natural Approach" to language learning. In the Natural Approach,

more emphasis is placed on real communication and less on grammatical structures and audiolingual skills.

Also with the goal to move FL learning closer to that of SL learning, Stephen Krashen (1982) states that the optimal input for language learning should be comprehensible and set in low anxiety situations. The input should also be interesting to the acquirer (student).

Language learning consists of the four areas of listening, speaking, reading, and writing. This study focuses on the speaking aspect of FL learning.

Situated Learning

Brown, Collins, and Duguid (1989) assert that knowledge cannot be separated from the situation or activity in which it is used and that in order for meaningful learning to take place, it needs to be embedded in authentic situations. Lave and Wenger (1991) offer a similar definition: they suggest that learning occurs through social engagement, in context, and not simply through the acquisition of knowledge. A key component of this concept is the notion that new members of a community participate from the boundary, or what Lave and Wenger (1991) call *legitimate peripheral participation (LPP)*. Although the words *boundary* or *peripheral* may seem to imply insignificance, quite the opposite is true. Wenger (1998) states that peripherality allows for "an approximation of full participation that gives exposure to actual practice" (p. 100). In terms of legitimacy, "learning is not merely a condition for membership, but is itself an evolving form of membership" (Lave & Wenger, 1991, p. 53). In other words, newcomers must be accepted and treated as legitimate members of this community. These new members spend time observing and learning from more experienced members of the community, until they eventually become fully-fledged members themselves.

Situated language learning. In situated language learning, the community for a language learner consists of other learners of the language along with native speakers of the L2. Several studies on situated learning and LPP in language learning have been conducted in areas such as university group projects (Leki, 2001), academic publishing (Flowerdew, 2000), ESL adult immigrant experiences (Norton, 2001), graduate academic communities (Morita, 2004), and tutored writing sessions (Young & Miller, 2004).

In a multiple case study of Japanese graduate students at a Canadian university, Morita (2004) described the students' experiences in participating on the periphery as newcomers to several L2 academic communities at the university. Morita followed the students' progression toward becoming competent members of these communities. The study found value in inquiring into the students' perspectives and not just relying upon observations to understand their participation as members of the communities.

Mobile Learning

Mobile phone usage is pervasive in the U.S. today, including on college and university campuses. The Pew Research Center (Zickuhr, 2011) reports that 85% of Americans over the age of 18 own a cell phone. Additionally, with the advent of smartphones and tablet computers, mobile devices have become much more powerful than their predecessors. Klopfer, Squire, and Jenkins (2002) describe five properties that make mobile devices attractive platforms for learning:

- Portability: mobile devices are small enough that they are almost always in one's possession

- Social interactivity: allows for exchange of data and collaboration with other people

- Context sensitivity: allows for the collection of data based on one's current location and environment

- Connectivity: mobile devices can be connected to other devices through wireless access points and cell phone networks thus allowing for a true shared environment

- Individuality: provides for individualized scaffolding that is customized to the user.

Writing web logs, or what is more commonly referred to as 'blogging', is one way of taking advantage of the mobile platform for learning. Huang, Jeng, and Huang (2009) investigated the effects of mobile blogging on learning at a university in Taiwan. This study found that mobile blogging allowed for better integration of blogging into the students' daily lives because of its mobility aspect. Students were able to blog at any time or place without the need to sit in front of a computer. As a result, the researchers determined that this system provided a more authentic context for learning.

Mobile language learning. Several studies have explored the use of mobile devices for language learning. Cavus and Ibrahim (2009) and Lu (2008) investigated the use of Short Message Service (SMS) as a means for studying vocabulary. Lu's study found that students using mobile devices had greater vocabulary gains than the control group that used traditional paper-based methods for studying vocabulary. The participants in the mobile device group also showed positive attitudes toward learning via mobile phone. All the participants in Cavus and Ibrahim's study reported that they enjoyed using mobile devices to study vocabulary as well. In their study of mobile community blogs for language learning, Petersen, Chabert, and Divitini (2006) found that a community blog extends learning outside of the classroom and facilitates collaboration between students.

Situated mobile learning. Mobile technologies support situated learning by the distinct characteristic of the user always having their mobile devices on their person. Mobile devices can also take advantage of 'context-awareness' (Naismith, Lonsdale, Vavoula, & Sharples, 2004, p. 14) by using information from the environment such as location through the GPS receiver in the mobile device. Ogata et al. (2006) found that with the assistance of a mobile system called Language-learning Outside the Classroom with Handhelds (LOCH), students were active participants in gathering real-life situational information such as photos to complete tasks. The students perceived that the LOCH system aided them in the learning of local expressions and allowed them to practice situationally what they learned in class. The instructors reported that students seemed more confident in speaking the language after using the LOCH system to practice in real-life social situations.

There may be challenges to learning via mobile technology. Cognition overload can occur with small screen sizes and the need to jump from screen to screen in order to complete a task. Kim and Kim (2012) looked at the effects of screen size on vocabulary learning for Korean middle-school students studying English and found that the smaller screen sizes created higher cognitive loads for the students. In their study of the AR game *Alien Contact!* with high-school students, Dunleavy, Dede, and Mitchell (2009) found that students reported feeling "frequently overwhelmed and confused with the amount of material and complexity of tasks" (p. 17) that needed to be performed in order to play the game.

Video Games and Language Learning

History of Computer-Aided Language Learning (CALL). As its name suggests, the field of Computer-Aided Language Learning involves the use of computers in language teaching and learning. In the 1960s and 1970s, mainframe and mini-computers were used for drill-and-

practice exercises in which the computer performed the role of a tutor (Bush, 2008; Warschauer, 1996). One of the better-known learning systems was called Programmed Logic for Automatic Teaching Operations (PLATO), created by the University of Illinois in 1960 (Sanders, 1995) and later purchased by the Control Data Corporation (Hart, 1995). The PLATO IV system consisted of large stations with plasma panels rather than the typical text-based Cathode Ray Tube (CRT) screens that were common at that time. In addition to offering a crisper display, these plasma panels could also display graphics and foreign language fonts (Hart, 1995). These stations were connected to a timeshared mainframe computer, which allowed multiple users to access the same computer resources simultaneously.

In the late 1970s and 1980s, the personal computer became widely available. Users did not need to rely on having access to a timeshared mainframe computer. Instead, they had a powerful machine of their own to use at any time. Drill-and-practice exercises were still available through floppy disks and other media. However, language instructors could now create their own learning activities that incorporated multimedia through the use of authoring software such as HyperCard (Warschauer, 1996).

With the start of widespread availability of the World Wide Web in the 1990s, resources for language learning grew rapidly. As anyone could create web pages, authentic content in an L2 became readily available. Language instructors were also able to take advantage of web-based game authoring software such as Quia (http://www.quia.com) and Hot Potatoes (http://hotpot.uvic.ca/) to create their own learning activities and make them available to anyone on the Internet. Students could also subscribe to instructor-created material through the RSS (Rich Site Summary or Really Simple Syndication) technology, which *pushes* podcast and blog entries to users. Synchronous communication through free Internet applications such as Skype

(http://www.skype.com) and Google Hangouts (http://www.google.com/+/learnmore/hangouts/) allow learners to communicate in the L2 in real-time with their instructors or other native speakers.

Games. One form of CALL is computer or video gaming. Although many definitions for the term *game* exist (Costikyan, 2002; K. Salen & Zimmerman, 2004), this study uses the following definition: "A game is a form of play with goals and structures" (Maroney, 2001, p. 1).

Much of the research involving games and language learning is based on games specifically created for language learning (Hubbard, 1991; Warschauer & Healey, 1998; Yip & Kwan, 2006). However, recent research has shown that games not specifically meant for classroom use are being used to supplement language learning. In their review of Web 2.0 tools (for example blogs and wikis) and the use of games in language learning, Sykes, Oskoz, and Thorne (2008) found that these immersive digital spaces facilitate the blurring of lines between study and play, so that students may transition seamlessly between learner and player, or information consumer and producer.

The results of a study that used the MMORPG game *EverQuest 2* as a tool for learning English as a second language showed that for intermediate and advanced English learners, participation in the game increased their vocabulary by 40%. The researchers also concluded that this MMORPG provided motivation for learning through a desire to communicate with players whose native language was the students' target language (Rankin, Gold, & Gooch, 2006).

Virtual Worlds

Situated learning can occur through the use of technology, particularly in virtual worlds. Thomas and Brown (2009, p. 1) define virtual worlds as "persistent, avatar-based social spaces

that provide players or participants with the ability to engage in long-term, coordinated conjoined action." Characteristics of virtual worlds include:

- Persistence: world exists even after the user exits the world

- Shared Space in Real Time/Synchronous: multiple users participate in the world simultaneously

- Virtual Representation of Self: *avatars* represent users in the world

- Networked Computers: participants gain access to the world through networked computers

- Interactivity: users communicate and collaborate with each other in the world (Bell, 2008; Williamson, 2009).

One of the largest virtual worlds is Second Life (http://secondlife.com). Participants access Second Life via the Internet through a free application available on multiple computer platforms from Linden Lab (http://lindenlab.com). In Second Life, users (residents) create three-dimensional avatars to represent their online persona in the virtual world, and residents can communicate with each other via gesture, text, or voice. See Figure 2 for a screenshot of a class meeting in Second Life.

Figure 2. Screenshot of a class meeting within the Second Life virtual world. Screenshot reproduced with permission of Linden Lab.

Virtual worlds and language learning. Virtual worlds have been used as extensions of language classrooms in lieu of language learners being physically present in countries where the target language is the official language. According to their review of virtual worlds and online games in language learning, Thorne, Black, and Sykes (2009) found that virtual worlds such as Second Life promoted interactions similar to what students would experience in real life. Boundaries, which separated language study from social life, were blurred while in a virtual world.

Affective factors related to language learning have also been studied in virtual worlds. Self-efficacy and attitude were measured in a study of students in China learning English with *Quest Atlantis* (Zheng et al., 2009). The students solved quests in English alongside American, Australian, and Singaporean native English speakers. Compared to the control group, the students who played *Quest Atlantis* rated themselves higher in self-efficacy in English usage, e-communication, and attitude toward English.

In their study of Spanish learners at a southeastern U.S. university, Wehner et al. (2011) found that the group using Second Life reported more positive feelings in the area of motivation as compared to the control group. The learners in the virtual world also reported lower levels of anxiety.

Situated learning in virtual worlds. Virtual worlds can contain digital artifacts and NPCs that can simulate situated learning and LPP. The River City MUVE (Multi-User Virtual Environment) is an example of a virtual world that implements an internship model that allows the player to experience LPP. Designed for middle-school science classes, River City MUVE takes students back in time to the 1800s to help solve the city's health problems. This study used

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a design-based methodology; the researchers conducted several iterations of design and evaluation of the virtual worlds (Dede, Nelson, Ketelhut, Clarke, & Bowman, 2004).

Augmented Reality

AR has been defined as "A situation in which a real world context is dynamically overlaid with coherent location or context sensitive virtual information" (Klopfer & Squire, 2008, p. 205). Mobile technologies offer features such as portability, connectivity, and individuality (Klopfer et al., 2002), which can be used to facilitate and enhance learning in a way that merges the virtual worlds and real world environments. By using location-based technologies such as Wi-Fi or GPS on mobile devices, AR software can provide computer-generated elements such as NPCs that augment reality by appearing on-screen when the player moves to certain geographical locations.

AR technology has been in existence for approximately 20 years, as documented in Azuma's (1997) seminal paper on early AR systems. These early designs were used in disciplines such as medicine, robotics, entertainment, as well as military navigation and required the use of cumbersome head-mounted displays.

AR on mobile devices can encourage transfer of learning which is a challenge for many educators (Klopfer, 2008). Transfer is defined as the "ability to extend what has been learned in one context to new contexts" (Bransford, Brown, & Cocking, 2000, p. 51). In an education setting, this usually means being able to apply what was learned in the classroom to situations in the real world. AR places the learner in the real world while learning is taking place; therefore, the problem of transfer may be minimized.

AR in science inquiry. Many AR games have been designed and implemented in the subject area of science inquiry. In *Environmental Detectives* (Squire & Klopfer, 2007), high-

school and university students played the role of environmental engineers who investigated a chemical spill. Students used handheld Pocket PCs equipped with GPS devices to take virtual environmental samples with the goal of locating the source of the chemical spill. Students had access to virtual experts on their handheld devices to aid in their investigation.

Another AR game in the field of environmental science is *Mad City Mystery,* which took place on the University of Wisconsin, Madison campus (Squire & Jan, 2007). The goal of the game was to determine the cause of death of a fictitious friend. However, the ultimate educational objective of the game was to help students develop investigative and inquiry skills through the research required to determine the friend's cause of death. Participants in this study ranged from elementary through high-school students who took on various roles such as doctors, environmental specialists, and government officials. Each role gave the participants different responsibilities and capabilities. In order to reach the goal, the participants needed to collaborate.

In *Alien Contact!* (Dunleavy et al., 2009), high school students used math, language arts, and science skills to find out why aliens landed on Earth. As students moved around an area, icons representing artifacts and people were superimposed on a map on their handheld devices. When the students were within 30 feet of an artifact or person, the AR software displayed relevant video, audio, and text files to the students.

AR in libraries, museums, and zoos. AR has also been used in venues not necessarily designated as traditional academic locations, such as libraries, museums, and zoos. Many AR projects that take place in libraries have used the marker technology of QR codes (Elmore & Stephens, 2012; Pons, Vallés, Abarca, & Rubio, 2011; Wells, 2012), most likely due to the fact that GPS does not work well indoors. One example of AR usage in a library took place at the University of the Pacific where first-year music majors were introduced to the library's music

collection via a QR scavenger hunt (Wells, 2012). The majority of the students felt that the QR code activity helped them become better acquainted with the library services and thought that the activity was fun or entertaining.

Museum guides on mobile devices are becoming more commonplace. Attractions such as the Getty Museum in Los Angeles (http://www.getty.edu/visit/see_do/gettyguide.html) and St. Paul's Cathedral in London (http://www.stpauls.co.uk/Visits-Events/Sightseeing-Times-Prices/Multimedia-Guides-Tours) provide additional information regarding their artifacts via iPod Touches. The Getty Museum application requires the patron to enter a number corresponding to a number posted near the work of art to display more information regarding the artwork, and the St. Paul's application uses interactive maps to present audiovisual information about the cathedral.

The AR game *Then Now Wow* (previously called *Our Minnesota*) was created for the Minnesota Historical Center and enables visitors to virtually meet and solve problems with real historical figures via iPod Touches (Dikkers, 2012). Visitors use the mobile devices to scan QR codes located throughout exhibits to learn more about the exhibits. Feedback from initial testers indicated that the game was a fun and engaging learning experience.

In the AR game *Zoo Scene Investigators*, which took place at a zoo in Columbus, Ohio, participants aged 10-14 years old were tasked with using clues provided in the game to find out why an intruder broke into the zoo (Perry et al., 2008). Participants were issued handheld computers and GPS units as well as paper worksheets with clues. The goal of this game was to raise awareness about illegal poaching and threats to animals because of habitat loss.

AR in higher education. *Digital Graffiti Gallery* was created by a student at the University of New Mexico in 2010 (Holden, 2011). In *Digital Graffiti Gallery*, players

documented graffiti found on campus by taking pictures using the mobile device's camera and annotating the pictures with the game's note-taking feature. *Digital Graffiti Gallery* was designed to be open-ended with limited guidance from the game. The significance and usefulness of the game increased as participants played; for without their input, the game was just a shell.

An AR mobile campus touring system prototype was developed to guide incoming freshmen at the Fu-Jen Catholic University in Taiwan (Chou & ChanLin, 2012). Users of the system could obtain location-specific information such as the library's operating hours when they were in the vicinity of the library. Based on feedback from the pilot testing, the touring system accomplished its goal of assisting the newcomers in navigating the 86-acre campus.

AR in language learning. Although the aforementioned studies successfully used AR games in educational settings, they were mainly employed in science education contexts or libraries and museums. Few studies have been conducted on the use of AR technology for language learning. The Handheld English Language Learning Organization or HELLO system (Liu & Chu, 2010) is a 2D barcode and handheld AR system. Using the device's camera, students took photos of barcodes attached to objects. The barcode was converted to data that were used to determine the students' location and to access learning material from a remote database. Unlike the previous AR games however, this system did not use GPS but relied solely on 2D barcodes. This can be problematic in that these barcodes are easily removed. This may not pose a problem in a location where the developers have complete control over the environment, i.e. a classroom or a building. However, for places that are publicly accessible, barcodes may be easily removed or defaced, compromising the user's experience.

More recently, Holden and Sykes (2011) from the University of New Mexico, created an AR game called *Mentira* for use by students enrolled in a fourth semester Spanish class. The

main goal of *Mentira* was to connect students in a meaningful way to their language learning experiences. In other words, the designers wanted students not simply to learn the language but also to embrace the culture and location associated with the language. To that end, part of the project included a field trip to the neighborhood of Los Griegos in Albuquerque, which has a strong connection to the Spanish language. Before traveling to Los Griegos, game play began in the classroom with students learning about the game narrative. The goal was to solve a murder, and each student was assigned a different role along with clues only known by his or her character.

Mentira was a media-rich game with 70 pages of Spanish dialogue and expository text, 150 items of visual art, and four video clips. The basic game structure involved conversations between the player and the game's NPCs in the form of scripted dialogues. Although the dialogues were scripted, the player could often choose between multiple responses, and based on this choice, different events occurred.

Students were loaned Apple iPod Touches to play the game. iPod Touches do not have GPS capability and must rely on Wi-Fi connectivity for Internet access. However, because Wi-Fi access in Los Griegos was not reliable, *Mentira* was able to determine where the student was by requesting acknowledgement from the student that they were at a specific location such as near a certain street sign.

Students indicated in interviews that they preferred the on-site activity of the game that took them to Los Griegos versus the classroom activity that could be played anywhere. While some students used Spanish only when necessary to progress through the game, others used Spanish exclusively. The designers felt that this could be construed as evidence of the students

incorporating the setting and narrative of the game to take language learning outside of the classroom.

AR and situated learning. AR allows newcomers to participate in a community of practice, in this case language learning, from the periphery. Because of certain affordances, such as authentic tasks in meaningful situations that mobile AR brings to language learning, the use of AR can be viewed as a form of LPP. AR can provide the "activities, identities, artifacts, and communities of knowledge of practice" that Lave and Wenger (1991, p. 29) associate with LPP. In other words, mobile AR can assist new members of a community in moving from peripheral participation to full participation.

Tool for AR development. Although there are several AR tools currently in existence, such as Layar (http://www.layar.com) and Wikitude (http://www.wikitude.com), the ARIS (Augmented Reality and Interactive Storytelling) system was chosen to create and deploy the game in this study (http://arisgames.org) because of its ease of use and active online community. The ARIS system includes a web-based game editor and an Apple iOS application. The ARIS software was developed by David Gagnon at the University of Wisconsin, Madison and is open-source, meaning that it is free of charge for other developers to modify and use. According to Gagnon, ARIS was designed to "create mobile, locative, narrative-centric, interactive experiences" (Gagnon, 2010, p. 1). The ARIS editor was also designed to be easy to use for non-programmers. Its simple drag-and-drop interface allows game developers to concentrate on game design and functionality instead of programming details.

After a game is developed in the ARIS editor, it is available to play using the companion ARIS iOS application which is available as a free download from the Apple's iTunes App Store (http://www.apple.com/itunes/). The ARIS application runs on iOS devices such as the iPad,

iPhone, and iPod Touch. Upon starting the ARIS application, the player can search for nearby

games or for a particular game by its name. See Figure 3 for a screenshot of the ARIS

application's interface consisting of a main window and tab bar.
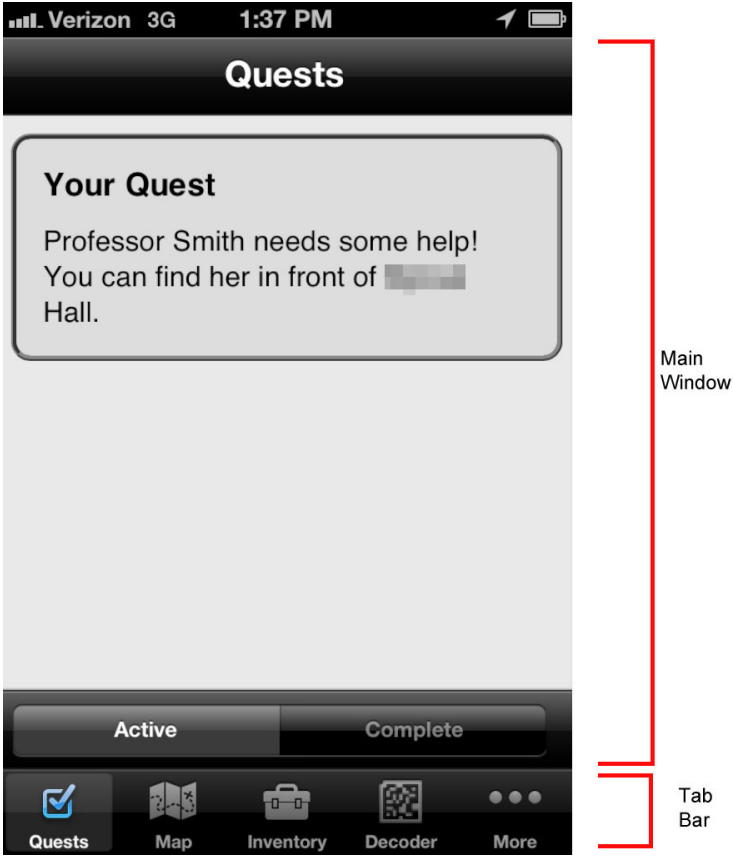
Figure 3. ARIS application user interface on an iPhone.

Screenshot reproduced with permission from ARIS.

The following is a list of features available on the Tab Bar:

- Quests - displays a list of active and completed quests, or tasks

- Map - displays the player's current location and nearby game-related objects such as

  NPCs and items

- Inventory - displays items currently in the player's possession; items can be picked up or dropped throughout the game; items can be created by the game designer or other players through the camera and audio recorder

- More - displays additional features such as the camera and audio recorder

Willingness to Communicate in L2

For many, the fundamental purpose for learning a language is to be able to communicate in the L2. However, competence in the L2 may not be enough. Learners must also be willing to communicate in the L2. Therefore, the concept of *Willingness to Communicate* (WTC) has been declared an integral component of language learning and necessary to achieve the end goal of communicating in an L2 (Hashimoto, 2002; MacIntyre et al., 1998). MacIntyre et al. (1998, p. 547) defined WTC in a second language as "a readiness to enter into discourse at a particular time with a specific person or persons, using a L2." In other words, WTC is the likelihood of a person initiating communication in an L2 with others in a specific situation. Studies have shown that a person's WTC affects the frequency and amount of second language communication that person uses (Clément et al., 2003; Yashima et al., 2004).

The concept of WTC originated in L1 studies by McCroskey and Richmond (1987). In their article "Willingness to Communicate: A Cognitive View," McCroskey and Richmond (1990) referred to the variables which they believed to affect WTC as *antecedents*. This current study uses the terms *variables* and *antecedents* interchangeably.

