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LISTENING STRATEGIES THROUGH
MOBILE LEARNING GAMES

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Heather D. Mendoza

Candidate

Organizational Learning and Instructional Technology

Department

This dissertation is approved, and it is acceptable in quality and form for publication:

Approved by the Dissertation Committee:

Patricia Boverie, Chairperson

Victor Law

Chris Holden

Julie Sykes

**PLAYING BY EAR: DEVELOPING SPANISH LISTENING STRATEGIES
THROUGH MOBILE LEARNING GAMES**

by

HEATHER D. MENDOZA

B.A., Spanish, University of Central Arkansas, 1994
M.A., Spanish and Latin American Literature,
University of Arkansas, 1998

DISSERTATION

Submitted in Partial Fulfillment of the
Requirements for the Degree of

**Doctor of Philosophy
Organizational Learning and Instructional Technology**

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Dedication

So much of me is made from what I've learned from you.

You'll be with me like a handprint on my heart.

--Stephen Schwartz

This dissertation is dedicated to my late mother, Patricia Ann Davis. Even though she was not able to see the end of my journey, she set my feet on this path long ago. I gratefully dedicate this work to her and will forever appreciate the love of learning she instilled in me at a very early age.

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Finally, I would like to thank my friends and family for their support throughout this process and for believing that I would actually see this journey through to the end. My deepest gratitude is reserved for my husband, Alejandro, and our son, Nico. Their patience and support made this journey

possible. I am truly grateful for their encouragement and unconditional love. I look forward to continuing our adventure together.

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ABSTRACT

This mixed-methods study evaluated the use of a mobile learning game as a pedagogical tool aimed at developing the listening comprehension strategies of college-level Spanish students. Eighty-three students of Spanish 202 (Intermediate Spanish II) played six levels of a mobile learning game designed to guide learners through the listening comprehension process while providing a low-risk practice space for second and foreign language (L2) listening. In order to evaluate change in listening comprehension awareness and perceived use of listening comprehension strategies, an analysis of pretest and posttest survey data was conducted. Additionally, analysis of exit questionnaires, participant interviews, and gameplay data were used to identify which specific aspects of

the mobile learning game influenced the development of listening comprehension awareness and strategy use.

Quantitative data, in the form of survey and questionnaire results, suggest that playing the game influenced development in perceived listening comprehension strategies use. The change in survey scores from the pretest to posttest was found to show statistical significance on both the overall score for strategy use as well as for three of four sub-sections of the survey that were coded to match instructional content from levels one, two, three, and four of the game. Qualitative data from individual interviews support this finding as well. Both the quantitative and qualitative data indicate that whiteboard animations, auditory vocabulary quizzing, and pair interaction with multiple exposure to the listening text were the game components that most influenced listening comprehension development. In terms of listening strategy awareness, the survey results showed little change from pretest to posttest. Similarly, interview data revealed little evidence of any increase in awareness after playing the game.

Overall, the results of this study demonstrate that the use of mobile learning games can have a positive impact on listening comprehension in terms of listening comprehension

strategy use. These results have implications for foreign language pedagogy as well as future research in this area.

Table of Contents

List of Figures	xii
List of Tables	xiii
Chapter 1 Introduction	1
Problem Statement	3
Purpose of the Study	5
Research Questions	5
Theoretical Framework	6
Limitations	9
Significance of the Study	10
Summary	11
Chapter 2 Literature Review	12
L2 Listening Instruction and Instructional Technology .	12
Defining Listening Comprehension Strategies	17
L2 Listening Strategy Instruction	20
Mobile Assisted Language Learning	22
Advantages of Mobiles Games for L2 Listening Strategies	25
Disadvantages of Mobile Games for L2 Listening Strategies	29
.....	29
Digital Game-Based Learning	32
Game Design Principles	33
Summary	37

Chapter 3 Methodology	39
Research Design	39
Research Methods	41
Participants	41
Instruments	41
<i>Estrategia</i>	42
Informational questionnaire.	54
Metacognitive Awareness Listening Questionnaire (MALQ).	55
Language Strategy Use Survey (LSUS).	56
Data Collection	57
Data Analysis	58
Chapter 4 Results	64
Main Research Question	64
Sub-question #1	67
Sub-question #2	74
Sub-question #3	85
Summary of the Findings	96
Chapter 5 Discussion and Conclusions	98
Main Research Question	98
Sub-question #1	99
Sub-question #2	104
Sub-question #3	106

Importance of Engagement and Reduced Anxiety	109
Limitations of the Study	111
Implications for Design	114
Implications for Pedagogy	117
Future Research	120
Summary	121
Conclusions	