MacIntyre et al. (1998) developed a model that describes variables that influence WTC in an L2 (see Figure 4). In this model, WTC is influenced by both situational variables (layers I, II, and III) and enduring variables (layers IV, V, and VI) and suggests that WTC is a composite variable influenced by these other variables.
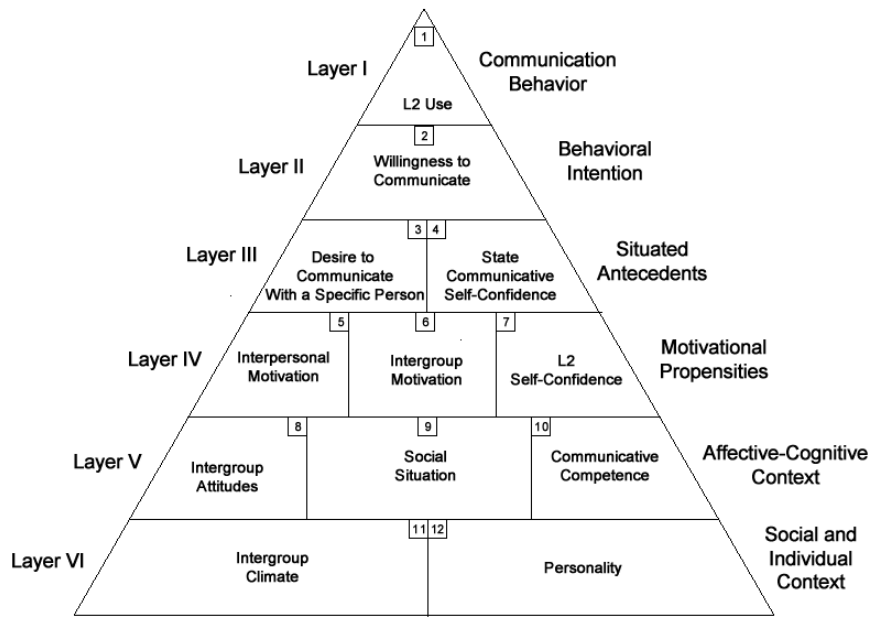
Figure 4. Model of variables influencing WTC.

From "Conceptualizing Willingness to Communicate in a L2: A Situational Model of L2 Confidence and Affiliation," by P.D. MacIntyre, Z. Dörnyei, R. Clément, and K. A. Noels, 1998, *The Modern Language Journal, 82,* p. 547. Copyright by John Wiley and Sons. Reprinted with permission.

Trait variables. Trait variables such as personality type (introvert or extravert), motivation, anxiety, perceived competence, situation, and integrativeness, or "inclination to interact or identify with the L2 community" (Peng, 2007, p. 38), have been found to affect L2 WTC (Hashimoto, 2002; MacIntyre & Charos, 1996; Peng, 2007; Yashima et al., 2004).

Perceived competence occurs when learners feel that they have the capability to communicate effectively in certain situations (MacIntyre et al., 1998). A reduction of L2 anxiety occurs when the learners do not have a fear of communicating in the L2 (McCroskey & Richmond, 1990).

The current study focuses on the perceived effect that AR games have on students' WTC. Two of the WTC trait variables—perceived competence and L2 anxiety—will be examined.

Researchers have also found that among all variables, perceived competence and L2 anxiety (also called communication apprehension in some studies) were found to be the best predictors of WTC (Baker & MacIntyre, 2000; MacIntyre & Charos, 1996). Therefore, it stands to reason that if AR mobile games can affect either or both of these variables, the games can also affect WTC. The trait variables that cannot be affected by the game, such as integrative motivation or personality, are not included in this study.

Figure 5 is a portion of MacIntyre and Charos' (1996) path model that describes the relationships found among L2 variables in their study. The researchers examined WTC in adult French learners in Canada. Path analysis can be used to examine situations in which there is what Streiner (2005, p. 115) calls "chains of influence". The numbers attached to the lines represent path coefficients in which positive numbers indicate positive relationships and negative numbers indicate negative relationships. This model shows, among several other relationships, that L2 anxiety negatively affects perceived competence and L2 WTC. The model also demonstrates that perceived competence positively affects L2 WTC.
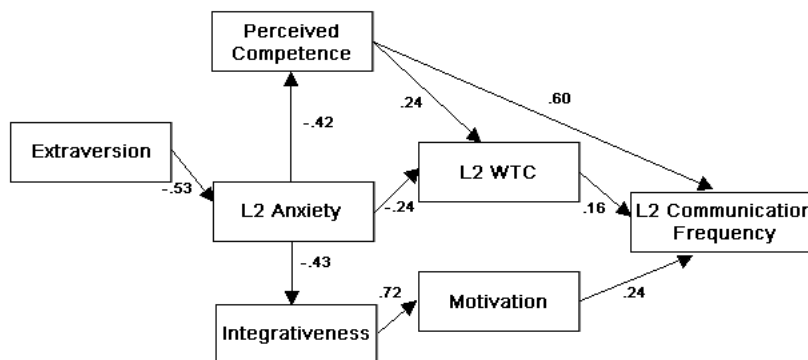
Figure 5. Portion of MacIntyre and Charos' (1996) model of L2 communication applied to adult French learners.

From "Personality, Attitudes, and Affect as Predictors of Second Language Communication," by P.D. MacIntyre, and C. Charos, 1996, *Journal of Language and Social Psychology, 15,* p. 18. Copyright by Sage Publications. Reprinted with permission.

Situational variables. WTC has also been studied as a situational construct. In a study of Korean learners studying English at an American university, Kang (2005) identified three psychological antecedents to situational WTC: security, excitement, and responsibility. Security was exhibited when the learner had some knowledge about the topic of conversation, when there were fewer interlocutors present, and when the interlocutors had a positive and pleasant attitude (Kang, 2005). Excitement was seen when the learner was interested in the topic of conversation. Lastly, responsibility appeared when there was a feeling of obligation or duty to deliver a clear message when speaking in the L2.

Relationship between AR mobile games and WTC variables. This study looks at the effect that an AR mobile game may have on both trait and situational variables, which in turn may affect WTC. Specifically, this study examines the following variables: perceived competence, L2 anxiety, security, excitement, and responsibility. Figure 6 depicts a model for this study.
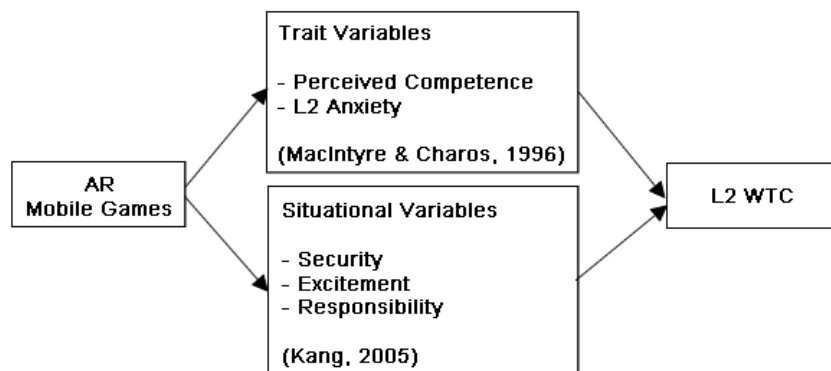
Figure 6. Model depicting relationship between AR mobile games, trait and situational variables, and L2 WTC.

WTC in virtual environments. Several studies have shown that anxiety, one of the WTC's antecedents, decreases when students interact in a virtual environment. One study conducted by Reinders and Wattana (2011) investigated the willingness of Thai speakers to

communicate in English in an online multi-player game. The investigators concluded that the digital game environment posed less of a barrier to the students for language production than the classroom environment. Students who were shy in the classroom tended to express themselves freely while playing the game. This in turn appeared to enhance their WTC in English.

In a study of first and second year students of Danish, Roed (2003) found that students who were typically reluctant to speak in class tended to contribute more in a chat room environment. Reasons attributed to this phenomenon included that it was easier for introverts to participate in a chat room than it was in class, that there was less time pressure than what exists in a classroom environment, and that there were no audio or visual reactions from teachers or classmates such as giggles or raised eyebrows.

In their study, Jauregi and Canto (2012) found that Spanish language learners who interacted in the virtual world Second Life experienced a positive impact on their WTC and a decreased feeling of anxiety as compared to a control group. The experimental group also experienced a higher level of perceived competence in the target language.

Quest Atlantis is a 3D multi-user educational virtual game for children aged 9-12 (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005). In their study of middle-school students studying English in China using *Quest Atlantis*, Zheng et al. (2009) reported an increase in the students' WTC in English. The students also reported that there was an increase in their comfort in expressing their opinions in English while they played *Quest Atlantis*.

Summary

A review of the literature was conducted in the areas of situated learning, mobile learning, video games and language learning, virtual worlds, augmented reality, andragogy, language acquisition versus language learning, and willingness to communicate. Mobile AR

games have affordances such as portability, context sensitivity, and connectivity that dovetails well with situated language learning. Video games have been used successfully in language learning environments and have additional benefits of being engaging and challenging.

WTC is for many the ultimate goal of learning a language. WTC's antecedent variables of perceived competence, L2 anxiety, security, excitement, and responsibility appear to align well with the affordances of mobile AR games as shown in Table 1.

Table 1

WTC Antecedent Variables and Mobile AR Game Affordances

ANTECEDENT VARIABLES TO WTC	MOBILE AR GAME AFFORDANCES
Perceived Competence in L2	Games can increase perceived competence by providing additional practice in L2.
L2 Anxiety	Mobile learning can decrease L2 anxiety by providing a personal space for practice in L2.
Security	Mobile learning can provide a sense of security by providing a personal space for practice in L2.
Excitement	Games can provide an element of excitement.
Responsibility	Games with a real-life purpose can provide a sense of responsibility.

Questions arising from this review of literature give credence to the need for the investigation of the use and design qualities of AR mobile game in language learning, specifically in the area of WTC. This was accomplished through an investigation of how students describe the ways in which playing the mobile AR game aids or hinders their WTC using the Japanese language. This research also investigated the characteristics of the mobile AR game that best supported the students' WTC using the Japanese language.

Chapter 3: Methodology

In this chapter, pilot studies, game design, research time line, sample, research tools, data collection techniques, and data analysis are described, together with a discussion of the ethical considerations for the examination of the use and design qualities of an AR mobile game in a Japanese language learning, specifically in the area of WTC.

The purpose of this study was to examine student perceptions regarding the use and design qualities of an AR mobile game in a Japanese language course at an institute of higher education in California. This investigation explored if, and how, the use and design of the game affected students' perceptions of their WTC in Japanese. For this reason, a Japanese language class was selected in California for this study.

Specifically, this project addressed the following research questions:

1. How do students participating in a second-year Japanese language course at a California public university describe the ways in which playing a mobile AR game influenced their WTC in the Japanese language?

2. What characteristics of a mobile AR game do students participating in a second-year Japanese language course at a California public university attribute to influencing their WTC in the Japanese language?

Researcher Positionality

A worldview or paradigm is a researcher's "basic set of beliefs that guides action" (Guba, 1990, p. 17). In this study, the researcher views the world from a situated learning perspective. Through this lens, learning is seen as being situated in daily activities and cannot be separated from the context in which it occurs (Brown et al., 1989). Integral to situated learning is the concept of Legitimate Peripheral Participation (LPP) coined by Lave and Wenger (1991) in

which new members of a learning community participate from the periphery, or boundary. They state, "As a place in which one moves toward more-intensive participation, peripherality is an empowering position" (p. 36). The researcher also views the world through the broader social constructivist lens in which participants interpret or make sense of their own learning (Creswell, 2009). Therefore the researcher investigated students' perceptions pertaining to the use of an augmented reality game as a form of LPP in support of WTC.

Rationale for a Qualitative Case Study Approach

This qualitative study explored student perceptions regarding the use and design qualities of an AR mobile game. Merriam (1998, p. 6, emphasis in original) states "Qualitative researchers *are interested in understanding the meaning people have constructed,* that is, how they make sense of their world and the experiences they have in the world." A case study approach (Merriam, 1998; Stake, 1995; Yin, 2009) was chosen because of the use of this relatively new application of AR technology. Due to the nature of the research questions, this study examined two units of analysis. The unit of analysis for research question one is the individual student. The unit of analysis for the second research question is the game.

The individual student cases form a multiple case study, which will yield greater insight into AR mobile language learning experiences through both individual and cross-case analysis (Miles & Huberman, 1994; Yin, 2009). According to Miles and Huberman (1994), reasons for using cross-case analysis include enhancement of generalizability and "to deepen *understanding and explanation*" (p. 173, emphasis in original). They further state that "Multiple cases not only pin down the specific conditions under which a finding will occur but also help us form the more general categories of how those conditions may be related" (p. 173). Additionally, Merriam

(1998) states that multiple cases can enhance external validity by providing diverse cases that allow results to be applied to a greater range of situations.

Pilot Study

Light, Singer, and Willet (1990) stated, "No design is ever so complete that it cannot be improved by a prior, small-scale exploratory study. Pilot studies are almost always worth the time and effort" (as cited by Maxwell, 2005, p. 57). Likewise, the current study has benefited from such a pilot study.

In the Fall 2012, Winter 2013, and Spring 2013 sessions of a public university in California, a Japanese language instructor and the researcher worked together to create two AR games. This project served two purposes: (a) as a proof-of-concept for the use of AR on the university campus and (b) to explore the use of mobile AR technology for Japanese language learning outside of the classroom.

In order to assess the proof-of-concept, the instructor and researcher aimed to create simple games that tested various aspects of AR in language learning on the university campus. Specifically, the researcher was interested in the process of creating and deploying games using the ARIS game editor and iPhone app, determining Wi-Fi/3G/4G coverage on the campus, and obtaining students' initial feedback. It was determined that in order to make the games interesting and memorable to the students, the use of locations unique to the campus would be used. The campus is home to a set of sculptures created specifically for the university by a local artist. As these sculptures are unique to the campus, it was deemed appropriate to incorporate these sculptures into the games.

For both games in the pilot study, volunteers were recruited from a third year Japanese language class. A total of nine students volunteered to test the games with two of the students participating in both games.

First pilot game. The first game of the pilot project was conducted in the Spring 2013 quarter. The instructor and the researcher worked together to create a simple task-based game for third-year Japanese language students, which included a narrative as a key element of the game. The storyline involved an instructor who lost her dog on campus. The students were tasked to assist the instructor in finding the dog. Four locations throughout the campus, two with sculptures, were used for this game. Students were guided to these different locations on campus via the game's NPCs. Both audio and text information were presented to the students as they reached these locations. The students were also instructed to either respond to the NPC or report back to the owner of the dog via the audio recording mechanism of the game. These audio recordings were uploaded to a server by the ARIS application and were available for later review by the instructor and the researcher.

As it was the first attempt at introducing AR into the Japanese language class, this phase took place over several iterations. During the first iteration, the instructor and the researcher walked through the game together. Although the instructor knew the storyline and outcome of the game, because it was the first time she played the game, it was a new experience for her. Based on her experience and her knowledge of her students, she recommended several modifications that were incorporated into the game before the next iteration.

Next, one student was asked to play the game. We observed his game play and again found areas in which to modify and improve the game based on his feedback. We executed two more iterations with six other students, for a total of seven students. After students played the

game, the instructor and researcher met with the students to discuss the game, what they liked

and disliked about the game, and areas in which it could be improved. The instructor also met

individually with the students to review the recordings that the students made during the game to

give them feedback on their grammar and pronunciation. See Figure 7 for a screenshot of a

conversation screen from the game.
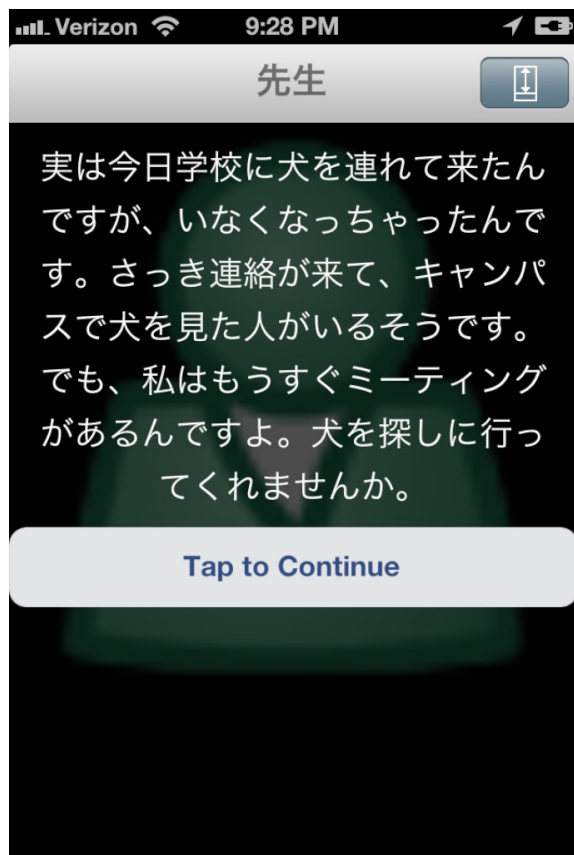
Figure 7. Example screenshot from the first pilot game.

English translation: *My dog that I brought to school today disappeared. A short time ago, a person named Tamako contacted me and said she saw a dog on campus. But, I need to go to a meeting soon. Would you go to see this person for me?*

Screenshot reproduced with permission from ARIS.

Second pilot game. The second game of the pilot project was also conducted in the

Spring 2013 quarter, again with third-year Japanese language students. Students were grouped in

pairs and instructed to visit at least one of the sculptures with their iPhones. The AR software on

the students' iPhones used GPS technology to determine when the students were in the vicinity of a sculpture and triggered a screen to appear on their devices. The initial screen displayed information about the nearby sculpture in Japanese. After reading this information, the students collaborated in their pair groups to create a story about this sculpture. The students spent approximately half an hour creating their story. After they composed a story, the students created an audio narration of the story at the site of the sculpture through the use of the ARIS application. In addition to the story, the students recorded a question based on the story for their fellow classmates. The recordings were then available to other classmates who played the game. These classmates in turn recorded their answer to the question posed by the story makers. Figure 8 depicts the information screen that appeared at the sculpture.

Pilot study findings. Several key themes emerged from the pilot study. First, it appeared that students truly enjoyed playing the games. Comments included "I liked that I could actually get out and do things. I liked the interaction with the game. Plus, it was a good walk" and "It was a good speaking exercise. I don't feel comfortable to speak in class, so it was nice to record individually" (interview, February 1, 2013). The instructor felt that having the capability to provide feedback on the students' recordings was an important component of the games. The ARIS framework allowed for the instructor to sit down with the students at a later time to review the students' grammar and pronunciation.

There were also consistent themes that emerged about what students did not like about the game. Comments were made such as "The interface was complicated" and "It was a little hard to keep up with the story and situations without audio provided" (interview, February 1, 2013).
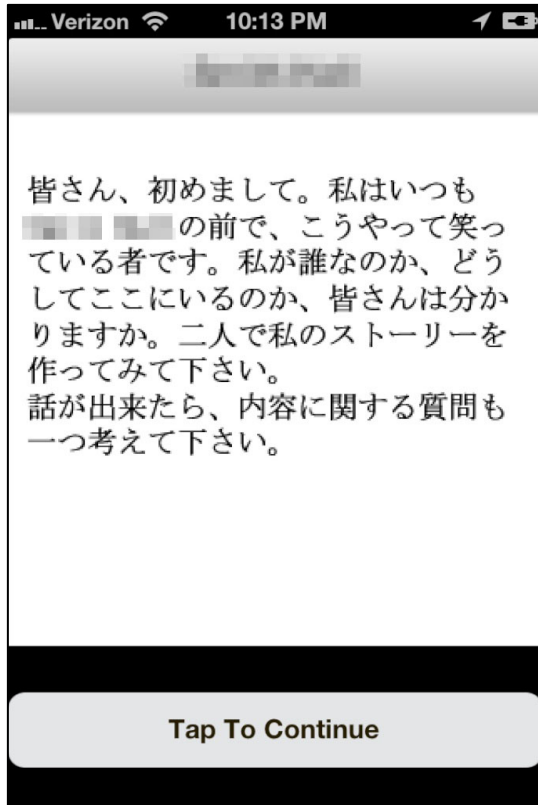
Figure 8. Second pilot game screenshot.

English translation: *Nice to meet you, everyone. I am the person always laughing in front of ----- Hall. Who am I? Why am I here? Do you know? With your partner, please come up with a story about me. After you're done with the story, think of one question related to your story for other people to answer when they come by.*

Screenshot reproduced with permission from ARIS.

The outcomes of the pilot study were used to inform this current research in several ways. First, several students commented on the lack of audio in the first pilot game. The students were required to record audio but they did not have the opportunity to hear audio, which they considered to be a deficiency in the game. As a result of this observation, audio by a native speaker was included in the second game of the pilot study as well as in the game for the current research study.

Second, the students found the ARIS interface to be confusing. Therefore, a demonstration game was created (in English) which showed students how to use the features of ARIS. The students played this demonstration game prior to their playing of the *real* game.

Third, students who participated in both pilot studies indicated that they enjoyed the open-ended and creative format of the second pilot game versus the directed and prescriptive format of the first pilot game. Therefore, it was decided that the game for the current research would allow the participants to be creative and not dictate where the students played the game.

Last, several students mentioned that they were more comfortable speaking in the game rather than in class in front of their instructor and classmates. This led the researcher to further concentrate on the WTC construct and to investigate what influence, if any, AR mobile games have on WTC.

Game Description: *Yookoso*

For ease of reference and user appeal, this study's game was given a name, unlike the pilot games, which were referred to as the first and second pilots. The game for the current study has been designed around a scenario based on having the participants introduce the campus to exchange students from Japan. The word *yookoso* means *welcome* in Japanese and this is the main goal of the game - to create audio recordings to help the exchange students feel welcome at the university and to inform them about the different places on campus that may be of interest to them. Specifically, the students were told the following in the game's User's Guide (Appendix A):

> Your *sensei* [teacher] has informed you that there will be a group of exchange students visiting California University in a few weeks. She has asked you to identify several places on campus that you think the exchange students would enjoy learning about. Using the *Yookoso* game, your goal is to share at least three locations on campus that you enjoy visiting and that you think the exchange students would enjoy as well. Examples include your favorite place to study, to eat lunch, or to relax.

The idea for the game used in this study partially came from another ARIS game called *Digital Graffiti Gallery* (Holden, 2011). Similar to *Digital Graffiti Gallery*, this game was open-ended with minimal built-in guidance from the game. One difference between the *Digital Graffiti Gallery* and *Yookoso* is that *Yookoso* was audio-based because of the emphasis in speaking and the WTC construct.

Game Design. The game was designed to support the five WTC antecedents through game play. Table 2 maps the WTC antecedents to seven game design characteristics that support the antecedents.

Table 2

Antecedents to WTC and Game Characteristics

Antecedents to WTC	Promoted or achieved by	Game Characteristics*
Perceived competence	Learners feel more competent if they have the capability to communicate effectively in certain situations (MacIntyre et al., 1998).	A, B
L2 Anxiety	Learners feel less anxiety if they do not fear communicating in the L2 (McCroskey & Richmond, 1990).	B, E
L2 Anxiety	Learners feel less anxiety while playing games, which are typically perceived as *fun*. (Klopfer, 2008; Reinders & Wattana, 2011).	G
Security	Learners feel more secure when they have some knowledge about the topic of conversation (Kang, 2005).	A
Security	Learners feel more secure if the interlocutor knows the learner's level of L2 proficiency (Kang, 2005).	D
Security	Learners feel more secure when there are fewer interlocutors present (Kang, 2005).	E
Security	Learners feel more secure when interlocutors have a positive and pleasant attitude (Kang, 2005).	F
Excitement	Learners are more excited to speak about topics that interest them and of which they have knowledge (Kang, 2005).	B
Excitement	Learners are more excited to speak to native speakers (Kang, 2005).	D
Responsibility	Learners feel obligated to deliver a clear message (Kang, 2005).	C

*Codes
A = Game audio prompts were of appropriate language level for the participants.
B = Open-ended format. Allowed learners to choose where to record, when to record, and the topic of the recording.
C = Storyline revolved around a scenario of helping exchange students from Japan.
D = Game audio prompts were recorded by a native Japanese speaker.
E = The game was designed to be played alone.
F = The audio prompts were recorded in a welcoming and friendly tone of voice.
G = Game feature of finding and collecting hidden *omamori*, or Japanese charms.

It is important to note that the game is *in* the Japanese language and is not *about* the Japanese language. In other words, this game did not explicitly teach the participants about the language (grammar, vocabulary) but instead required them to read and speak the language. Grammar and vocabulary may have been reinforced through the use of the game but was not a specific goal.

Game Play. Through the use of the game *Yookoso*, the participants were requested to document their favorite places or places they think the Japanese exchange students would find interesting or useful to visit during their exchange stay. The university campus was chosen as the site for game play since it was assumed that if the players were already familiar with the campus, the game would take on a more significant meaning to them (Klopfer, 2008).

The students used the audio recorder and camera available through the ARIS application to document these places. As findings from the pilot study indicated that students thought it was useful to be able to hear native speakers while playing these games, an instructor recorded an introduction (Figure 9) to the game along with prompts at several places on campus to give the students suggestions about locations and topics that may be of interest to the exchange students. When the "Tap to Continue" button is tapped, the player hears the following audio:

日本語のゲームへようこそ。CUのキャンパスの中には、おもしろいところがたく

さんあります。みなさんはこのゲームで、CUのおもしろいところを、日本人の

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りゅうがくせいにしょうかいします。一人でやりたい人は、一人でやりましょう。

二人でやりたい人は、二人でやりましょう。

English translation:

Welcome to the Japanese language game. There are many interesting places on the CU

campus. Using this game, you are to introduce CU's interesting places to exchange

students. If you would like to play alone, you may do so. If you want to play with

someone else, you may do so.
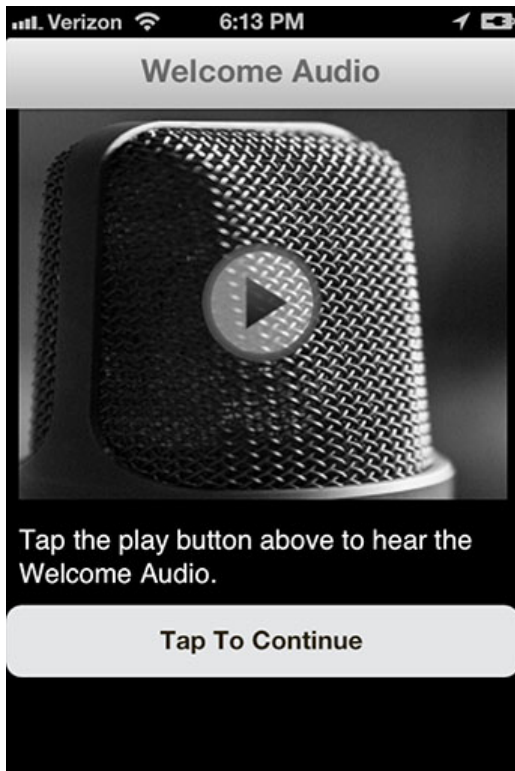
Figure 9. Welcome screen.

Screenshot reproduced with permission from ARIS.

The audio prompts provided by the game were accompanied by corresponding text items,

which were added to the participant's game inventory for future reference. Figure 10 contains

example screenshots of the audio prompt and its corresponding text item that appears in the

game when a student was in vicinity of a campus restaurant. The audio prompt is played when

the user taps on the play icon on the image of the microphone.
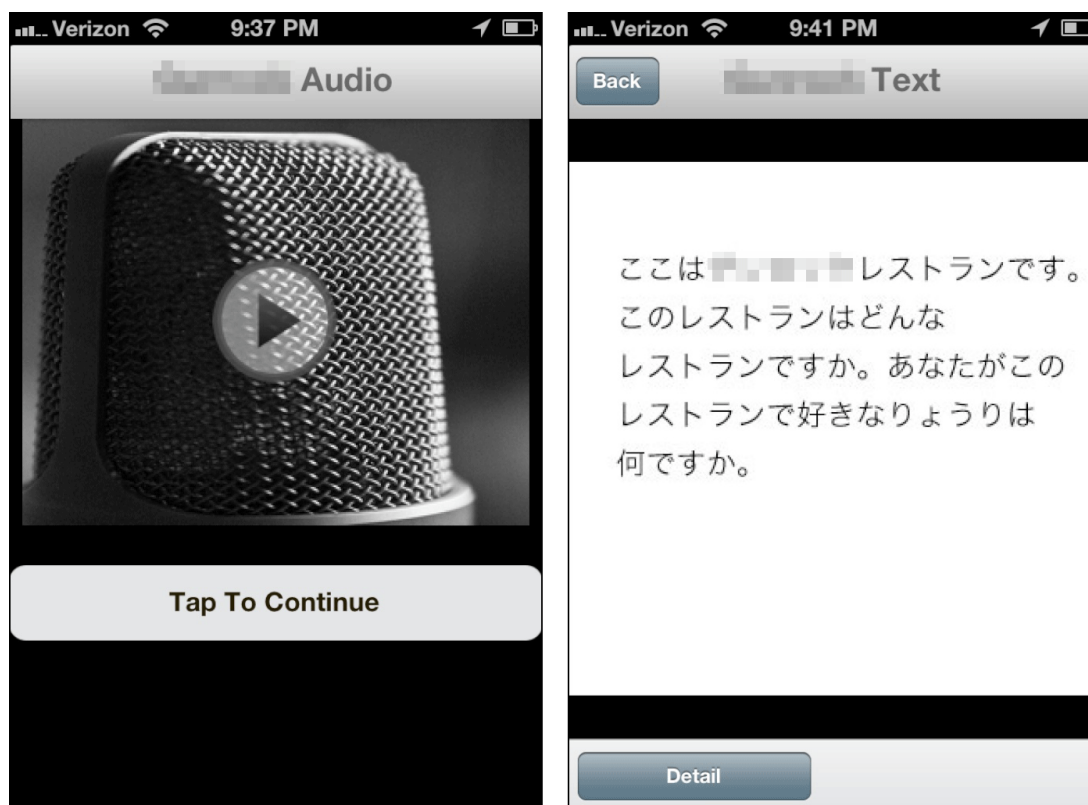
Figure 10. Screenshots of audio prompt and corresponding text item.

English translation: *This is the ----- restaurant. What kind of restaurant is this? What is your favorite dish at this restaurant?*

Screenshots reproduced with permission from ARIS.

There were four locations on campus with audio prompts: at a coffee shop, in front of the

library, at a restaurant, and at a café. Table 3 lists the locations, Japanese transcriptions of the

audio prompts, and the English translations.

Table 3

Game Audio Prompts

Location	Japanese Audio/Text	English Translation
Coffee Shop	ここはきっさてんです。あなたが好きな飲み物は何ですか。それはどんな飲み物ですか。そのしゃしんをとりましょう。	This is the coffee shop. What is your favorite drink here? What kind of drink is it? Please take a picture of it.
Library	こんにちは。あなたはどんな本が好きですか。好きな本の名前は何ですか。	Hello. What kind of books do you like? What is the name of your favorite book?
Restaurant	ここは---レストランです。このレストランはどんなレストランですか。あなたがこのレストランで好きなりょうりは何ですか。	This is the --- Restaurant. What kind of restaurant is it? What is your favorite food at this restaurant?
Café	ここはきっさてんです。あなたが好きな飲み物は何ですか。それはどんな飲み物ですか。そのしゃしんをとりましょう。	This is the coffee shop. What is your favorite drink here? What kind of drink is it? Please take a picture of it.

The participants were informed of the locations of these audio prompts at the orientation and the locations also appeared on the in-game map as shown in Figure 11.

In addition to the audio prompts, there were nine hidden text-based prompts that appeared only when the participant was within 30 meters of the text prompt location. After viewing the text prompt, the participant was rewarded with a Japanese good luck charm (*omamori*), which was placed in the participant's game inventory. Because there were nine text-based prompts, the participants could be rewarded up to nine *omamori*. Figure 12 depicts an example of a text-based prompt screenshot and Table 4 contains the text for the nine text-based prompts. Figure 13 shows the game inventory screen after several text-based prompts were found.
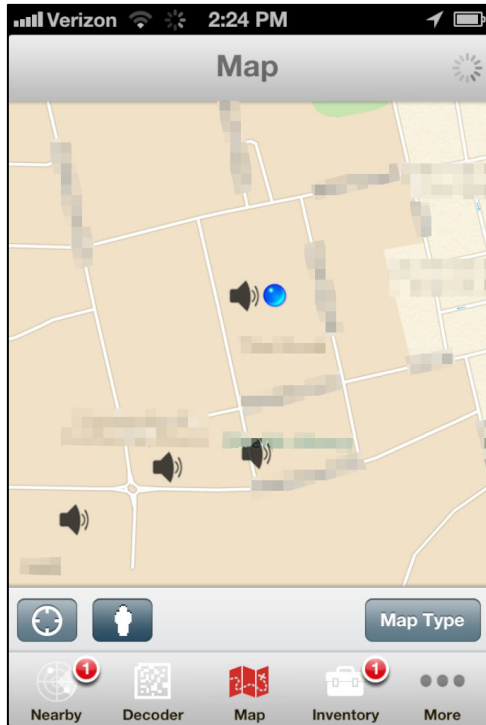
Figure 11. In-game map with audio prompt icons. The dot indicates the location of the player.

Screenshot reproduced with permission from ARIS.

Table 4

Hidden Game Prompts

Location	Japanese Text	English Translation
Bicycle parking area	じてんしゃがたくさんあります。あなたはじてんしゃがありますか。どんなじてんしゃですか。	There are a lot of bicycles. Do you have a bicycle? What kind of bicycle do you have?
Bookstore	本屋でどんなものを買いますか。	What kinds of items do you buy from the bookstore?
Recreation Center	うんどうするのが好きですか。どんなうんどうをしますか。	Do you like to exercise? What kind of exercises do you do?
Sculpture	このたてものの前で---は何をしていますか。	What is that --- doing in front of this building?
Food court	レストランがたくさんあります。どんな食べ物が好きですか。	There are a lot of restaurants. What kind of restaurants do you like?

Location	Japanese Text	English Translation
Stadium	コンサートに行ったことがありますか。どんなコンサートでしたか。	Have you ever been to a concert here? What kind of concert was it?
Sculpture	このたてものの前で---は何をしていますか。	What is that --- doing in front of this building?
Quad	ここでときどき寝ますか。	Do you sometimes take a nap here?
Craft Center	ここでクラスをとったことがありますか。それは、どんなクラスでしたか。	Have you taken a class here? What kind of class?

Figure 12. Example of a hidden game prompt.

English translation: *Do you sometimes take a nap here?*

Screenshot reproduced with permission from ARIS.
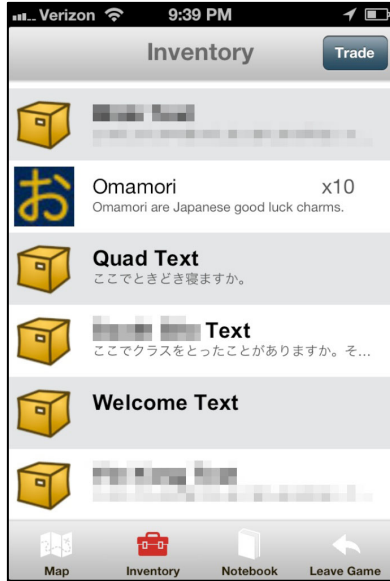
Figure 13. Game inventory screenshot.

Screenshot reproduced with permission from ARIS.

Game prompts used in the game were created by a Japanese language instructor from the university and were designed to be appropriate for the students' language level in order to provide comprehensible input (Krashen, 1982). The textbook used in the students' previous Japanese language class, *Nakama 1* (Hatasa, Hatasa, & Makino, 2011), was used as a guide for the game prompts.

Research Timeline

Table 5 lists the key dates and corresponding tasks for this study.

Table 5

Research Timeline

DATES	TASKS	DURATION

September 27 – October 3, 2013	- Introduction of research to students
	- Give interested students a packet that
	   contains:
	     o Consent form
	     o Research Information Sheet
	     o Demographic survey	

(continued)

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DATES	TASKS	DURATION
	o Pre-requisites and Contact Information	
October 8, 2013 and October 11, 2013	- Orientation	30 minutes
October 8-31, 2013	- Participants play the game	
October 11-25, 2013	- Researcher conducts observations of participants	15 - 30 minutes per participant
October 30- November 6, 2013	- Researcher conducts interviews with participants	30 minutes - 1 hour per participant

Sample

Since generalization was not an intended goal of this qualitative study, a non-probability (not random) sampling method was selected (Bryman, 2008; Merriam, 1998). The researcher was interested in the perceptions of beginning level Japanese language learners in higher education. Therefore, a stratified purposeful sample (Sandelowski, 2000) of students enrolled in multiple sections of a second year Japanese language course in the Fall 2013 quarter at an institution of higher education in California was used. Typically there may be up to 24 students enrolled in each section of this course. In order to be a participant in this project, volunteers were required to be 18 years of age or older. Students volunteering to participate in this study were required to have access to an Apple iOS device with operating system version 6 or higher. The software (ARIS) with which the game was created runs only on iOS devices.

Research Tools

Case study evidence can come from a number of different sources such as documents, interviews, observations, and artifacts and are used to triangulate the findings (Merriam, 1998; Yin, 2009). The use of multiple sources of data, or triangulation, was employed in this study. In

addition to strengthening "reliability as well as internal validity" (Merriam, 1998, p. 207),

triangulation "helps to identify different realities" (Denzin & Lincoln, 2005, p. 454). A

demographic survey was given at the start of the study, followed by observations and interviews.

Game artifacts in the form of audio recordings and photos along with server logs were also

obtained for analysis.

Observations. This case study is about a new technology. Therefore, direct observations

of this technology were helpful in understanding how this technology is actually used (Yin,

2009). Observations allow the researcher to obtain data that "represent a firsthand encounter with

the phenomenon of interest rather than a secondhand account of the world obtained in an

interview" (Merriam, 1998, p. 94). In this study, field notes were gathered on game play via

unstructured non-participant observations through shadowing. Because this was an exploratory

study, the aim was to collect as much information as possible regarding the behavior of the

participants while playing the game (Bryman, 2008). Specifically, in response to the research

questions of this study, evidence of the WTC antecedents were noted in the observations.

Additionally, the physical setting, activities, conversation, and the researcher's behavior were

documented (Merriam, 1998). Permission was obtained from the participants to record the

observations for later analysis. Appendix B contains the game observation protocol.

Interviews. Interviews are described by Yin (2009, p. 106) as "guided conversations

rather than structured queries." As such, the interviews for this study were conducted in order to

allow the participants to describe in their own words their experience in playing the game.

Learners' perceptions of the game characteristics that contributed to their WTC behavior were

elicited through open-ended, semi-structured interviews (Patton, 1980). Open-ended questions

provided opportunities for the participants to define the world in their own unique way (Merriam,

1998). Appendix C contains the interview questions. The first section consisted of questions related to the trait-based WTC variables of perceived competence and L2 anxiety. The second section contained questions related to the situational WTC variables of security, excitement, and responsibility. Follow-up questions were asked to seek clarification if needed. Permission was obtained from the participants to record the interviews for later transcription and analysis.

During the interview, stimulated recall was used to collect the participants' thoughts about their learning process (Gass & Mackey, 2000). The researcher played back audio recordings that the participants made while playing the game. The participants were asked to report upon their thoughts at the time of the recording.

Respondent validation (Bryman, 2008), in which participants were asked about data collected about them, was used to corroborate findings. For example, during the interviews, participants may have been asked to confirm what the researcher saw in observations or in the game data logs.

Artifacts. Artifacts in qualitative research provide insight into the ideas, assumptions, knowledge, values, and opinions of the study's participants (Given, 2008). In this study, game artifacts included audio recordings and photos created in the game by the participants, along with game logs generated by the ARIS server. By examining these artifacts, the researcher gained a better understanding of how the game was used.

Participant audio recordings and photos. The participants located and described, via audio recordings and photos, places they thought the Japanese exchange students would find interesting or useful to visit during their exchange stay. The participants used the audio recorder and camera features available through the ARIS application to document these places. The

resulting digital audio and image files were uploaded to the ARIS server from the participants'

mobile devices immediately after they were created.

ARIS game logs. Game log data provided additional information about the game's usage.

User actions such as items viewed along with locations were recorded in real-time to the ARIS

server. These data provided information on how the application was used in the field. The raw

game logs consisted of time-stamped entries for every action taken by a participant while playing

the game.

Research Questions and Methods

Data collection methods and instruments have been mapped to corresponding research

questions as illustrated in Table 6. The unit of analysis is listed under its corresponding research

question.

Table 6

Research Questions and Methods

	DATA COLLECTION METHOD	INSTRUMENT
Research Question #1	Participant observation	Observation Field Notes
	Interviews	Interview Guide
Unit of Analysis: Individual	Game artifacts in the form of images and audio	ARIS Editor Page
Research Question #2	Interviews	Interview Guide
	Game artifacts in the form of images and audio	ARIS Editor Page
Unit of Analysis: Game	Game logs	ARIS Server Data

Data Collection Techniques

Data collection took place during the fall quarter from September 27 through November

6, 2013. Appendix D contains a data collection log.

Invitation to Participate. During the first week of the Fall 2013 quarter, the researcher conducted a 15-minute presentation to introduce the project to the students who were enrolled in two sections of a second-year Japanese language class. If they wished to participate in the study, students were asked to fill out a consent form and demographic survey. Information regarding the study, risks and benefits of participating in the study, eligibility requirements, and researcher contact information was provided. Eligibility was based on access to an Apple iOS mobile device with operating system 6 or later, willingness to install the free ARIS application on their mobile device, and ability to spend the required amount of time on using the application and participating in interviews with the researcher. Appendix E contains the script that was used to invite students to participate in the study.

Appendix F contains the informed consent document and Appendix G contains the research information sheet provided to the student. The demographic survey with questions regarding age, gender, and years of studying Japanese can be found in Appendix H.

Since the initial recruitment from the two sections yielded only six participants, the researcher opened up the recruitment to include two other sections of the same course. Due to time limitations, the researcher was not able to conduct a presentation to these sections. Instead, a hardcopy of the invitation script was provided to the students along with the informed consent document, research information sheet, and demographic survey (Appendices C, D, E, and F).

Orientation Sessions. A total of 13 students from the four course sections submitted their informed consent forms. These students were invited to orientation sessions that took place during the second week of the fall quarter at a conference room in a building on campus. Information about the project and assistance in installing the iOS app was provided at these sessions. The researcher had intended to show a brief demonstration of the game to the

participants at the orientations; however, this was not possible due to the lack of Wi-Fi access in the conference room. Instead, the researcher presented the content of the game's user's guide, which contained a short walk-through of the game (Appendix A). Each orientation lasted between 15-30 minutes. Out of the 13 students who submitted a consent form, nine attended an orientation. The other four students did not respond to multiple email invitations to attend the orientations or to meet the researcher for a one-on-one orientation.

Observations. The nine participants who attended an orientation were asked to play the game at least three times within the three weeks allocated for the game. The researcher obtained permission to observe seven of the nine participants while they played the game. The observations took place during the three weeks allocated for game play.

Interviews. After the three weeks of game play ended, the researcher invited the participants via e-mail to take part in follow-up interviews. Eight of the nine participants agreed to be interviewed. The one participant that did not respond to the interview request showed up with another participant and asked for permission to be interviewed at the same time, to which the researcher consented.

Six of the interviews took place in a classroom at the university, one in a conference room, and one outdoors on a bench. Permission to record the interviews was obtained from all interviewees prior to the interviews. The researcher used two recording devices: a Livescribe pen and the Griffin iTalk application on an iPad. The length of the interviews averaged 30 minutes per participant.

Artifacts. The participants' audio recordings and photos were uploaded by the game to the ARIS server via the campus' Wi-Fi network in real-time while the game was played. The resulting digital audio recordings and photos were downloaded from the ARIS server by the

researcher via the editor web page after the three weeks allocated for game play had passed. Game logs were also downloaded from the server at this time. To aid in the analysis, the game log file was imported into a local MySQL database on the researcher's personal computer. The MySQL database allowed for queries to be made efficiently since the original log file consisted of approximately 2400 entries.

Data Analysis

Qualitative data analysis involves preparing, organizing, reducing, and finally analyzing the data collected in a study (Creswell, 2013). This study followed the six steps for data analysis as recommended by Creswell (2009).

- Step 1: The first step is to organize and prepare the data (Creswell, 2009). The researcher and an assistant transcribed the interview and observation audio recordings. The researcher re-listened to the recordings to confirm that the transcriptions were accurate. A data collection log was assembled to document when and what types of data were collected for each participant (Appendix D). The game artifacts and server logs were downloaded from the server and stored on a local secured hard-drive. Finally, the game play log was assembled (Appendix I) based on data from the ARIS web-based game editor (Appendix J) and the game server log (Appendix K).

- Step 2: The second step is to gain a general sense of the data and reflect on its overall meaning (Creswell, 2009). The researcher reviewed the data and took notes on general ideas that arose from this initial evaluation of the data.

- Step 3: The third step is to begin detailed analysis of the data through the coding process (Creswell, 2009). The researcher used the qualitative analysis tool HyperRESEARCH (http://www.researchware.com) to aid in the analysis of the

transcriptions. Qualitative computer software programs such as HyperRESEARCH allow for faster and more efficient coding as compared to hand coding. For instance, text can be highlighted and assigned a code from the codebook instead of manually highlighting hard copies of transcripts. Also, text can be easily re-coded by choosing another code from the codebook. Specific codes or combination of codes can be searched, making it easy to find all text associated with these codes. Appendix L contains an example screenshot of coding using HyperRESEARCH. The transcripts were analyzed by first reducing the data into meaningful segments which were assigned codes (Creswell, 2013). The researcher began with provisional codes (Miles, Huberman, & Saldaña, 2013) based on the five WTC antecedents and game characteristics.

WTC Antecedents:

- Perceived L2 competence

- Reduced L2 Anxiety

- Security

- Excitement

- Responsibility

Game Characteristics:

- The audio prompts were of appropriate language level for the participants.

- The open-ended format of the game.

- The storyline revolved around a scenario of helping exchange students from Japan.

- The audio prompts were recorded by a native Japanese speaker.

- The game was designed to be played alone.

- The audio prompts were recorded in a welcoming and friendly tone of voice.

- The hidden *omamori*, or Japanese charms, added a learning incentive.

Other categories of codes were also created based on what the researcher found in the transcripts. Initially, 61 codes were identified; however, Creswell (2013) recommends using a more manageable list of 25-30 codes, therefore the codes were further pared down to 22 codes.

- Step 4: The fourth step is to develop themes based on the initial coding done in step three (Creswell, 2009). The researcher grouped similar codes and looked for text segments that represented recurring themes, surprising information not anticipated, and ideas that were conceptually interesting (Creswell, 2013).

- Step 5: The fifth step is to use narratives and visuals such as tables and diagrams to convey the themes that have been discovered (Creswell, 2009). The researcher created tables based on the WTC antecedents and game characteristics to display the data in a concise format.

- Step 6: The last step is to interpret or make meaning of the data (Creswell, 2009).

Human Subjects Considerations

The safety and well being of the participants were of utmost concern for this study. As such, measures were taken to ensure the protection of the participants. All the students who participated in this study were volunteers. Before the initiation of this project, consent from the subjects was obtained for the collection, analysis and quotation of any transcript data, game artifacts, and server logs. The students were informed that a decision to participate or not

participate would not have an impact on their grade. Appendix F contains the informed consent form.

The study involved minimal risks that were no different from everyday risks taken by the participants such as walking around campus and using a smartphone. It was not necessary for students to walk and use the smartphone at the same time. Because this study required the participant to be outdoors, risks or discomforts associated with being outdoors included but were not limited to: inclement weather, allergies, contact with obstacles or exposure to traffic, and physical exertion. However, because of the free-form nature of the game, participants could choose where to play the game and it was anticipated that participants would not choose locations that caused them discomfort or risk. Participants were told that they might experience frustration in not being able to adequately express themselves in the Japanese language. Participants were also told that they might experience boredom or frustration with the game. Participants were allowed to withdraw from the study at any time. Approval to conduct the study on the university campus was obtained from the instructors of the courses, the Japanese language program coordinator, and the department chairperson.

Participants are identified by study codes in all documents to ensure confidentiality. The document linking the participants' identities to their corresponding study codes is kept in a password-protected file in a location separate from other data.

Data include survey responses, observation notes, interview notes, audio recordings, email correspondence between the researcher and participants, game data, and server log data. All data associated with this research will be destroyed five years after the completion of the study.

In order to ensure that the research was conducted in accordance with accepted standards, it was assessed and approved by the Pepperdine Graduate and Professional Schools (GPS) Institutional Review Board (IRB). An expedited IRB application was submitted because the research presented no more than minimal risk to human subjects but did involve the audio recording of the participants. Appendix M contains the Pepperdine GPS IRB approval notice.

Summary

Two pilot study games informed the design of the game in this study. The narrative for this game revolved around a scenario involving visiting exchange students from Japan. A case study approach was taken for this study. Students enrolled in a second year Japanese language course at an institution of higher education in California were asked to participate in the study.

Data collection was conducted through a demographic survey, game-play observations, game artifacts in the form of images and audio, game log data, and interviews. Qualitative data analysis included preparing, organizing, reducing, and finally analyzing the data collected in the study (Creswell, 2013). This study followed the six steps for data analysis as recommended by Creswell (2009).

Chapter 4: Findings

The purpose of this study was to examine student perceptions regarding the use and design qualities of an augmented reality mobile game in a Japanese language course at an institute of higher education in California. This study explored if and how the game's use and design qualities affected students' perceptions of their WTC in Japanese.

Two research questions guided the study:

1. How do students participating in a second-year Japanese language course at a California public university describe the ways in which playing a mobile AR game influenced their WTC in the Japanese language?

2. What characteristics of a mobile AR game do students participating in a second-year Japanese language course at a California public university attribute to influencing their WTC in the Japanese language?

This chapter presents key findings obtained from the demographic survey, observations, game objects, game artifacts, and interviews. This chapter also shares the participant profiles along with select quotations from the interviews. This is followed by a summary of the data in the form of Content-Analytic matrices and the beginning analysis of selected and emerging themes. The interviews provided the most insight in answering the research questions with the observations and game logs used for triangulation.

Demographic Survey

All participants in this study were traditional college-aged students and the majority of the students claimed English as their first language. All but one student played video and/or computer games weekly. Table 7 displays demographic data for the participants.

Table 7

Demographic Survey Results

Participant	Gender	Age	First language	Years of study of Japanese	Reasons for studying Japanese*	General use of video and/or computer games	Time spent on video and/or computer games (hrs/week)
P1	Female	18-24	English	1	A, B, C, D, E	Yes	1
P2	Male	18-24	English	1	B, C, D	Yes	2
P3	Female	18-24	English	1	A, B, C, D, E	Yes	10
P4	Female	18-24	Spanish	4-5	B, C	Yes	1
P5	Male	18-24	Cantonese	1	A, B, C, D	Yes	0-20
P6	Female	18-24	English	1	A, B, C, D, E	Yes	14
P7	Female	18-24	Chinese	1	A, B, C, D, E	No	
P8	Female	18-24	English	1	B, C, E	Yes	40+
P9	Male	18-24	English	2	B	Yes	1-2

*Codes
A = It will be useful in getting a job.
B = It will help me understand the Japanese culture.
C = I would like to study in Japan.
D = I would like to speak to my Japanese friends.
E = It is required for my major.

Observations

The researcher requested permission to observe the participants individually while they

played the game. Seven out of the nine participants agreed to be observed. The researcher met

the participants at the student union and the observations lasted 10 to 30 minutes. Since the researcher was not able to demonstrate the game at the orientations, most of the observation sessions began with a short walk-through of the game and its use and features.

With the exception of one participant, all the participants chose to be observed while playing the game at the student union. The observations for participants 3 and 6 overlapped since participant 6 arrived earlier than scheduled. Both participants were in favor of doing their observation session at the same time, and this provided the researcher with an opportunity to observe the social interaction that occurred between these two participants. They were able to share with each other what they had learned about the game. For example, participant 6 discovered that she had a list of coffee-related words in Japanese in her game inventory:

P6: "Oh, it gives you vocab words!"

P3: "Really? Where?"

P6: "I got vocab words for unlocking the ----."

P3: "Really? How come I didn't get that? Oh, yeah, now I see it."

The observation sessions also served as trouble-shooting sessions for some participants. Participant 9 complained that the battery on his phone did not last long while he played the game. The researcher recommended that he stop the game when he was not actively playing since the use of GPS running in the background can decrease battery life. Participant 8 demonstrated to the researcher that she was not able to use the record function in the game. The researcher later posted this problem on the ARIS Internet forum and a suggestion to change a setting was given shortly after, which subsequently allowed participant 8 to successfully record audio using the ARIS application.

Participant 4 chose to describe a building where she occasionally has lunch for her observation session. She used her iPad to type her speech in English and then in Japanese (Figures 14 and 15). She read the Japanese text on her iPad while recording her voice using the *Yookoso* game on her iPhone. After she was done recording, she took a photo of the building with the game application.

Figure 14. Participant typing notes on her iPad.

Today I'm at the ▮▮. I often come to ▮▮ because I sometime forget to bring lunch so I buy lunch. I usually get Taco Bell because it's cheap and delicious. I like to eat the crunchy wrap. Sometimes I'll buy tea at Starbucks. On free time I study too.

今日私は▮▮▮にいます。ときどきおひろごはんつわれるから▮▮▮におひろごはんが買うからよくここに行きます。タコベルはやさくておいしいですからよくタコベルが買った。クランチラプが好きです。ときどき私はスタバーにチャイこうちゃが買う。ひまな時ここにべんきょうする。

Figure 15. iPad notes in English and Japanese.

Game Objects

There were four locations on campus with audio prompts: at a coffee shop, in front of the library, at a restaurant, and at a café. At each of these locations, participants received a corresponding text note of the audio prompt. These text notes were placed in the participant's game inventory for reference throughout the game. In addition to the audio prompts, there were nine hidden text-based prompts that appeared only when the participant was within 30 meters of the text prompt location. After viewing the text prompt, the participant was rewarded with a Japanese good luck charm (*omamori*), which was placed in the participant's game inventory. When students located either an audio prompt or hidden text prompt, the game logged the event to the ARIS server. Table 8 shows the audio prompts that each participant located and Table 9 shows the text prompts that were found.

Table 8

Audio Prompts Found by Participants

Participant	Coffee Shop	Restaurant	Library	Café
P1	X	X	X	X
P2				
P3	X			
P4	X	X	X	X
P5	X		X	
P6	X			
P7				
P8	X	X	X	X
P9	X			

Table 9

Text Prompts Found by Participants

Parti-cipant	Bikes	Book-store	Stadium	Sculpture	Sculpture	Food Court	Stadium	Quad	Craft Center
P1	X	X		X		X		X	X
P2			X				X		

Parti-cipant	Bikes	Book-store	Stadium	Sculpture	Sculpture	Food Court	Stadium	Quad	Craft Center
P3		X							
P4						X			
P5	X		X					X	
P6		X				X			
P7						X			
P8						X			
P9									

Game Artifacts

Game artifacts consisted of audio recordings and photographs taken by the participants while playing the game. The number of recordings created by individual participants ranged from two to seven and the number of photos zero to three. Table 10 shows the number of recordings created and the number of photos taken by each participant. The table also includes the number of audio prompts and *omamori* rewards found. See Appendix I for a detailed list of the recordings, which includes the following for each recording: participant, date, time, note name, location, topic, length of recording, and description of the photo if one was taken. The data used to compile the detailed list was acquired from the ARIS web-based editor (Appendix J) and the game server data log (Appendix K). Most of the recordings took place on campus, although a few were made at the participant's place of residence. The duration of the recordings ranged between 8 and 55 seconds. Figure 16 depicts the number of participants' recordings by date.

Table 10

Game Results

Participant	Number of Recordings	Number of Photos	Number of Audio Prompts Found (out of 4)	Number of *Omamori* Rewards Found (out of 9)
P1	6	0	4	6
P2	4	3	0	2

(continued)

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Participant	Number of Recordings	Number of Photos	Number of Audio Prompts Found (out of 4)	Number of *Omamori* Rewards Found (out of 9)
P3	3	0	1	1
P4	4	3	4	1
P5	9	0	2	3
P6	4	0	1	2
P7	6	0	0	1
P8	7	0	4	1
P9	2	0	1	0
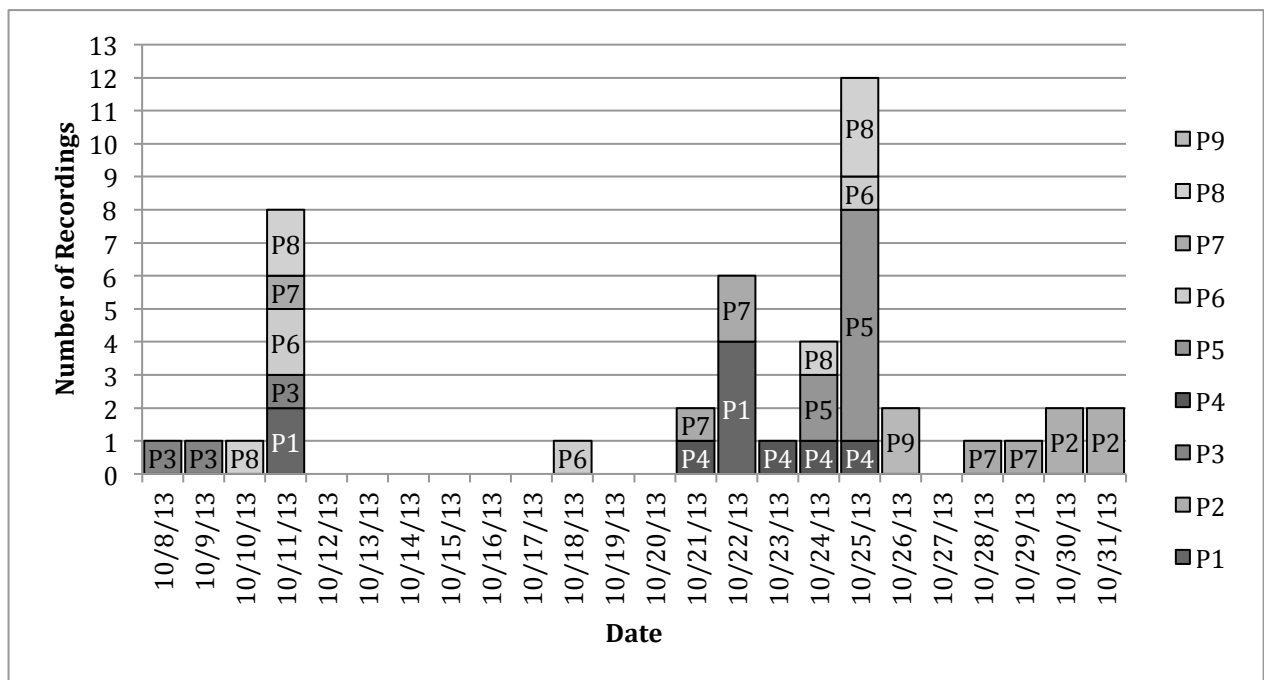
Figure 16. Participant use of the game's recording feature.

Interviews

After the interviews were transcribed and imported into HyperRESEARCH, the researcher began the coding process with provisional codes (Miles, Huberman, & Saldaña, 2013) based on the five WTC antecedents and seven game characteristics. In order to answer the research questions for this study, a number of quotations have been selected from the participants in support of the WTC antecedents and game characteristics.

WTC antecedents. Table 11 depicts a summary of the evidence found during the

interviews that suggests these antecedents were present for the participant while playing the

game.

Table 11

Evidence of WTC Antecedents

Participant	Perceived Competence	Reduced L2 Anxiety	Security	Excitement	Responsibility
P1	X	X	X		
P2	X	X		X	X
P3	X	X		X	X
P4	X	X		X	X
P5	X	X			X
P6		X		X	X
P7		X	X		
P8		X			
P9					

Game characteristics. Table 12 lists the game characteristics and whether a participant

had a positive comment about the characteristic, indicated by "+", or a negative comment,

indicated by "-".

Table 12

Game Characteristics

	Audio prompts were of appropriate language level	Open-ended format	Storyline revolved around a scenario of helping exchange students from Japan	Audio prompts were recorded by a native Japanese speaker	Game was designed to be played alone	Audio prompts were recorded in a welcoming and friendly tone of voice	Finding and collecting hidden *omamori*, or Japanese charms
P1		-		+	+		+
P2		+	+				+
P3		+	+				
P4	+	+	+				
P5		+	+				+

(continued)

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	Audio prompts were of appropriate language level	Open-ended format	Storyline revolved around a scenario of helping exchange students from Japan	Audio prompts were recorded by a native Japanese speaker	Game was designed to be played alone	Audio prompts were recorded in a welcoming and friendly tone of voice	Finding and collecting hidden *omamori*, or Japanese charms
P6		+	+	+			+
P7		+			+		
P8		-					-
P9		-					

Participants

This section includes the researcher's reflections pertaining to each of the participants.

Participant 1. Participant 1 was enthusiastic from the beginning and was the first person to volunteer for the study. She shared with the researcher that her major was anthropology and that she was interested in seeing how the study was going to be conducted. She recently got an iPhone so she was just learning how to use it. Although she found the most *omamori* out of all the participants (6 out of 9), she created her recordings mainly at home. She enjoyed the opportunity to read Japanese text in the game since she perceived her reading capability to be subpar. When asked about using her iPhone for studying Japanese, she responded that she mainly uses her iPhone as a phone.

Participant 2. Participant 2 expressed excitement about playing the game at the orientation. Despite his initial enthusiasm, he did not respond to any of the researcher's email messages nor did he play the game during the designated time frame. He did, however, show up with another participant at her scheduled time for her one-on-one interview. The researcher interviewed the two participants at the same time. Unbeknownst to the researcher who had checked the game logs the night before, participant 2 played the game after the logs were

checked and created four recordings. He was able to provide very insightful comments regarding his experience with the game, perhaps because it was fresh in his memory. He sincerely took the storyline into consideration when creating his recordings. He mentioned several times that he wanted to find places that would be interesting to campus visitors. He also was one of two participants who supplemented his recordings with photos.

Participant 3. Participant 3 played the game the minimum requested times. During her observation session, she did not seem comfortable speaking in Japanese. This could be partially attributed to several reasons: (a) she was being observed and (b) another participant (participant 6) joined this observation session. Participant 6 came prepared with notes and seemed comfortable in recording her voice, which may have intimidated participant 3.

Participant 4. Participant 4 probably adhered most to the game's storyline while creating her recordings. As highlighted by her interview comments below, she thought of what she would have liked to see if she were an exchange student in another country. Participant 4 was one of two participants who supplemented her recordings with photos, which was further evidence of her commitment to the game's storyline.

Participant 5. Although participant 5 declared Cantonese as his first language on the demographic survey, during his interview he stated that he felt that he had lost his fluency in Cantonese. Recently he has been trying to regain fluency by talking to himself in Cantonese and likened this game to that except for the fact that he is using the Japanese language. Participant 5 created the most recordings (nine) out of all the participants.

Participant 6. Participant 6 was probably the most confident in her language skills out of all the participants. She studied abroad in Japan during the summer after her graduation from high school. She stated that language learning comes naturally for her and that she has studied

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four languages (Mandarin, French, German, and Japanese) thus far. Her major is International Relations and she plans to work abroad after graduating from college. She has also done voice-overs in the past for a job, which may explain her high level of comfort in creating the recordings for this game.

Participant 7. Participant 7 was the only participant who did not play video or computer games. She also chose to disregard the game's storyline and instead used the game as an instrument to create an audio journal in Japanese. Since she chose to use the game as a way to record journal entries, she did not visit the various places on campus to play the game and as such, found only one of the text prompts and none of the audio prompts.

Participant 8. Participant 8 was a dedicated gamer who, according to her response on the demographic survey, logged over 40 hours of video and computer gameplay a week. Therefore it was not a surprise to the researcher when one of this participant's first responses during the interview was "Overall, I don't think it was mostly a game, I think it was just mostly recording your own thoughts" (interview, October 30, 2013). She initially had problems accessing her microphone in the game although her microphone worked with other applications. A solution was found through the ARIS user's forum. She also shared with the researcher that she is more interested in being able to *read* Japanese, and not necessarily *speak* the language. She mainly wants to be able to read *manga* (Japanese comics) and play Japanese video games.

Participant 9. At the orientation, participant 9 expressed doubts about being able to successfully participate in this study. He felt that because he was a freshman, and this was a location-based game, that he would be at a disadvantage since he was not familiar with campus. He also had an older iPhone that he thought would not be able to run the game. At the observation session, he complained about the slowness of the game on his phone along with

other technical problems he was experiencing which could have been due to his older phone. He was the only participant who did not exhibit any of the antecedents associated with increasing WTC and was also the only participant who did not find any *omamori* rewards. Moreover, he was the only participant who did not create the requested three recordings.

Selected Quotes

This section contains selected quotes organized by themes that will assist in answering the research questions.

WTC antecedents.

Perceived competence. When asked if she thought the game increased her competence in speaking Japanese, participant 3 replied that it did by allowing her to practice the building of sentences and to use Japanese outside of the classroom:

> Yes, yeah because like I mentioned earlier. It's the sentence building structure and then actually using Japanese outside the classroom. This like forcing you to sort of try to remember like what words that you need to use (interview, October 31, 2013).

Participant 4 stated that by concentrating on using the language, it changes her mentality, which in turn will help her language skills:

> …it makes you think about how to say things properly and change your mentality which partly happens when you speak to Japanese in general or are surrounded by Japanese speakers. So if you start focusing your attention in one language it will help you get a better feel for it so when you actually talk to somebody you have more confidence in what you're saying so it's not jumbled up or confusing to the other person (interview, November 6, 2013).

Participant 5 felt that the game helped in the performance of dialogs during class:

> Well about this game. It certainly helped my performance in class because during class we would always have dialog and she would ask us random questions and so like I think our using the game and talking about places, I already had the answer prepared in my mind when class came. And then she asked me about the library or something. I would have a sentence similar to what I needed to say (interview, October 31, 2013).

Reduced L2 anxiety. Participant 1 felt that she concentrated more on speaking instead of what others were thinking:

> …you stop worrying about people listening and judging how you're speaking and you're more trying to remember what you are going to say. And kind of use the language properly. Instead of panicking. And being like "I don't know what to say" or saying the wrong thing (interview, November 1, 2013).

Participant 2 made an intentional effort to use the game to help reduce the anxiety he felt while speaking in class:

> I really just wanted to focus on my pronunciation and my pace, because I feel like in Japanese class I get really flustered like when I get called on, so I think that was like my main thing to work on with this project was just calming down and being able to pronounce everything correctly (interview, October 31, 2013).

In response to a question regarding whether this type of game would reduce L2 anxiety, participant 3 responded that practicing makes her more confident in her skills and that in turn reduces anxiety.

> Yeah. Because it's speaking, basically. I mean it's practicing. It's like making you more confident in your skills (interview, October 31, 2013).

When asked about anxiety in speaking the L2, participant 4 said that she uses the game as a virtual practice partner, which would help in reducing her anxiety when speaking to a real person in the L2:

> In Japanese class you're self-conscious in saying it because you don't know if you're right or wrong and the teacher is there. But if you're doing it like this [using the game] you're kind of putting yourself in a situation where you're actually talking to someone but you're not. And so when you do talk to someone, you might be a little unsure about it, but you have practiced already saying the form so you can say it faster without stuttering. Therefore it seems like you know it better. So it kind of would help, yeah (interview, November 6, 2013).

Participant 5 thought that the game would help in reducing his nervousness when speaking in Japanese class:

I'm always really nervous when I go to Japanese class. I need to prepare my mind and on some days I go to class and she asks me questions and my mind's gonna be blank. And I just stumble until she passes on to someone else. But, like I needed more activities to like mentally prepare myself to be Japanese and not English when I go to class, so I think this could help if I did it a lot more often (interview, October 31, 2013).

When asked if this game reduced her L2 anxiety, participant 6 responded that the more you use the L2, the more comfortable you become with the language:

The more you use a language, the more comfortable you become with it especially in something you have the choice to choose what you talk about, how long you speak about it, etc. (interview, November 1, 2013).

Participant 7 shared her experience that occurred during an optional *kaiwa* (Japanese conversation practice) session where she gradually felt more at ease with speaking in Japanese:

I went to *kaiwa* the other day. And then like at first I was pretty hesitant to talk in Japanese but then eventually it got better, and then I've also talked to my tutors more, so I don't know if this has anything to do with the game (interview, October 31, 2013).

When asked if she thought this game would reduce anxiety when speaking in Japanese, participant 8 replied that since she chose crowded areas when playing the game, she did not worry about speaking in the L2:

Well, when I went out to like speak, I was around crowded places so people don't really bother or look at you while you're speaking, it sounds like you're just on a phone call (interview, October 30, 2013).

When asked if he thought this game would reduce anxiety when speaking in Japanese, participant 9 replied that he did not think so since speaking into a microphone was not the same as speaking to a real person:

I'd say no actually. Because the way the game works, you speak into a microphone and you can speak at any volume you want. The big thing about speaking Japanese is that you have to be understandable, so in the classroom situation you're talking to someone so you have to speak up so they can hear you. Here you just kinda can just mumble or something and the game would accept it. But it actually wouldn't work in society (interview, October 31, 2013).

Security. Participant 1 chose to make several of the recordings at home, where it was

quieter than out in public and where she could focus on pronunciation and intonation:

> I felt like I wanted to think about it. And then at home it's quiet, I can hear it when I want
> to re-play it back. I could actually hear what I was saying. I wasn't going to have as many
> of those "ums". And I think I was more focusing on how I was pronouncing things and
> the intonation rather than what I was saying in those cases (interview, November 1, 2013).

> Participant 7 stated that she felt comfortable while creating the later recordings:

> I think for these last couple of recordings, I didn't write it down beforehand. I think it
> was because I felt a little more comfortable (interview, October 31, 2013).

Excitement. Participant 2 spoke of places he enjoyed visiting on campus:

> It was useful like coming up with the sentence structures just because it's like outside
> Japanese class so we got to just come up with what we wanted to talk about on our own.
> Like at the fountain in front of the [performing arts] center or the arboretum they're very
> like quiet peaceful places. I like to study there. So maybe they would too. And like also I
> do yoga at the arboretum because it's so open and everyone's just riding their bikes,
> having a joyful time. (interview, October 31, 2013).

Participant 3 wanted to share with the exchange students some information about her

favorite building on campus:

> [Language building] is actually my favorite building in the campus, 'cause it's also the
> tallest and a lot of my teachers are there. And the tutor room is there too. … And also the
> teachers there are super nice (interview, October 31, 2013).

When asked whether she was excited to play the game, participant 4 replied that she was

excited to put into use different grammatical forms to express herself:

> I can use all these new different forms of saying certain things to do and why, and
> different forms of saying why (interview, November 6, 2013).

> Participant 6 enjoyed sharing trivia about the campus:

> It's whatever you want to share, like for me I said earlier those little tidbits of trivia that
> you probably never care about. I like sharing those things (interview, November 1, 2013).

Responsibility. Participant 2 tried to find out-of-the-way places that he thought the

exchange students would find interesting:

I tried to go to places that weren't very obvious like the [student union] or the [coffee house]. I really tried to find places that Japanese speakers or people that were visiting CU would want to go to but they don't really know about. Like one's the [recreation center]. And that's kinda well known, but the other two were I went to CU creek which is in the arboretum. It's this giant park with the river. And the other one is the [recreation center] - there's this really pretty like water fountain. I like to sit there and relax (interview, October 31, 2013).

Participant 3 took into account the difference in cultures when making her recordings:

I tried to take into consideration like what they would try and do in like the certain areas that I was in. It's like we met in the [student union], what can I say that I can recommend to them. But then the problem is also the cultural differences. Would they be interested in trying out new foods or would they like something similar? (interview, October 31, 2013).

Participant 4 thought about locations that an exchange student would be interested in

hearing about. Also, in order to provide a basis for comparison, participant 4 compared Japanese

college campuses to ones in the US:

I wasn't thinking about it from an American's point of view as I was playing it or using the program. I was thinking about it in terms like if I was an exchange student here in California or if I went to Japan and it was a program they were doing themselves for us…So I was giving "why I like this here" and "oh yeah, this is good and sometimes I get this because it's my favorite drink" or "I like to lay out in the quad because it's pretty quiet, regardless of the time of day it's actually pretty quiet and empty and sunny and it's pretty close to all the buildings" so my whole aspect on it was trying to be as helpful as possible because I know if I were using the program as a foreign person, I would not find it helpful if people just said they were here and that's it. I'm like "no, I would like to know more about it" like "okay, so that's why people are always here." Especially like culture differences. I don't know if they have big lawns in Japanese colleges, I know they don't in high school. So it's like "why do they have this space" and you tell it, and it gives people spaces to read, or "why is there a coffee shop on campus" well, because people like to do this and it's a good place to study. So it kind of gives an overall better understanding of the culture that you are trying to immerse yourself in (interview, November 6, 2013).

Participant 5 shared unique activities that are available at the university's recreation

center:

I was trying to pinpoint or trying to show how there's different kinds of activities at the gym. Like I did not say weight lifting, but most gyms have basketball, but the fact that it has yoga and karate, that's unique to the [recreation center] gym. So that's why I had said

those. And then besides the activities that you could do there, I wanted to include what is there. Like Starbucks and the convenience store. And I wanted to also say that they also hold meetings (interview, October 31, 2013).

Participant 6 included other aspects of a building about which an international student

might be interested:

If it was really going to an international student, that's kind of the information, like the little tidbits of trivia that you normally wouldn't care about but it just gives a whole other feel to the building when you look at it (interview, November 1, 2013).

Game characteristics.

Audio in Japanese. Participant 1 commented about the NPC's intonation and

pronunciation in the game:

When she [NPC] spoke that's also nice because you could hear just how to pronounce things and intonation and everything. I did like how you could listen back because then I could see how I was speaking (interview, November 1, 2013).

Although participant 4 thought the listening part was easy, she also felt that it increased

her confidence in understanding the L2.

The listening part was pretty easy because it was very basic. It was like "oh I can understand it. Okay." But it also increases my confidence in understanding. It's like "Yay, I got that" (interview, November 6, 2013).

Participant 6 mimicked how the NPC spoke in order to sound more like a native speaker:

You listen to it, you see what a native speaker has to say about that place, you kind of repeat it to yourself, and then you're like this is how I would describe this place to another native speaker (interview, November 1, 2013).

Storyline. Participant 6 recorded information on a rarely visited museum in the oldest

building on campus:

It was just something I really wanted to share with people because I was like "no one ever visits that museum inside [campus building]." And a lot of people don't know that it's the oldest building on campus (interview, November 1, 2013).

Open-ended format. Participant 1 did not enjoy the open-endedness of the game, and would have preferred that there be specific objectives or goals:

> I would like there to be more objectives mainly because I'm the kind of person that wants to be able to have completed all the objectives (interview, November 1, 2013).

Because the game was open-ended, participant 2 was able to practice various sentence types and incorporate different vocabulary:

> And there wasn't really any like constraints to that. So I was able to use a lot of different sentence types and I tried to use different vocabulary and structures (interview, October 31, 2013).

> …there weren't any constraints and that did allow me to just talk freely and it, I think that helps you like practice more because if you did have constraints then you'd be very limited to what you could say (interview, October 31, 2013).

Participant 3 enjoyed the fact that she could go anywhere and record anything:

> But I found it fun. Because like I can go anywhere. I can do [record] anything (interview, October 31, 2013).

When asked about the open-ended format of the game, participant 5 said he liked it and that playing this game was similar to what he did on a day-to-day basis when he spoke to himself in Cantonese:

> Like I like things all spontaneous. And so it kind of worked well like I didn't have to follow a set schedule of what I needed to do. And again, it's very similar to what I just do on a day-to-day basis where I just talk by myself. And so whenever a thought comes up I should have just pick up the phone and just spoke about it (interview, October 31, 2013).

Participant 6 enjoyed the game because it did not force her to use it on a regular basis:

> I love a game like that. That's why I like Mabinogi [an online game]. You're free to do whatever you want. It is like a no pressure kind of thing (interview, November 1, 2013).

> And it's also great that you don't have that kind of pressure to produce something on a regular basis. It's whatever you want to share, like for me I said earlier those little tidbits of trivia that you probably never care about. I like sharing those things (interview, November 1, 2013).

Participant 7 chose to use the game as way to log audio diary entries:

I would make it into a diary format. So I think the fact that it's open ended is really good because people can use it to do anything (interview, October 31, 2013).

Participant 8 did not like the open-ended format of the game, specifically the hidden

rewards (*omamori*). She would have preferred to have a list of the *omamori* and their locations

ahead of time:

Also with the open-ended thing, it's like you're not sure of like what you're supposed to collect basically, because they're all scattered around, so there's not really a list of where they are at. So it's like you have to find 'em yourself (interview, October 30, 2013).

During the interview, participant 9 again brought up the fact that he thought he was at a

disadvantage since he did not know the campus as well as the other participants.

Well, it was convenient I guess. But at the same time, kind of hurtful since I'm a freshman, I barely know of this school. I'm sure for the other members in this group study it was really helpful because they already know a lot. But for me I only know about the [campus building] and maybe my dorm. How do I describe those? (interview, October 31, 2013).

In-game rewards. As previously mentioned, participant 1 found the most *omamori*, or

rewards in the game. During the interview, she said that she was still wondering where the other

omamori were located:

I really liked that. I was like I want to find where all of them are. I really wonder where the last four are… (interview, November 1, 2013).

Participant 6 held informal challenges with a few other participants by seeing who

received the most *omamori*:

'Cause like me and my friends for like a day were like scouting to see if we could find the other ones. We were unsuccessful but we were like okay that's fine. That's okay. Towards the end, maybe this past week, we were comparing each other's logs. We were like "I got one *omamori*" and I'm like "I got two, hey…" It's kind of fun when there are little easter eggs [rewards] hidden inside the game (interview, November 1, 2013).

Other themes.

Preparation. Participant 1 prepared in advance before doing a recording and then re-

recorded until she was satisfied with her audio:

> I prepared ahead. I wrote it down. And I read it off to myself first. And then I recorded it. And then if it didn't sound good on the recording when I listened back, I re-recorded it and listened again to see if I fixed the things I wanted to fix (interview, November 1, 2013).

> Participant 4 prepared in advance before making a recording:

> I would actually write it out in English, translate it into Japanese, make sure I have the correct form. Sometimes practice it before actually saying it. That way it doesn't come out too choppy as I'm recording it (interview, November 6, 2013).

> Participant 5 prepared in advance by writing scripts:

> I didn't do this spontaneously, I wrote down my answers before I spoke it. And so it kind of made me think harder and I actually had some grammar issues trying to say what I wanted to say. So I think I got some wrong, but it made me learn a little bit. That was good (interview, October 31, 2013).

Enjoyment. Participant 1 enjoyed playing the game between classes even though she

ultimately made most of her recordings at home:

> I really liked recording and listening back and I thought it was fun when I did have the time to play it…, it was nice because I have breaks in between classes and I can just walk around and see what they were saying and I mean that I recorded stuff at home but I listened to things a lot around campus (interview, November 1, 2013).

> Participant 3 enjoyed going to different places and finding the voice prompts:

> But it was fun overall. Because it was like go to different places and find those little – like when we went over to the [student union] and found those little voice bonuses like this is so fun it's like I can talk about the drinks I'm going to get (interview, October 31, 2013).

> Participant 4 enjoyed using the L2 to describe the places on campus she frequented.

> It was pretty fun 'cause it had me think about places and why do I go here. I go here often, but why. And where do I actually go, and then not only say it English but have to translate it and use the skills that I have been acquiring for the last few years, in practical terms (interview, November 6, 2013).

Participant 5 expressed excitement about looking for the rest of the *omamori* and

exploring campus at the same time:

> After I had played it, yeah, I was excited. I wanted to find the rest of the *omamori*. Because there's a lot of the campus that I have not explored yet. I usually stay in my own place. Or classes, and go straight home (interview, October 31, 2013).

Participant 7 enjoyed being able to use her Japanese language skills with this game:

> I think whenever I recorded it I enjoyed it, it's just like I don't have a habit of using apps, but it was fun when I did it because like then, I'm thinking, oh like I actually get to use my Japanese now (interview, October 31, 2013).

Did not record. Participant 1 said that after listening to some of the prompts, she just

thought about the answer but did not respond:

> And then thinking about my answer. Because I just think about my answer. I just didn't answer them. I did like how you could think beforehand before you actually said anything (interview, November 1, 2013).

Re-listened to own recordings. Participant 1 listened to her recordings and re-recorded if

necessary:

> Since you can listen back you can fix all of your mistakes so if you do say the wrong thing you can be like "that's not the right thing OK I need to change that" (interview, November 1, 2013).

Participant 2 re-recorded if the original recording didn't sound right:

> Some of mine I recorded several times. Because like the first time I was just like reading so fast it was really jumbled. And then I would listen to it and I'm like "that sounds awful." I'd re-record it and try talking in a more calm and conversational manner and in that way each time I'd re-recorded it, it did seem a lot calmer and more smooth to me (interview, October 31, 2013).

Participant 4 wanted to make sure her recordings were understandable by the listeners:

> Wrote in English and Japanese, make sure I had it right, practiced it a little bit, recorded, if I didn't like the recording, delete it, did it again. 'Cause I would probably have wanted to make sure I had it correct (interview, November 6, 2013).

Participant 5 re-recorded his audio until he was satisfied with the results:

I re-listened a lot. I kept deleting and redoing over and over and over until I found one that I spoke fluently enough, or smoothly enough, there wasn't too much loud distractions. Or sound interference. And that I didn't stutter. That's why I had a piece of paper (interview, October 31, 2013).

Continue playing the game. Participant 1 indicated that she intends to continue to use the

game:

I was thinking about it and I figure I would probably keep the app on my phone to just to have something to practice with (interview, November 1, 2013).

Participant 7 plans to make it a goal to use this game more often:

I think I want to make it a goal for me to use it more because I think it really does help and yeah. I don't know. I'm still like pretty excited about this game even though I haven't used it a lot. But I think it's good to have on my phone (interview, October 31, 2013).

Instructor feedback. Participant 1 would have liked to receive feedback from her teacher:

One thing that I was kind of bothered by was when you speak, you don't have anything to test it against so you don't know how good you are. You kind of just like "I think this is good but I'm not quite sure" but I mean that's where you would go to a teacher. I'd be like "is this OK? Am I saying it properly? Is like the grammar correct?" (interview, November 1, 2013).

Participant 6 would like to have received feedback from her teacher as to whether the

form of speech she was using was appropriate (casual versus formal):

I'd probably would like to see if I'm using it correctly and if *sensei* [her instructor] had any feedback or she might say "you sound too formal here, you can use a more casual form of speech" things like that. Especially when I have goals of living abroad or working or studying abroad you want to know what kind of speech works well in every situation so you're not sounding weird. So it helps from a native speaker to know what you are doing wrong or what you are doing right (interview, November 1, 2013).

Participant 8 indicated that she was not sure if she was speaking correctly and that it

would have been nice to receive feedback:

I had no one around me to correct my speaking, so I'm not sure if I was speaking well enough or if I was speaking correctly at all… Yeah, it would be nice to get feedback, but it'll be embarrassing too (interview, October 30, 2013).

Social aspects. Because participant 6 arrived earlier than expected for her observation

session, it overlapped with participant 3's session. When asked about the overlapping sessions,

participant 3 said that she thought it was a good experience:

> Because we can bounce off ideas, and then you can like practice your sentences with
> them. Or you can speak to them in Japanese. Because they also can speak the language
> that you're trying to learn. So then I was like this is good and we can do self-corrections
> with each other (interview, October 31, 2013).

Participant 4 thought that the game could be improved by the addition of social media

features such as that of Yelp, where users can view what other users have said about a particular

location:

> Like if you look at Yelp, there are other comments from people. But for this game, you
> don't really know what other people have said. Why are they here? Oh, look they're here.
> Maybe I should talk to them. You can talk to someone in person…Maybe have the option
> to share it or not share it. Do you want it to be public or private? (interview, November 6,
> 2013).

Participant 6 and participant 3 were observed at the same time. During the interview, the

researcher asked participant 6 what she thought about this overlapping session. She said that she

enjoyed having someone to interact with while playing the game:

> It is fun to have someone there so it's like "what are you going to talk about…don't copy
> me" things like that. Or "hey am I saying this right? Is my grammar right?" It's that kind
> of extra layer of security. It's not that awkward that you're walking around saying things
> to yourself. You have a buddy system so in that way it's more enjoyable if you do that.
> Or let's say you're talking about the same place you can offer two different perspectives
> on the place. That kind of thing is really nice I think (interview, November 1, 2013).

Repeated listening to one's own voice. Participant 7 shared an experience that she had

during a class activity in which she found that the more she listened to her own voice in the L2,

the more comfortable she felt speaking:

> I think this game too, just like hearing your voice in Japanese is like something that helps.
> We did the activity [in class] where we have the earphones and I talk to a random person.
> The first time we played that, I was like "oh my gosh, like I don't want other people to
> hear my Japanese. Like this is really nerve wracking and what if I get one of the tutors?"

and then I was like really stuttering. And I don't know if it's 'cause like oh we're learning more Japanese now, or that like I went to *kaiwa* or like met more Japanese people, or played this game but the second time we did it, I was a lot more comfortable with it. And then even to the point that I was like "I don't care if I get a tutor." And then when I was speaking into the microphone, I could hear my voice and it sounded kind of nice! And then I kept on talking and stuff. And then like I was "ok let's repeat this activity" 'cause it was pretty fun to like hear your voice (interview, October 31, 2013).

Technical problems: Participant 9 initially looked forward to playing the game, but ran

into technical problems early on:

I really liked the idea of biking around the school and picking up tokens. But I ran into Internet issues so I couldn't even do that…the first time I did this, somehow the recording didn't take so it got deleted, the second time I tried it again, and the thing froze (interview, October 31, 2013).

Other uses. Participant 7, who was a non-gamer, chose to use the mobile app not as a

game but instead as a way to create audio journal entries in Japanese:

It was fun 'cause I wanted, I guess like when I was doing that I was already thinking of this game as my diary, 'cause I was kind of like introducing myself, and I think before this one I made another recording that was like "*ja, ikimashou*" like "let's play the game now!" Kind of like me and my diary are friends or something like that (interview, October 31, 2013).

Cross-case Analysis

One purpose of using cross-case analysis is to determine if there are similar themes that

run across the cases (Miles et al., 2013). It is also a strategy for enhancing the generalizability of

a study's findings (Merriam, 1998). Miles et al. (2013) recommend the use of Content-Analytic

Summary Tables to bring together data from multiple cases in order to compare and contrast

across the cases. The Content-Analytic Summary for the WTC antecedents is depicted in Table

13. Research question 1 explored how students described the ways in which playing the AR

game influenced their WTC in the Japanese language. In order to assist in answering this

question, the following Content-Analytic Summary for the WTC antecedents was compiled.

Table 13

WTC Antecedent Content-Analytic Summary

	Perceived Competence	Reduced L2 Anxiety	Security	Excitement	Responsibility
P1	Felt that the speaking practice would increase her competence.	Concentrated more on speaking instead of worrying about what others thought.	Recordings were made at home where it was quiet and she could focus on pronunciation and intonation.		
P2	Felt that any sort of language practice will make him more competent in speaking.	Made an intentional effort to use the game to help reduce the anxiety he felt while speaking in class.		Spoke of places he enjoyed visiting on campus.	Tried to find out-of-the-way places that he thought the exchange students would find interesting.
P3	Felt that her competence will increase by practicing sentence building outside of class.	Practicing makes her more confident in her skills and that in turn reduces anxiety.		Shared information about her favorite building on campus.	Took into account the difference in cultures when making her recordings.
P4	Concentrating on using the language changed her state of mind, which in turn would help her language skills.	Using the game as a virtual practice partner will allow her to feel less anxiety when speaking to a real person.		Excited to put into use different grammatical forms to express herself.	In order to provide a basis for comparison to the exchange students, participant 4 compared Japanese college campuses to ones in the US.

(continued)

	Perceived Competence	Reduced L2 Anxiety	Security	Excitement	Responsibility
P5	Felt that the game helped the performance of dialogs during class.	Thought that the game would help in reducing his nervousness when speaking in Japanese class.			Shared unique activities that are available at the university's recreation center.
P6		Felt that the more you use the L2, the more comfortable you become with the language, thus reducing anxiety.		Enjoyed sharing trivia about the campus.	Included other aspects of a building about which an international student might be interested.
P7		Gradually felt more at ease with speaking in Japanese during a conversation practice session.	Felt comfortable while creating her later recordings.		
P8		Since she chose crowded areas when playing the game, she did not worry about speaking in the L2.			
P9		Did not think that this game would reduce L2 anxiety since speaking into a microphone was not the same as speaking to a real person.			

Perceived competence, which occurs when learners feel that they have the capability to communicate effectively in certain situations, showed up in several ways for the informants. Several commented that any language practice, including that obtained in this game, would increase their competence. Only participant 5, however, directly attributed this game to helping his performance in his Japanese class.

Of the five antecedents of WTC analyzed in this study, reduced L2 anxiety appeared most frequently. L2 anxiety occurs when the learners have a fear of communicating in the L2. Just as with perceived competence, several participants thought that any language practice would ultimately reduce their anxiety when speaking in the L2. Since the game allowed the participants to choose the locations where they would make their recordings, this factor appeared to play a part in reducing anxiety. For example, participant 1 felt more comfortable creating her recordings at home, while participant 8 purposely chose crowded areas where she felt others around her would not notice that she was speaking Japanese into her phone. However, not all participants thought that the game would reduce their L2 anxiety. Participant 9 did not think that the game would reduce L2 anxiety because it did not replicate the act of speaking to a real person.

Research has shown that security is exhibited when the learner has some knowledge about the topic of conversation, when there are fewer interlocutors present, and when the interlocutors have a positive and pleasant attitude (Kang, 2005). Several of the participants indicated that they chose the places they knew the most about. For example, participant 6 acquired some trivia about the campus' buildings during her freshman orientation and chose to share this information. Participant 2 visited the arboretum on campus often, so he spoke of its creek and trees. Participant 1 exhibited a sense of security when she made her recordings at home, with no one else was around and where it was quiet.

The WTC antecedent of excitement appears when the learner is interested in the topic of conversation (Kang, 2005). There is evidence of this phenomenon in the responses from the participants: it was clear that there was a higher level of engagement when the students selected their optimal learning environments. For example, participant 2 spoke of practicing yoga in a quiet part of campus that few people visited.

Lastly, responsibility tends to appear when there was a feeling of obligation or duty to deliver a clear message when speaking in the L2 (Kang, 2005). In this study, responsibility was exhibited mainly when the participants took into consideration the game's storyline, which was to create audio recordings at places that they thought exchange students from Japan would find interesting. For example, participant 6 said she had the international students in mind when she made recordings at locations including a museum in a campus building and the lounge in the student union. Her game recordings also reflected this sense of responsibility and an adherence to the game's storyline. As an example, her recordings always ended with 「時間があればぜひ来てくださいね。」 (Translation: "If you have time, by all means please come to this place.") Similarly, participant 5 said he chose places and activities that he thought were unique to the campus. For example, he mentioned that the gym has yoga and karate in addition to the usual sports such as basketball. His audio recordings mirrored this sentiment as well. Two participants took pictures of the locations they spoke about in the game. This can be construed as further evidence of the WTC antecedent of responsibility. Both participants who took pictures indicated that they wanted to show the exchange students images of the campus to supplement their audio recordings in order for the exchange students to get a better feel of those locations.

Research question 2 identified the game characteristics that the participants attributed to influencing their WTC in the Japanese language. In order to assist in answering this question, the following Content-Analytic Summary for the game characteristics was compiled (Table 14).

Table 14

Game Characteristic Content-Analytic Summary

*A	B	C	D	E	F	G
P1	Did not enjoy the open-endedness of the game and would have preferred specific goals.		Compared the NPC's pronunciation and intonation to participant's own recordings.	Recordings made at home when no one else was around.		Enjoyed looking for the *omamori*. Found the most *omamori* out of all the participants.
P2	Because there were few constraints, he was able to practice various sentence types and incorporate different vocabulary.	Tried to find out-of-the-way places that he thought the exchange students would find interesting.				Thought that there should be a prize for the person who found the most *omamori*.
P3	Enjoyed the fact that she could go anywhere and record anything.	Took into account the difference in cultures when making her recordings.				

(continued)

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	*A	B	C	D	E	F	G
P4	Although she thought the listening part was easy, it increased her confidence in understanding the L2.	Game allowed her to use the L2 to describe the places on campus she frequented.	In order to provide a basis for comparison to the exchange students, participant 4 compared Japanese college campuses to ones in the US.				
P5		Liked that he did not have to follow a set schedule for this game.	Shared unique activities that are available at the university's recreation center.				Found it exciting to look for the rewards (*omamori*) because it allowed him to explore different parts of campus.
P6		Enjoyed the game because it did not force her to play on a regular basis.	Included other aspects of a building about which an international student may be interested.	Mimicked how the NPC spoke in order to sound more like a native speaker.			Held informal challenges with a few other participants by seeing who found the most *omamori*.
P7		Chose to use the game as way to log audio diary entries.			Recordings made at home.		

*A	B	C	D	E	F	G
P8	Did not like the open-ended format of the game, specifically the hidden rewards (*omamori*).					Would have preferred to have a list of the *omamori* and their locations.
P9	Thought he was at a disadvantage since he did not know the campus as well as the other participants.					

*Codes

A = The audio prompts were of appropriate language level for the participants.

B = The game had an open-ended format.

C = The storyline revolved around a scenario of helping exchange students from Japan.

D = The audio prompts were recorded by a native Japanese speaker.

E = The game was designed to be played alone.

F = The audio prompts were recorded in a welcoming and friendly tone of voice.

G = The hidden *omamori*, or Japanese charms, added a learning incentive.

The game was specifically designed to encourage WTC in the participants. In order to

determine if the game succeeded in this endeavor, the interview transcripts were examined for

the participants' perceptions regarding the following characteristics:

- The audio prompts were of appropriate language level for the participants.

- The open-ended format allowed learners to choose where to record, when to

  record, and the topic of the recording.

- The storyline revolved around a scenario of helping exchange students from Japan.

- The game audio prompts were recorded by a native Japanese speaker.

- The game was designed to be played alone.

- The audio prompts were recorded in a welcoming and friendly tone of voice.

- The hidden *omamori*, or Japanese charms, added a learning incentive.

With one exception, all game characteristics were referenced by at least one of the participants. Although research indicates that a warm and friendly interlocutor reduces the level of anxiety in the L2, participants in this study did not comment on this feature. The characteristic most commented upon was that of the open-ended format of the game. Participants enjoyed the fact that they had free reign as to what they recorded and where the recordings were made. One participant also liked that there was not a set time schedule to follow while playing the game, perhaps alluding to the fact that all his school assignments almost always came with deadlines.

The following themes emerged from the data:

Preparation – Several participants prepared in advance before making a recording by writing a script of what they planned to say.

Enjoyment – Most participants stated that they enjoyed playing the game and a few indicated that they would like to continue playing even after the study had concluded.

Review – Although not required to do so, several participants indicated that if they were not satisfied with their recording, they would delete it and re-record until they were satisfied.

Feedback – Three of the participants indicated that the game would be more useful to their language learning if they knew that they were using the correct grammatical form. Therefore, they felt that it would be beneficial to have an instructor provide feedback on their audio recordings.

Socialization – Several comments by participants suggested that they would have liked to have collaborated with other participants in the game or listen to their recordings.

Individualization – One participant disregarded the game's storyline and instead used the game as means to record personal thoughts in Japanese.

Technology – Several participants encountered technical issues at various times during game play.

Real-world tools – Several of the participants used Google Translate on their mobile devices to assist them in preparing for their audio recordings.

Anime – Seven out of the nine participants indicated that one of their reasons for studying Japanese was their interest in *anime*. *Anime* is a media genre that consists of Japanese animated films or TV programs (Napier, 2005).

Summary

This chapter presented key findings obtained from the demographic survey, observations, interviews, and game logs for the nine participants. These findings were categorized based on the two research questions. The first section included findings related to the five WTC antecedents and the second section contained findings related to the game characteristics that may affect WTC in the L2. Other themes that emerged from the data were also identified. The findings will be explored and discussed in more detail in the following chapter.

Chapter 5: Discussion

This chapter summarizes the study and will examine key results that were presented in the previous chapter. The findings will be grouped into meaningful themes, which will then be used to answer the research questions. An evaluation of the doctoral study has been included, together with recommendations for further research. The concluding section provides an outline of the theory arising from this study.

The purpose of this study was to examine student perceptions regarding the use and design qualities of an AR mobile game in a Japanese language course at an institute of higher education in California. Within this qualitative investigation, the researcher explored if, and how, the game's use and design qualities affected students' perceptions of their WTC in Japanese. The following research questions guided this study:

1. How do students participating in a second-year Japanese language course at a California public university describe the ways in which playing a mobile AR game influenced their WTC in the Japanese language?

2. What characteristics of a mobile AR game do students participating in a second-year Japanese language course at a California public university attribute to influencing their WTC in the Japanese language?

The study was conducted in the fall of 2013. A total of nine students enrolled in a second-year Japanese language course at an institute of higher education in California participated in this project. After attending an orientation session, the nine participants were asked to play the game at least three times within the three weeks allocated for the game. During this period, the researcher conducted several observations of the participants playing the game. After three

weeks, all nine participants agreed to be interviewed. Game player artifacts such as audio

recordings and photographs were analyzed alongside the game's server logs.

Key Themes

There were nine major findings that were considered conceptually interesting and worthy

of further discussion. Eight of these findings have been grouped into four meaningful themes as

depicted in Figure 17. The last finding, which is student interest in Japanese animation, will be

discussed in the recommendations section of this chapter.

Use of mobile devices	**Impact on personalized learning**	**Need for instructor feedback**	**Incidental learning activities**
•Technology •Real-world tools	•Socialization •Individualization	•Feedback	•Preparation •Enjoyment •Review

Figure 17. Findings to themes grouping

Use of mobile devices. Many students at the beginning of the 21st century are never far

from powerful, multi-functional, and networked computers. These computers are often carried on

their person in the form of smartphones. Several of the participants in this study used Google

Translate (http://www.google.com/mobile/ios/) on their mobile devices to assist them in the

preparation of their audio recordings. The use of such tools support the premise of situated

learning "by placing the game within a context of real tools and techniques that the players are

skilled in and become skilled at using" (Klopfer, 2008, p. 58).

In addition to Google Translate, other tools on students' smartphones, such as language

dictionaries and access to the Internet, give them the support they need for language learning

where and when they need it. Multilingual capabilities of smartphones allow users to read and

write in the L2. This is a feature that only one generation earlier was not readily available for

most language learners. Prior to the widespread acceptance and use of a now industry standard character encoding process called *Unicode*, individual platforms, including mobile devices, were limited to the localized alphabet characters ("What is Unicode?," n.d.). For example, prior to the use of Unicode, most users in the United States had access to only English alphabet characters when reading or typing on their mobile devices. Students using the current generation of mobile devices can now read and write in the L2 on their devices. This use of Unicode provides multilingual capability, which combined with newer mobile devices' increased processing power, allows for the addition of speech-to-text and text-to-speech in the L2, which means that students can dictate to their mobile devices using the L2 and have it entered as text or have L2 text read back. These capabilities are only beginning to be tapped by language teachers and learners and show great promise for the development of future AR mobile learning applications.

Although most of the students were able to participate successfully in the game without any technical issues, one participant in particular did experience some problems. Participant 9 had an older phone than the other participants and experienced technical issues that may have been attributed to his phone's lesser capabilities. This student was also the only participant who did not exhibit any of the WTC antecedents, which could be attributed partially to the technical issues he encountered with his phone. This was an indication to the researcher that developers and instructors should be mindful of the fact that capabilities of student-owned devices will vary from device to device. This finding addresses the importance of assessing the likely range of devices in use among the population of learners, and designing the game for the most inclusive set of device requirements. Older devices may not have the performance to support processing-intensive game features.

Impact on personalized learning. Different learning styles became apparent during the course of this study. Learning and play styles ranged from cooperative to solo, and from following the narrative to students striking out on their own. Several comments by participants suggested that they would have liked to have collaborated with other participants in the game or listen to the other participants' recordings. The game was initially designed for participants to work in isolation since previous research has shown that anxiety can occur when there are other listeners in attendance (Kang, 2005). However, in order to accommodate those without access to an iOS device, the researcher decided to give the participants the option of working in groups, though no one chose to do so. During their interviews, several participants mentioned social aspects of the game in a positive light, such as discussing their dialogs with their classmates and comparing achievements. Klopfer (2008) offers several reasons for incorporating a social component into mobile educational applications including the following: mobile learning allows for an ever-changing game dynamic, promotes both collaborative and competitive game play, and provides an opportunity for players to learn from each other.

Not all participants shared in the desire to make the game more social. Participant 7 chose not to use the game as designed but instead used it as a personal diary or journal: this observation was considered an outlier. In one of her recordings (October 28, 2013), she said 「今部屋にいる。日本語はちょっとむずかしいと思う。しょうらい日本語が上手になるかな。」 (Translation: "I'm in my room right now. I think Japanese is kind of difficult. In the future, I wonder if I will ever become skilled at it"). This example showed that the game could be successfully used in ways in which it was not originally intended. This is a positive aspect of any educational tool because not only does it verify the flexibility of the tool, but also gives insight into the learners' preferred method of learning. Participant 7 also happened to be the only non-

gamer out of all the participants. Presenting the project as more than just a game may be a way to attract other non-gamers to participate in similar studies in the future. With an open-ended game such as *Yookoso*, the possible applications are limited only by the users' imaginations.

Need for instructor feedback. Three of the participants indicated that the game would be more useful to their language learning if they knew that they were using correct grammatical forms. Therefore, they felt that it would be beneficial to have the instructor provide feedback on their audio recordings. The game was designed specifically to *not* allow anyone other than the participant who created them (and the researcher) to listen to the recordings. It was thought that by the students playing individually, this design feature would reduce L2 anxiety and promote a feeling of security. Although it may have reduced anxiety and/or promoted a feeling of security, it should not be surprising that students have a desire for corrective feedback since previous research (Schulz, 2001) has shown that students want their errors to be corrected. Specifically, in her two studies concerning teacher and student perceptions on grammar instruction, Schulz found that most students believe that corrective feedback plays an important role in learning grammar in the L2. In future projects, it may be beneficial to allow the participants to designate whether recordings are to be *public* or *private* in order to allow for feedback from their instructors. A feature such as this would allow the game to both encourage WTC and provide an option for instructor feedback, if desired by the student.

Incidental learning activities. Although playing the game was considered a learning activity in itself, several other behaviors associated with language learning also surfaced. Though not required to do so, several participants prepared in advance of their recordings by writing scripts of what they planned to say. This involved pre-activities, such as looking up vocabulary using dictionaries or online translators, and determining proper and appropriate grammar

structures. For example, participant 5 stated: "It certainly made me look up more vocabulary. For example, I didn't know how to say the word 'basement' in Japanese until this game" (interview, October 31, 2013).

Participants who chose to re-record their audio contribution when they were dissatisfied by the way they sounded, benefited from additional speaking practice. In regard to listening to one's own voice, participant 7 said that the more she heard her own voice in the L2 when reviewing the recordings, the more comfortable she felt articulating sentences. However, not all participants enjoyed listening to their own voices. During the stimulated recall activity in which participants were asked to listen to one of their recordings and share their thoughts prior, during, and after creating a game audio recording, most of the participants expressed mild distress about having to listen to their voice recordings. This was consistent with Holzman, Berger, and Rousey (1967) who found that listening to one's own voice caused affective and defensive responses. Based upon the participants' experiences and past research, it may be reasonable to deduce that although initially distressful, repeated listening to their voices can allow users to become comfortable with hearing their own voices in the L2. It appears to be an important component in the language learning process to review and revise. This is not always possible in a conventional classroom. Since digital audio recordings are simple to create using mobile devices and laptop computers, students should be encouraged to take advantage of this capability to record and listen to their own voices as a means to encourage WTC.

Several participants shared that they were able to apply what they had learned in their Japanese language class when making recordings with the game. In one example, participant 6 said: "I think any outside practice of the classroom is very beneficial especially if you do use a new sentence structure you've learned recently. That really helps." (interview, November 1,

2013). Additionally, participant 4 said that the game allowed her to "use the skills that I have been acquiring for the last few years in practical terms" (interview, November 6, 2013). Likewise, in their study of the use of mobile devices to assist students learning Japanese in real life situations, Ogata et al. (2006) found that their participants perceived that the mobile devices aided them in practicing situationally what they had learned previously in class. Klopfer (2008, p. 221) summarized this phenomenon concisely by stating "Mobile games excel at connecting to existing classroom ecologies, and extending them in powerful new directions."

Although *Yookoso* had an educational purpose, it was clear that it also offered a sense of fun and enjoyment. Though the sample size was small, almost half (four out of nine) indicated that they would like to continue playing the game even after the study had concluded. This finding was consistent with previous studies about AR on mobile devices (Dikkers, 2012; Wells, 2012) in which players found the use of AR applications to be enjoyable. The possibility of students using the game on their own is an exciting prospect. Research has shown that positive motivation is associated with successful language learning (Lightbown & Spada, 2006) and also influences WTC (MacIntyre et al., 1998).

Research Questions

It is possible to respond to each of the research questions in the light of these key findings. Research question 1 was intended to explore how students described the ways in which playing the AR game influenced their WTC in the Japanese language. The WTC antecedents examined in this study were: perceived competence, reduced L2 anxiety, security, excitement, and responsibility. All five antecedents were present in varying amounts with some of the participants. None of the participants exhibited all five of the antecedents. However, three of the

participants exhibited four out of the five antecedents. One participant did not exhibit any of the antecedents and is considered an outlier.

Perceived competence, which occurs when learners feel that they have the capability to communicate effectively in certain situations, showed up in several ways for five of the informants. Several participants shared their belief that any language practice, including that obtained in this game, would increase their competence in speaking Japanese. This notion was confirmed in the study conducted by MacIntyre and Charos (1996) in which they found that WTC was in part affected by perceived L2 competency and opportunities to use the language. Participant 5 thought that the use of this game helped him in his Japanese language class:

> Well about this game. It certainly helped my performance in class because during class we would always have dialog and she would ask us random questions and so like I think our using the game and talking about places, I already had the answer prepared in my mind when class came. And then she asked me about the library or something. I would have a sentence similar to what I needed to say (interview, October 31, 2013).

Of the five antecedents of WTC analyzed in this study, reduced L2 anxiety was exhibited most frequently. L2 anxiety occurs when the learners have a fear of communicating in the L2. Eight of the nine students perceived that this game reduced their L2 anxiety. Some of the participants shared with the researcher that they felt L2 anxiety when speaking in the classroom setting. However, this study found that students who indicated that they were nervous when speaking in class ultimately created the same number of game recordings (or more) than those who were more confident in their language skills. This indicates that anxiety due to the lack of confidence in L2 proficiency is not a factor at the time when the student decides to play the game and make recordings. For example, participant 5 shared with the researcher the following statement: "I'm always really nervous when I go to Japanese class. I need to prepare my mind and on some days I go to class and she asks me questions and my mind's gonna be blank."

(interview, October 31, 2013). These types of comments were consistent with Baker and

MacIntyre (2000) who found that students learning French reported that their instructors made

them feel nervous, thus lowering their WTC in French. Despite his nervousness in speaking

during class, participant 5 created the most recordings in the game out of all the participants.

Similarly, Reinders and Wattana's (2011) study on the effect of video games on WTC found that

students who were shy in their face-to-face classes tended to express themselves freely while

playing a video game. This is an encouraging result and may indicate that the use of AR

language games outside of the classroom may be beneficial to students who acknowledge that

they get nervous while speaking in class.

Having a realistic purpose for playing the game seemed to affect directly the participants'

sense of responsibility and the way in which they approached the game. The goal of the game

was to create location-based audio recordings on campus in order to help Japanese exchange

students feel welcome at the university and to inform them about the different places on campus

that may be of interest to them. Several participants indicated that they wanted to ensure that

their recordings would be helpful for international visitors to the campus. For example,

participant 4 placed herself in the exchange students' shoes and shared that she was "thinking

about it in terms like if I was an exchange student here in California or if I went to Japan and it

was a program they were doing themselves for us" and that she was "trying to be as helpful as

possible because I know if I were using the program as a foreign person, I would not find it

helpful if people just said they were here and that's it" (interview, November 6, 2013). She went

on to say that she would have had a different mindset if the game did not have this purpose: "If I

knew I was doing it for no reason, just for a study, I feel like I wouldn't be as motivated to do it

properly. Or even want to do it" (interview, November 6, 2013). This sense of purpose or

obligation was found in Kang's (2005) study in which learners exhibited the WTC antecedent of *responsibility* when they felt obligated to deliver a clear message. This finding indicates that having a realistic purpose may make the game seem more worthwhile to the participants instead of being *just a game*.

Research question 2 was intended to identify the game characteristics that the participants attributed to influencing their WTC in the Japanese language. The game was specifically designed to encourage WTC in the participants through the inclusion of the following game characteristics:

- The audio prompts were of appropriate language level for the participants.
- The open-ended format allowed learners to choose where to record, when to record, and the topic of the recording.
- The storyline revolved around a scenario of helping exchange students from Japan.
- The audio prompts were recorded by a native Japanese speaker.
- The game was designed to be played alone.
- The hidden *omamori*, or Japanese charms, added a learning incentive.
- The audio prompts were recorded in a welcoming and friendly tone of voice.

Six of the seven design features were attributed in varying amounts by some of the students to influencing antecedents of their WTC. The final item in the list above was the only feature that was not referenced by any of the participants.

The characteristic most frequently mentioned was that of the open-ended format of the game. Six out of the nine participants commented positively on this feature of the game. These participants enjoyed the fact that they had free reign as to what they recorded, when they recorded, and where the recording was made. Since the game was open-ended, participant 2 was

able to practice various sentence structures and incorporate new vocabulary into his recordings: "And there wasn't really any like constraints to that. So I was able to use a lot of different sentence types and I tried to use different vocabulary and structures" (interview, October 31, 2013). He also commented on being free to talk about his favorite places on campus: "I went to CU creek which is in the arboretum. It's this giant park with the river. And the other one is the [performing arts] center - there's this really pretty like water fountain. I like to sit there and relax" (interview, October 31, 2013). This finding was consistent with Kang (2005) who observed in her study that learners tended to be more excited when speaking about topics that interest them and of which they have contextual knowledge. This finding also suggests that language learning game designs should not be prescriptive but instead should be flexible enough to allow students to explore their own areas of interest.

The storyline for the game revolved around a scenario in which the participants were asked by their teacher to record audio descriptions of places on campus that they thought exchange students from Japan would find interesting. Then, using the *Yookoso* game application, students made the audio recordings on their mobile devices. Since the characteristics of the storyline (helping exchange students) aligned with those of the WTC antecedent of responsibility, it was not surprising to the researcher that the participants' comments regarding responsibility were the same as those of the storyline. For example, when asked about the effect of the storyline on her playing of the game, participant 3 responded in a manner that exhibited a sense of responsibility:

> I tried to take into consideration like what they would try and do in like the certain areas
> that I was in...But then the problem is also the cultural differences. Would they be
> interested in trying out new foods or would they like something similar (interview,
> October 31, 2013).

Although participants were invited to play the game with a partner, this was optional and none of the participants chose that option. Since previous studies (Horwitz, Horwitz, & Cope, 1986; Reinders & Wattana, 2011; Roed, 2003) have found that classroom environments can cause L2 anxiety, it was hoped that by allowing the players to play the game by themselves, it would alleviate this anxiety, since there would be no else that would hear them speak. Both participants 1 and 7 created several of their recordings at home. Participant 1 said that she chose to record at home because it was quiet, and as stated previously, participant 7 chose to use the game as a way to log diary entries on her Japanese language progress.

There were nine hidden text-based prompts scattered throughout the campus. A prompt appeared only when the participant was within 30 meters of the prompt's location. After viewing the text prompt, the participant was rewarded with a Japanese good luck charm (*omamori*), which was placed in the participant's game inventory. The use of *omamori* as rewards received mixed comments by the participants. Several participants enjoyed the challenge of finding these hidden items; others felt that they were too hard to find or did not attempt to find them. It appears that most of the *gamer* participants tended to like having the goal of collecting as many of the *omamori* as possible. In her interview, participant 6 stated that some of the participants had an informal contest to see who could find the most *omamori*. The gamers' approach to this activity was somewhat different than that of the non-gamer. Although the gamers took the storyline seriously, they also enjoyed hunting for the *omamori*, which had nothing to do with the storyline. Participant 9, the one non-gamer, did not mention the *omamori* at all and collected only one, which occurred during the observation session with the researcher.

The audio prompts were crafted and recorded by a Japanese language instructor from the university. The instructor is a native speaker of the Japanese language. The audio prompts were

designed to be appropriate for the students' language level. It appears that the students did not have any issues with understanding the prompts because they did not indicate so and were able to respond appropriately. Participant 4 commented: "The listening part was pretty easy because it was very basic. It was like 'oh I can understand it. Okay.' But it also increases my confidence in understanding. It's like 'Yay, I got that'" (interview, November 6, 2013).

Two of the participants indicated that they compared their voices to that of the NPC and tried to imitate it. Participant 1 commented:

> When she [NPC] spoke that's also nice because you could hear just how to pronounce things and intonation and everything. I did like how you could listen back because then I could see how I was speaking (interview, November 1, 2013).

Similarly, participant 6 said:

> You listen to it, you see what a native speaker has to say about that place, you kind of repeat it to yourself, and then you're like this is how I would describe this place to another native speaker (interview, November 1, 2013).

This finding addresses the importance of including the voices of native speakers in a game such as this one. This is supported by the research conducted by Kang (2005) in which it was found that English learners in Korea were more excited to speak to native English speakers than non-native English speakers.

Out of all the game characteristics, the only one not referenced by the participants was that of the NPC having a welcoming and friendly tone of voice. Although research indicates that a welcoming and friendly interlocutor reduces the level of anxiety in the L2 (Kang, 2005), this did not appear to be of significance to the participants, as they did not comment on this feature. It was originally postulated that since the NPC's voice was that of one of the Japanese teachers for their courses, the voice would be familiar to them and that this familiarity would inevitably reduce the level of anxiety. However, regardless of the NPC's tone of voice, the voice may have

been recognized as that of an instructor at the university, therefore the students may have perceived her as an authority figure rather than a welcoming and friendly conversational partner. Perhaps it would be beneficial to use an unfamiliar voice—one that the students could imagine as a welcoming and friendly person. Further research could be conducted to investigate the use of tone in these kinds of recordings or in the selection of the NPC's voice.

Project Evaluation

This section will provide an evaluation of the project including its successes, challenges, and limitations. Recommendations for future research will also be discussed.

There are several successes to be reported for this project. The results show that most students enjoyed playing the game. This is important because it demonstrates that this type of game can be used independently from any class requirements. Students indicated that playing the game was an enjoyable way to improve their Japanese language skills.

The pilot study was invaluable in the development of the game design. It enabled the researcher to evaluate the game framework capabilities in a university setting. During the Fall 2012, Winter 2013, and Spring 2013 sessions at the university, a Japanese language instructor and the researcher worked together to create two AR games as part of the pilot study. The pilot study served two purposes: (a) as a proof-of-concept for the use of AR on the university campus and (b) to explore the use of mobile AR technology for Japanese language learning outside of the classroom. Specifically, the pilot study informed the design of *Yookoso* in the following ways: concentration on WTC, the addition of player orientation sessions, and the addition of a native speaker audio element.

Another aspect of the project that can be considered successful is that the use of the ARIS system worked as expected. As the ARIS game engine was still under development, game

designers were informed to "Expect to find rough edges and broken parts" ("Make Games," n.d.). However, the ARIS system remained stable during the three weeks in which this study took place, and there were no issues reported by the participants regarding the availability of the ARIS system.

Although the game was not intentionally designed as such, it could be played in small chunks of time, which seemed to work well with the students' class schedule and life style. Since it took only a few minutes to start the game and create an audio recording, students were able to participate in between classes.

The individual interviews proved to be very insightful to the researcher. Additional interviews, perhaps midway through the study, might also have been beneficial for this study. There were several unintentional group interviews and observations. Although unplanned, these gatherings provided the researcher with insightful data through group interactions among the study participants. Therefore, the addition of focus groups (Bryman, 2008) to this study would have been another method to obtain data through the sharing of, and commenting on, experiences.

Some challenges were encountered in this project and can be viewed as lessons learned. The researcher initially thought that two sections of the Japanese course would yield enough students for the study. However, from these two sections, only six students volunteered to participate. As the researcher desired approximately ten participants, she decided to invite students from the other two sections of the course. Due to the instructor's scheduling constraints, the researcher was not able to conduct a presentation to invite these students to participate. Instead, a hardcopy of the invitation script, along with the informed consent document, research information sheet, and demographic survey, was provided to the students. In hindsight,

arrangements should have been made to present in all four sections, thereby allowing the researcher to personally invite all students to participate in the study.

Another challenge occurred with the location selected for the orientation sessions. The orientations were held in a conference room that, unbeknownst to the researcher, did not have Wi-Fi access. Since the researcher had planned to conduct demonstrations of the game during the orientations, the lack of Wi-Fi access prevented this from happening. As a result, most of the observation sessions began with a short demonstration of the game by the researcher, which consumed time that had been set aside for the actual observations. A lesson learned here was to always check the facilities ahead of time, and to have a backup plan in place.

There was also a problem with Wi-Fi connectivity at peak usage times on campus. Occasionally, participant game play coincided with times when large numbers of students were accessing the Internet through the campus Wi-Fi network. As a result, the participants experienced application slowness and dropped connections while playing the game at these peak usage times. When this happened, it was mostly a source of inconvenience for the participants, and it took longer than usual to load the game's pages. However, if network connection was lost when a student was in the process of uploading a recording, the student needed to redo the recording. The researcher had tested the game prior to the start of the project, however this testing was done during the weekends and when classes were not in session. In retrospect, it would have been beneficial for the researcher to conduct some tests when classes were in session to evaluate performance in a more realistic environment. Had the researcher determined this in advance, she could have advised the participants of potential performance issues at peak usage times.

Through later analysis of the data log it was found that there were six days in a row during the allotted three weeks when there were no recordings made by the participants. This gap in game play is most likely due to the participants having to devote their full effort to the midterm examinations scheduled in this timeframe. The first peak in participant recordings could be due to initial interest in the game. The second peak could be attributable to several factors, including free time after midterm examinations or email requests from the researcher to schedule interview times. The effect of the midterm schedule was anticipated by the researcher but could not be avoided due to the short timeframe associated with the academic quarter system used at the university. The second peak could have been minimized if the researcher sent periodic emails as prompts or check-ins on a shorter cycle.

There were several limitations to this study. The major limitation was the relatively small sample size. Nine participants volunteered to take part in this study and do not necessarily represent the population, which included all students enrolled in the second-year Japanese language course at the university. Eight out of the nine participants stated that they were video and computer game players, so this sample did not fully represent non-gamers. Subsequently, the findings of this study cannot be generalized to those students who do not regularly play video or computer games.

A second limitation was that a large portion of the findings relied upon the participants' self-reported perceptions of their experiences. Perceptions cannot be used as measurable outcomes. In other words, although there were indicators that pointed to an increase in WTC, these were mainly based upon self-reported perceptions and therefore cannot be used as definitive proof of increase in WTC.

Recommendations for Future Research

As the use of AR on mobile devices in language learning is at its nascent stage, more research is needed in this area. The following recommendations are offered based on the findings and analysis of this study.

The comprehensible input hypothesis states that in order for L2 acquisition to occur, there must be input that is understandable by the learner (Krashen, 1982). In addition to language context, does the use of location in AR increase the comprehensibility of the input? For example, does being in the library and listening to the NPC talk about aspects of the library increase one's comprehensibility of what the NPC is saying? A recommendation for a future study would be to investigate the effects of location-based AR on the comprehensibility of input in language learners.

Seven out of the nine participants indicated that one of their reasons for studying Japanese was their interest in *anime*. *Anime* is a media genre that consists of Japanese animated films or TV programs (Napier, 2005). The use of *anime* as a motivational subject may be an area worthy of further investigation. For example, the incorporation of a storyline that revolves around a popular *anime* series may be more appealing to the general Japanese language student population rather than only the gamers.

The ARIS game creation editor was designed to be easy to use by non-programmers. Based on the experience of creating *Yookoso*, the researcher agrees with this statement. Therefore, a recommendation for future study would be to invite instructors to design and create their own language learning games. This concept could be expanded to include students in the game creation process. Since ARIS does require some level of computer proficiency, depending upon the individual's experience, some minimal amount of training may be required.

Another recommendation for future research would be the inclusion of social features, such as the ability to collaborate and to make audio recordings public, so that other participants could hear the recordings and provide feedback. It would be beneficial to investigate the usefulness of peer feedback on students' recordings along with the option for instructor feedback not tied to grades. Other social aspects could be investigated, such as augmentation with existing social media: Yelp, Twitter, and Facebook.

Conclusions

This study examined student perceptions regarding the use and design qualities of an AR mobile game in a Japanese language course at an institute of higher education in California. This study explored if, and how, the game's use and design qualities affected students' perceptions of their WTC in Japanese. From this investigation, it is evident that AR mobile language learning games can:

1. **Extend learning outside the classroom.**

2. **Reduce L2 anxiety.**

3. **Promote personalized learning.**

This study has shown that AR mobile games can provide a viable means to take language learning outside the classroom and into spaces students frequent. It allows the learner to gain "situated meanings" (Gee, 2008, p. 36) based on the actual context (location) in which the language is used. Although he spoke of games in general and not directly in reference to language learning, Gee expresses this sentiment well by stating that games are good at "putting language into the context of dialogue, experience, images and actions" (2008, p. 36). Since AR occurs in the real world, unanticipated events and objects, or what Klopfer (2008, p. 102) coined

as the "unknowability" of the real world, can play an important part in the game, thus making the experience similar to what participants would encounter in their everyday lives.

The game interface along with the NPCs can also encourage legitimate peripheral participation. In other words, AR games can provide "activities, identities, artifacts, and communities of knowledge of practice" that Lave and Wenger (1991, p. 29) associate with legitimate peripheral participation. Students can work toward becoming members of a community of Japanese language speakers by hearing Japanese audio and reading Japanese text created by native speakers/writers situated in locations where such speech/text is typically encountered in real life. Although this study concentrated on the speaking aspect of L2 language learning, specifically WTC, a game such as this could affect other areas of language learning in a positive fashion. These areas include L2 reading, writing, and listening. There seems to be no reason why the learners of other languages cannot benefit similarly from AR games.

AR mobile games can reduce L2 anxiety. Although all five antecedents of WTC were perceived by the participants to be in existence when playing the game, reduced L2 anxiety was mentioned most often. To be comfortable with their own voice, to become comfortable in creating their own monologues with minimal direction, and to have a purpose for creating those monologues privately without judgment, all contribute to reduction of L2 anxiety and improvement in WTC. Therefore, these elements are important to consider when designing and implementing any language learning AR game.

AR games should be open-ended and built for flexibility in order to allow for personalized learning. Out of all the game characteristics, the open-ended aspect was determined to affect the participants' WTC the most. It allowed them to choose the topic of their monologue as well as when and where this monologue took place. The participants chose to speak where

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they were comfortable, when they had free time or the inspiration to speak, and they could speak about topics that interested or excited them.

The researcher's theory promotes the use of AR on mobile devices for language learning and posits that AR does these three things well: extends language learning outside of the class, reduces anxiety, allows for an open-ended game format, all of which subsequently lead to WTC in the L2.

AR is worthy of continued investigation, both as it relates to the application of learning theories and to emerging technologies. Just as there is innovation in the field of education, there are exciting developments in the world of wearable and mobile computing. These developments will readily enable expanded use of AR. WTC is foundational to language learning: education researchers and software developers can benefit from the findings presented in this study, such that there will be a greater connection between learning methodologies and the development of mobile AR projects in the facilitation of successful language learning.

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APPENDIX A

Game User's Guide

Yookoso Game

Requirements
To play the *Yookoso* game, you need a free application called ARIS. ARIS requires iOS 6.0 or later and is compatible with iPhone, iPad, and iPod touch.

Game Introduction
Your *sensei* has informed you that there will be a group of exchange students visiting ▮▮ ▮▮ in a few weeks. She has asked you to identify several places on campus that you think the exchange students would enjoy learning about. Using the *Yookoso* game, your goal is to share at least three locations on campus that you enjoy visiting and that you think the exchange students would enjoy as well. Examples include your favorite place to study, to eat lunch, or to relax.

Game Mechanics
The game *Yookoso* uses a technology called Augmented Reality (AR). Using AR, a physical space, in this case the ▮▮▮▮ campus, is augmented or enhanced through the use of the ARIS app. Using technologies such as GPS and Wi-Fi positioning, the ARIS *Yookoso* game finds game objects near you and can therefore use that information in the game play. For the purpose of language learning, AR allows students to practice speaking where it would naturally occur. For example, if you were at a coffee shop in real life, it would be reasonable for you to tell a friend that your favorite coffee is café mocha and that they should try it. This game allows you to do this by providing a feature to record your voice anywhere (within Wi-Fi range) on campus. You have the option to use several pre-defined "prompts" around campus that suggest topics to talk about. You can also use any other location of your choice on campus. Additionally, you can supplement your audio recordings with photos taken at these locations.

Your audio recordings and photos will be saved to the ARIS server.

Research Focus
The main focus of this dissertation research is the concept of "Willingness to Communicate" (WTC). The researcher will be mainly interested in whether this game encourages your WTC in the Japanese language. Therefore, the researcher will not be examining your language skills (grammar, pronunciation, vocabulary, etc.). Instead, she is interested in your perceptions as to whether or not this game enhances your WTC.

Although the researcher will be able to later listen to the audio and view the photos, as mentioned above, her main interest is your perceptions of the game's influence on your WTC in Japanese.

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Install and Setup ARIS

1. Get ARIS from App Store and Install
   a. Go to Apple App Store and search for: aris
      Note: If you are using an iPad, you will need to click on the "iPhone Apps"
      button at the top after you search for ARIS. Make sure you choose the right app.
      It has a red icon and was created by the "GLS Mobile Learning Team".

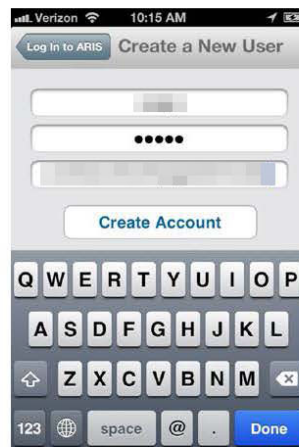   b. Install ARIS. If prompted to use your current location, tap the "OK" button.

    c. If prompted to, turn on Location Services for your device and ARIS.

2. Login
    a. Each player on ARIS has an account. To get started, create an account by tapping "Create Account".
    b. Enter a Username, create a password, enter your email address, and then tap "Create Account"

c. Enter a Public Name and take your Public Player photo.

[Take Your Public Player Image]

Retake **Move and Scale** Use

To Play the Game – a short walkthrough

You can start the game anywhere; you don't even need to be on campus. The first task will be to introduce yourself, and you can do that anywhere that you can get onto a Wi-Fi network. However, to complete the rest of the game, you will need to be on campus.
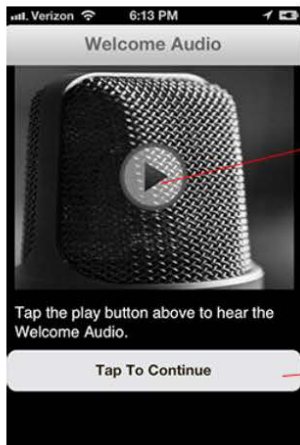
1. Tap the ARIS icon on your iOS device.

2. Tap the Search (magnifying glass) icon at the bottom of the screen.
3. Enter: ▓▓▓ ▓▓▓▓▓

4. You should see the following:
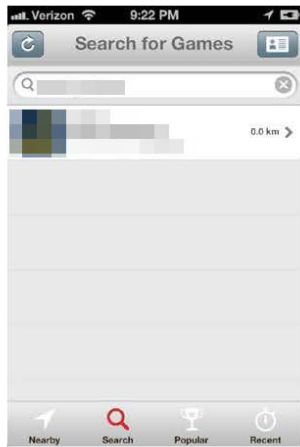
5. Tap: ▮▮▮▮▮
6. Tap: **New Game**
7. A Welcome Audio screen will be displayed

8. After you click the "Tap to Continue" button, the following screen will be displayed asking you to introduce yourself in Japanese.
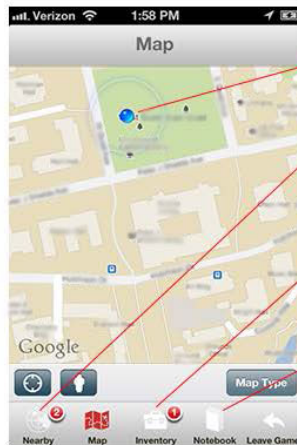
Notification that you received a Welcome Text. This item will show up in your Inventory.

Tap the Play icon to listen to the instructions in Japanese.

Tap this button to continue.

9. After you tap the continue button, you can either view the contents of your inventory or record your introduction.

Blue dot indicates your current location.

Tapping Nearby will display items that are close to you.

Tapping Inventory will display the items currently in your inventory.

Tapping Notebook will allow you to record your voice and take photos.
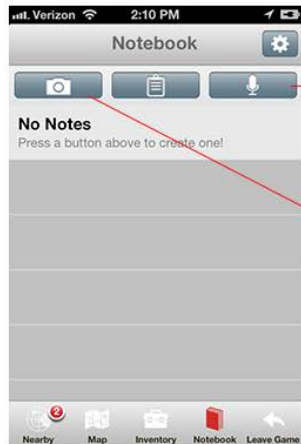
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10. Let's see what's in your inventory.
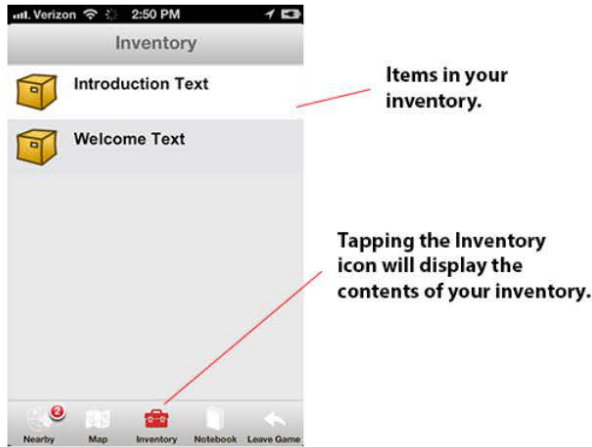
11. In this game, the Inventory is used to store items to assist you in your audio recordings. For example, the Welcome Text item displays the text version of the audio welcome message. If you tap an item in your inventory, it will be displayed in more detail. Tapping the Welcome and Introduction Text items will display the following.

12. Next let's record an introduction by first tapping the "Notebook" icon and then the microphone icon.

13. After tapping the Microphone icon, the Recorder screen will appear. When you are ready to record your introduction in Japanese, tap the "Begin Recording" button. When you are done recording, tap the "Stop Recording" button. Finally, tap the "Save" button to save your recording.

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14. Enter a title for your recording. Enter something meaningful to you so you will know what recording it is if you choose to listen to it later. Tap Done.
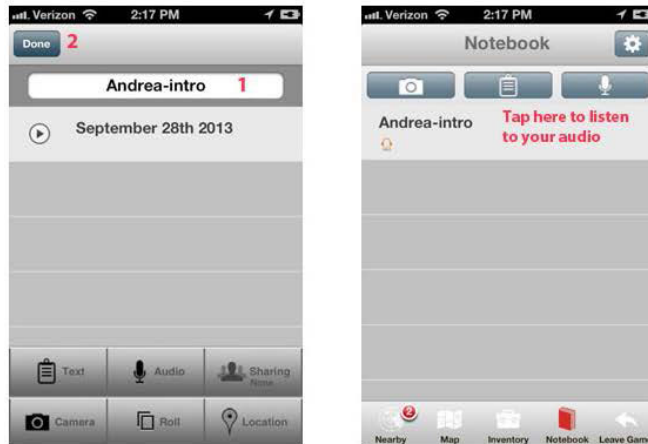

15. If you would like, you can also take a picture of yourself to include in your introduction. Just tap on the Camera icon to access your device's camera.
16. That's it! You've completed your first task in the game.

Playing Around Campus

There are several locations around campus that you can visit to interact with existing game items. These items will suggest topics that you can talk about. However, you can talk about anything that you would like to share with the Japanese exchange students.

As an example of a game item, if you walk by the ▓▓ coffee shop in the ▓▓▓▓▓ ▓▓▓, a message should appear on your screen indicating there is a recording available for you to listen to. After you listen to the audio, you will receive an item in your inventory to assist you with your audio recording.

Other locations with audio prompts include the front of ▓▓▓ Library, ▓▓▓▓ Restaurant at the ▓▓, and ▓▓▓▓▓ Café at the ▓▓▓▓▓▓▓▓▓ By listening to the audio messages at these locations, you can get ideas of topics to talk about. "Speaker" icons indicate these locations when you tap on the Map icon:

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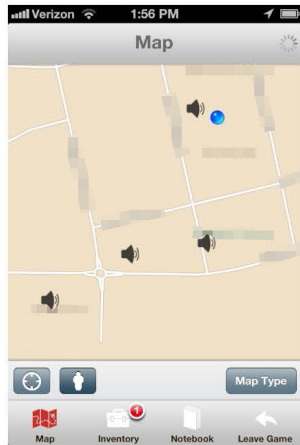
There are also text prompts scattered throughout campus that will not show up on your map. A message will appear when you are in the vicinity of one of these text prompts. When you find one of these hidden text prompts, you will be rewarded with a virtual *omamori* (Japanese good luck charm).

Keep in mind that the audio and text prompts are just suggestions, you can talk about anything that you would like to share with the Japanese exchange students.

Also remember that if you are using the Wi-Fi network on campus (versus 3G/4G on your iPhone or iPad), you will need to be in a wireless zone in order to play the game. Please see this map to view available wireless coverage on campus: You can also view wireless coverage by building floors here:

In a nutshell, here are the steps to play the game after you initially record your introduction:

1. Go to a favorite location on campus (that has Wi-Fi access)
2. Start the ARIS app. You may see the welcome screen again. If so, just click the Continue button.
3. Tap the Notebook icon.
4. Tap the Microphone icon.
5. Record an audio message describing this location and why you like it.
6. Tap Save to save the message and then tap Done
7. Take a photo (optional)

Although you are asked to create at least 3 recordings, please feel free to do it as many times as you like. Be creative!

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Game Tips and Troubleshooting

- Tapping the Recent icon when you re-start ARIS is a quick way to get back to the *Yookoso* game. Make sure to choose Resume instead of Reset. Your audio and photos will be saved if you choose Reset but your *Omamori* points won't.
- Make sure audio is turned on for your device. You will not be able to hear any audio if your device is set to vibrate mode.
- Occasionally you may see messages such as "Bad Response from the Server" or "Network Warning". If you see these messages, tap "Ignore" or "OK" and move to an area with better Wi-Fi coverage.
- If the game does not allow you to enter a name for your recording, it's okay. Your recording will be saved.
- If the game locks up and does not respond at all, try the following:
    - Wait for a few seconds for it to respond or go to a place with better Wi-Fi signal.
    - Press the Home button and then tap the ARIS icon.
    - Quit the ARIS app by pressing the Home button once to display your Home screen. Then double-tap the Home button to display the multitasking bar on the bottom of the screen. These are your most recently used apps. Press any of the app icons and hold down until the icons wiggle and a minus sign appears on the top left of all the icons. Tap the minus sign for the ARIS app to quit that app. Press the Home Button to stop the icons from wiggling, and then press it again to display your Home screen.

Home button:
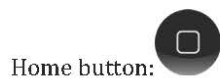
Glossary

ARIS – The game engine that *Yookoso* is built in.
Audio prompts – Audio messages in Japanese that give you suggestions on topics to talk about. There are 4 audio game prompts in the game.
Hidden locations – Various locations on campus that do not show up on your ARIS map. The only way to find them is to be in the vicinity of the location.
Home button – The button at the bottom of the iPhone, iPad, and iPod Touch.
Inventory icon – Contains items you receive during the game. If you need a reminder of what a certain prompt was, check here.
Nearby icon – Only appears when there are nearby game locations.
Notebook icon – This is where you go to make your audio recordings and to take pictures.
Omamori – Japanese good luck charm. You'll receive these when you come upon one of the hidden locations.
Text prompts – Text messages in Japanese that give you suggestions on topics to talk about. These prompts are at hidden locations on campus.

Questions?
Contact Andrea Shea: **andrea.shea@pepperdine.edu**

Page 11

Game Observation Protocol

Date: _____

Time: _____

Participant Code Number: _____

Location: _____

ANTECEDENTS OF WTC	NOTES
Perceived Competence	
L2 Anxiety	
Security	
Excitement	
Responsibility	

Notes: _____

_____

_____

_____

Semi-structured Interview Guide

With your permission, I would like to record this interview. I will be the only one that will have access to the recordings. As with all data collected during this study, these recordings will be securely stored. The data will be deleted 5 years after the conclusion of this study.

General

1. What did you think of the game?

2. Did you enjoy playing the game? Why? Why not?

3. In what ways was this game useful or not useful for Japanese language learning?

4. Do you think you played the game well? Why? Why not?

WTC Trait-based variables (perceived competence, anxiety)

1. Do you think playing this type of game would increase your competence in speaking

   Japanese? Why? Why not?

   a. If yes, what aspects of the game increased your competence?

2. Do you think playing this type of game would reduce your anxiety when speaking Japanese?

   Why? Why not?

   a. If yes, what aspects of the game reduced your anxiety?

Situational antecedent variables to WTC (security, excitement, responsibility)

1. What do you think about the open-ended format of the game?

2. Were you excited to play the game? Why or why not?

3. Did having a purpose (help exchange students) have an effect on how you felt about the

   game? Why or why not?

Appendix D

Data Collection Log

Table 15

Data Collection Log

Participant	Orientation Dates	Observation Dates	Interview Dates	Number of Recordings/ Photos	Number of Audio Prompts Found (out of 3)	Number of Omamori Found (out of 9)
P1	10/4/13	10/11/13	11/1/13	6/0	3	6
P2	10/4/13	Did not reply to request.	10/31/13 (along with P3)	4/3	2	2
P3	10/4/13	10/11/13 (along with P6)	10/31/13 (along with P2)	3/0	2	1
P4	10/8/13	10/25/13	11/6/13	4/3	3	1
P5	10/4/13	Declined request.	10/31/13	9/0	2	3
P6	10/4/13	10/11/13 (along with P3)	11/1/13	4/0	2	2
P7	10/4/13	10/22/13	10/31/13	6/0	0	2
P8	10/4/13	10/11/13	10/30/13	7/0	2	1
P9	10/8/13	10/17/13	10/31/13	2/0	1	0

Appendix E

Invitation to Participate in Study

My name is Andrea Shea and I am a doctoral student at Pepperdine University in the Learning Technologies program. I would like to invite you to participate in a research study. This research study will focus on the use of a mobile augmented reality game in support of Japanese language learning. Augmented reality allows learning to take place outside of the classroom with GPS-equipped mobile devices such as the iPhone. Since the mobile device can determine your location, specific information can be displayed on the device based on this location. As an example, if you are at a coffee shop, the phone could display the menu in Japanese, allowing for location-based learning to take place.

The results of this study will contribute to the dissertation requirement for my doctoral degree.

Taking part in this study is voluntary and will not help or hurt your grade. You may stop taking part in this study at any time. Your identity will not be revealed in any part of this study. A pseudonym will be used instead. Your personal information will be kept confidential and will not be shared with anyone else.

There are several eligibility requirements that must be met in order to participate in the study:
-   You are 18 years old or older
-   You have access to an iPhone
-   You are willing to install the free mobile game application ARIS on your iPhone

I would also like to emphasize that you do not need to be technology-savvy or have any familiarity with games on mobile devices. There will be several orientation sessions where you will receive more information about the project and receive help, if needed, in installing the application on your iPhone. A demonstration of the game will also be shown at that time.

You have the option of working alone or in pairs. If you do choose to work as part of a pair, only one of you is required to have access to an iPhone.

There will be several stages to the research.

Stage 1: Read and sign the consent form to participate in this study. Fill out a demographics survey.

Stage 2: Attend an orientation session that will take place within the first two weeks of the quarter. More information about the project and assistance in installing the iPhone app will be provided at this session. A demonstration of the game will be shown (1/2 – 1 hour)

Stage 3: Play the game at least three times within the two weeks allotted for the game. It is expected to take approximately 15 to 30 minutes for each time you play the game. The researcher may ask you for permission to observe you while you play the game.

Stage 4: Participate in an interview session with the researcher (1 hour) or fill out a post-game survey.

I appreciate your attention and thank you for considering this request.

APPENDIX F

Informed Consent for Participation Form

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES

Participant: _____

Principal Investigator: Andrea Shea

Title of Project: Student Perceptions of a Mobile Augmented Reality Game and Willingness to
                    Communicate in Japanese

1. I _____ , agree to participate in the research study being
    conducted by Andrea Shea under the direction of Dr. Martine Jago.

2. The overall purpose of this research is:

    To examine student perceptions regarding the use and design qualities of an augmented
    reality mobile game in a Japanese language course at an institute of higher education in
    California. This study will explore if and how the game's use and design qualities affect
    students' perceptions of their Willingness to Communicate in Japanese.

    Specifically, this study will address the following research questions:

    1. How do students participating in a second-year Japanese language course at a California
        public university describe the ways in which playing a mobile AR game influence their
        WTC in using the Japanese language?
    2. What characteristics of a mobile AR game do students participating in a second-year
        Japanese language course at a California public university attribute to influencing their
        WTC in using the Japanese language?

3. If I have access to an iPhone, am willing to install the ARIS app on the iPhone, and choose to
    continue further in the study, my participation will involve the following:

    a. Fill out the demographics survey. You are not required to answer every question.
    b. Attend an orientation that will last approximately one-half to one hour. This orientation
        will be spent describing the game scenario, installing the ARIS software, and
        familiarizing the participants with the game environment and interface.
    c. Play the game at least three times within the two weeks allotted for the game. It is
        expected to take approximately 15 to 30 minutes for each time you play the game. The
        researcher may ask to observe you while you play the game. You have the option to
        choose not to be observed.
    d. Participate in an interview session with the researcher or fill out a post-game
        questionnaire.

4. My participation in the study will take place during the fall 2013 quarter. The study shall be conducted at xxxxxxxxxxx.

5. I understand that the possible benefits to myself or society from this research are:

    - Learning about and exposure with language learning in an augmented reality environment.
    - Having the opportunity to practice your Japanese language skills outside of the classroom.
    - Additionally, information from this study may benefit other people now or in the future.

6. I understand that there are certain risks and discomforts that might be associated with this research. These risks include:

    - Because this study requires you to participate outdoors, risks or discomforts associated with being outdoors may include but are not limited to: inclement weather, allergies, contact with obstacles or exposure to traffic, and physical exertion.
    - Frustration in not being able to adequately express yourself in the Japanese language.
    - Frustration or boredom with game play experience.

7. I understand that I may choose not to participate in this research.

8. I understand that my participation is voluntary and that I may refuse to participate and/or withdraw my consent and discontinue participation in the project or activity at any time without penalty or loss of benefits to which I am otherwise entitled. I understand that whether I participate or not will not affect my course grade in any way.

9. I understand that the investigator(s) will take all reasonable measures to protect the confidentiality of my records and my identity will not be revealed in any publication that may result from this project. The confidentiality of my records will be maintained in accordance with applicable state and federal laws. Under California law, there are exceptions to confidentiality, including suspicion that a child, elder, or dependent adult is being abused, or if an individual discloses an intent to harm him/herself or others.

10. I understand that the investigator is willing to answer any inquiries I may have concerning the research herein described. I understand that I may contact Dr. Martine Jago, Dissertation Advisor, at xxx-xxx-xxxx if I have other questions or concerns about this research. If I have questions about my rights as a research participant, I understand that I can contact the chairperson of the Graduate and Professional School IRB, Pepperdine University, xxx-xxx-xxxx.

11. I will be informed of any significant new findings developed during the course of my participation in this research which may have a bearing on my willingness to continue in the study.

12. I understand that in the event of physical injury resulting from the research procedures in which I am to participate, no form of compensation is available. Medical treatment may be provided at my own expense or at the expense of my health care insurer which may or may not provide coverage. If I have questions, I should contact my insurer.

13. I understand to my satisfaction the information regarding participation in the research project. All my questions have been answered to my satisfaction. I have received a copy of this informed consent form which I have read and understand. I hereby consent to participate in the research described above.

_____, Participant Signature   _____, Date

_____, Witness Signature   _____, Date

I have explained and defined in detail the research procedure in which the subject has consented to participate. Having explained this and answered any questions, I am cosigning this form and accepting this person's consent.

_____   _____
 Investigator Signature   Date

Research Information Sheet

Title of Study: Student Perceptions of a Mobile Augmented Reality Game and Willingness to Communicate in Japanese

Principal Investigator (PI): Andrea Shea, (xxx) xxx-xxxx

Purpose:
You are being asked to be in a research study of a mobile augmented reality game for Japanese Language Learning because you are enrolled in a Japanese language class. This study is being conducted at xxxxxxxx by a doctoral candidate from Pepperdine University.

Study Procedures:
You will be asked to attend an orientation session, which should take approximately half an hour to one hour during the week of October 1-4. After attending the orientation, you will be asked to play the game from October 7 to October 18 at least three times. It can take from 15 minutes to 30 minutes to play the game. The researcher may ask to observe you playing the game. You have the option to choose not to be observed.

Benefits:
- The possible benefits to you for taking part in this research study are learning about and exposure with performing activities in an augmented reality environment.
- You will also gain the opportunity to practice your Japanese language skills outside of the classroom.
- Additionally, information from this study may benefit other people now or in the future.

Risks:
There are certain risks and discomforts that might be associated with this research. These risks include:

- Because this study requires you to participate outdoors, risks or discomforts associated with being outdoors may include but are not limited to: inclement weather, allergies, contact with obstacles or exposure to traffic, and physical exertion.
- Frustration in not being able to adequately express yourself in the Japanese language.
- Frustration or boredom with game play experience.

Costs:
- There will be no costs to you for participation in this research study. However, if you choose to use the 3G/4G service on your iPhone (instead of the free campus-wide Wi-Fi service), you may incur data usage costs depending on your data plan.

Compensation: You will not be paid for taking part in this study.

Confidentiality: You will be identified in the research records by a code number. When the results of this research are published or discussed in conferences, no information will be included

that would reveal your identity. After transcription, data collection and analysis, all data and identifying information will be disposed.

Voluntary Participation/Withdrawal: Taking part in this study is voluntary. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with xxxxxxxx or Pepperdine University.

Questions: If you have any questions about this study, now or in the future, you may contact Andrea Shea at the following phone number xxx-xxx-xxxx, or dissertation advisor Dr. Martine Jago at xxx-xxx-xxxx. If you have questions or concerns about your rights as a research participant, you may contact the chairperson of the Graduate and Professional School IRB, Pepperdine University, xxx-xxx-xxxx.

Participation: By signing the consent form you are agreeing to participate in this study.

APPENDIX H

Demographic Survey

1. Gender   Male   Female
2. Age   18-24 25-32   33-40   40+
3. What is your first/mother language? _____
4. How many years have you studied Japanese? _____
5. What are your reasons for studying Japanese? Check all that apply:

   ☐   It will be useful in getting a job.
   ☐   It will help me understand the Japanese culture.
   ☐   I would like to study in Japan.
   ☐   I would like to speak to my Japanese friends.
   ☐   It is required for my major.

   Other reasons:
   _____
   _____
   _____
   _____

6. Do you play video or computer games?   Yes   No

If you answered "No" to #6, please skip these next two questions.

7. How many hours a week do you play video/computer games? _____
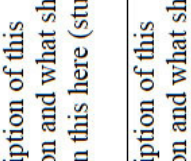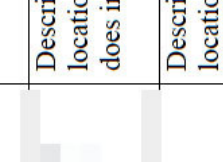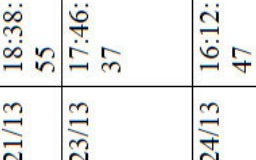8. What video or computer games do you play?

   _____
   _____
   _____
   _____
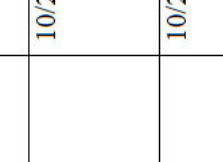
APPENDIX I

Game Play Log

Table 16

Game Play Log

Participant	Date	Time	Note Name	Location	Topic	Length (in seconds)	Picture
P1	10/11/13	14:07:08			Self-introduction	37	
P1	10/11/13	14:12:04			Favorite coffee shop drink	28	
P1	10/22/13	22:35:31			Favorite coffee shop drink	19	
P1	10/22/13	22:51:48			▨ restaurant	23	
P1	10/22/13	22:53:01			Favorite book and genre	24	
P1	10/22/13	22:53:39			▨	19	
P2	10/30/13	23:36:38			Self-introduction	15	
P2	10/30/13	23:41:30			Description of the ▨	25	Inside the ▨
P2	10/31/13	14:29:09			Description of a fountain on campus	24	Fountain
P2	10/31/13	14:37			Description of a creek on campus	23	Creek
P3	10/08/13	16:43:42			Self-introduction	20	

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Participant	Date	Time	Note Name	Location	Topic	Length (in seconds)	Picture
P3	10/09/13	17:32:45			Self-introduction	28	
P3	10/11/13	13:31:23			Bookstore description	15	
P4	10/21/13	18:38:55			Self-introduction	48	
P4	10/23/13	17:46:37			Description of this location and what she does in this here (study)	35	
P4	10/24/13	16:12:47			Description of this location and what she does in this here (study, drink tea)	23	
P4	10/25/13	16:27:45				55	
P5	10/24/13	14:05:17			Self-introduction	28	
P5	10/24/13	15:55:36			Self-introduction	29	
P5	10/25/13	17:56:01				11	
P5	10/25/13	17:58:35				25	
P5	10/25/13	18:07:35			Description of his bike.	42	

Participant	Date	Time	Note Name	Location	Topic	Length (in seconds)	Picture
P5	10/25/13	18:21:57				22	
P5	10/25/13	18:27:24				30	
P5	10/25/13	18:36:23			Description of the library.	20	
P5	10/25/13	18:58:41			Description of the cafeteria and the food available there.	37	
P6	10/11/13	01:01:02			Self-introduction	20	
P6	10/18/13	13:53:14			Description of	18	
P6	10/11/13	13:30:31			Description of	30	
P6	10/25/13	14:55:21				25	
P7	10/11/13	12:50:54			Daily diary entry	22	
P7	10/21/13	19:44:44			Self-introduction	12	
P7	10/22/13	11:42:12			Daily diary entry	23	
P7	10/22/13	00:03:11			Daily diary entry	8	
P7	10/28/13	23:17:07			Daily diary entry	12	

Participant	Date	Time	Note Name	Location	Topic	Length (in seconds)	Picture
P7	10/29/13	13:52:35			Description of the science building	9	
P8	10/10/13	13:11:48			Self-introduction	10	
P8	10/11/13	12:43:29			Description of the library	23	
P8	10/11/13	12:31:17			Description of the student union.	32	
P8	10/24/13	14:20:51				37	
P8	10/25/13	12:11:15				23	
P8	10/25/13	12:18:35				22	
P8	10/25/13	12:23:38			Doing homework in the science building	11	
P9	10/26/13	15:21:41			Description of the student housing complex	46	
P9	10/26/13	15:25:05				42	

APPENDIX J

ARIS Web-based Editor

Participant Backpack

Items

📦 **Welcome Text**

📦 **Introduction Text**

📦 **Coffee Shop Words**

📦 ▨▨▨▨▨

📦 **Library Text**

お **Omamori**　　　　Omamori are Japanese good luck charms.

📦 **Marketplace Text**

レストランがたくさんあります。どんな食べ物が好きですか。

Notes

▨ 😊 0　　　　　　　　　　　　　　　　　　　　**PRIVATE**

▨▨▨

🎧 October 25th 2013 11:28:07 PM

October 25th 2013 11:29:52 PM

Server Log Example

event_id	player_id	date_time	event_type	event_detail_1	event_detail_2	event_detail_3	deleted_flag
		2013-10-04 23:16:53	VIEW_NODE	64917	0	NA	0
		2013-10-04 23:16:53	PICKUP_ITEM	45305	1	NA	0
		2013-10-04 23:16:53	SEND_WEBHOOK	670	NA	NA	0
		2013-10-04 23:18:10	VIEW_NODE	93710	0	NA	0
		2013-10-04 23:18:10	PICKUP_ITEM	46222	1	NA	0
		2013-10-04 23:24:47	MOVE			NA	0
		2013-10-04 23:23:40	MOVE			NA	0
		2013-10-04 23:24:48	MOVE			NA	0
		2013-10-06 18:26:38	VIEW_NODE	64917	0	NA	0
		2013-10-06 18:26:38	PICKUP_ITEM	45305	1	NA	0
		2013-10-06 18:26:39	SEND_WEBHOOK	670	NA	NA	0
		2013-10-06 18:27:46	MOVE			NA	0
		2013-10-06 18:26:39	VIEW_MAP	NA	NA	NA	0
		2013-10-06 18:27:51	VIEW_NODE	93710	0	NA	0
		2013-10-06 18:27:51	PICKUP_ITEM	46222	1	NA	0
		2013-10-06 18:26:59	VIEW_MAP	NA	NA	NA	0
		2013-10-06 18:26:44	MOVE			NA	0
		2013-10-06 18:27:01	VIEW_INVENTORY	NA	NA	NA	0
		2013-10-06 18:26:49	VIEW_MAP	NA	NA	NA	0
		2013-10-06 18:27:56	MOVE			NA	0
		2013-10-07 05:41:22	MOVE			NA	0
		2013-10-07 05:42:37	MOVE			NA	0
		2013-10-07 05:41:33	MOVE			NA	0
		2013-10-07 05:41:50	MOVE			NA	0
		2013-10-07 05:42:48	MOVE			NA	0
		2013-10-07 05:42:11	VIEW_NODE	64917	0	NA	0
		2013-10-07 05:42:11	PICKUP_ITEM	45305	1	NA	0
		2013-10-07 05:42:11	SEND_WEBHOOK	670	NA	NA	0
		2013-10-07 05:41:57	VIEW_MAP	NA	NA	NA	0
		2013-10-07 05:43:04	MOVE			NA	0

Appendix L

HyperRESEARCH Coding Screenshot

	I: How did you go about doing this recording? Did you just happen to walk by and decide or did you plan it ahead of time?
Location	P: A little bit of both. For one I knew I had to do a recording. And I was already heading to the ▮▮ building because I usually do my printing there or sometimes I'll just study there when I have a little bit of time. On my way there I'm like "I need to do a recording so I'm gonna do it here." So I sat there and I'm like "all right, I can study." But there is more things than just obviously studying and using the computers. I'm like "What else is here? Oh, the coffee shop." It's not often that I'll buy tea or coffee on campus because I rather just make it. But if I get here, and I'm cold, I would sometimes go buy it. So I just put it in there. It's like all right "I come here, I do this." I planned on coming here to do one thing, and I'm doing two things at once. Two birds with one stone.
	I: And while you were recording it, were you aware of the surroundings, people around you?
Preparing ahead of time **Speaking in public**	P: What I would do, as you saw, I would actually write it out in English, translate it into Japanese, make sure I have the correct form. Sometimes practice it before actually saying it. That way it doesn't come out too choppy as I'm recording it. I realized there were a lot of people here. It must be awkward if they're watching, like "what the heck is that person saying, they're speaking gibberish." So I'm like "all right, I'm going to lower my voice a bit." I think it's partly because here we all speak English instead of Japanese and when you hear something else and someone just talking into their phone, not like this way [holds it up to her ear] but in front of you it looks kind of weird. So maybe I should do it next time like this [holds it up to her ear] so it looks like I'm on the phone talking to someone about something in a different language.
	I: After you were done, do you re-listen to your recordings?
Re-listen to recordings **Listening to one's own voice**	P: Yes, to make sure what I said, that I pronounced everything correctly or at least pronounced that could be understood. Once I had that recording done, I'm like "I'm not going to listen to it again, I sound too weird."
Location **Responsibility** **Taking pictures**	I: You took pictures at all your locations. You did that to enhance the experience that the exchange student knew what you were talking about?
	P: Yes, I did that purposely. 'Cause if someone is just talking about a place and you don't know the campus you're like "what the heck? Where are they?" So if you take a picture and they probably passed it, then they're like "what is that building" and they're like "oh, that's what that is, okay, that makes sense."
	I: You already answered this question - Did you prepare in advance of the recording, and how?
Re-listen to recordings	P: Yeah, wrote in English and Japanese, make sure I had it right, practiced it a little bit, recorded, if I didn't like the recording, delete it, did it again. 'Cause I would probably have wanted to make sure I had it correct. So if someone would have actually listened to me they would look at me funny if I kind of went off the end and like "what?" So it's "okay, I'm going to try to make it clear for you."
	I: Do you use your mobile device for other Japanese studying, and if so, how?
Mobile device for Japanese	P: Yes, I have a Japanese dictionary on my phone as well as my iPad. Google translate for certain things that I want to translate that I'm not quite sure how do it. For my iPad I take notes in Japanese and general classes.

APPENDIX M

IRB Approval Notice

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

September 19, 2013

Andrea Shea
xxxxxxxxxxxxxx
xxxxxxxxxxxxxx

Protocol #: E0713D08
Project Title: Student Perceptions of a Mobile Augmented Reality Game and Willingness to Communicate in Japanese

Dear Ms. Shea:

Thank you for submitting your application, *Student Perceptions of a Mobile Augmented Reality Game and Willingness to Communicate in Japanese*, for expedited review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The GPS IRB appreciates the quality of your application. The GPS IRB has reviewed your submitted IRB application and all ancillary materials. The proposed research is eligible for expedited review according 45 CFR 46.110, research category 7.

I am pleased to inform you that your research study has been granted **Approval.** The IRB approval begins today, **September 19, 2013,** and terminates on **September 18, 2014**.

Your final consent form has been stamped by the IRB to indicate the expiration date of study approval. One copy of the consent form is enclosed with this letter and one copy will be retained for our records. **You can only use copies of the consent that have been stamped with the GPS IRB expiration date to obtain consent from your participants.**

Please note that your research must be conducted according to the protocol that was submitted to the GPS IRB. If changes to the protocol occur please submit a **Request for Modification Form** to the GPS IRB. The revised protocol and all ancillary materials must be reviewed by the IRB before implementation of new or modified research procedures. If contact with subjects or data analysis will extend beyond **September 18, 2014** a **Continuation or Completion of Review Form** must be submitted at least one month prior to the expiration date of study approval to avoid a lapse in approval.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy material" at http://www.pepperdine.edu/irb/graduate/).

6100 Center Drive, Los Angeles, California 90045 ▪ 310-568-5600

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact the GPS IRB office at gpsirb@pepperdine.edu. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Thema Bryant-Davis, Ph.D.
Chair, Graduate and Professional Schools IRB
Pepperdine University

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
        Ms. Alexandra Roosa, Director Research and Sponsored Programs
        Dr. Martine Jago, Graduate School of Education and Psychology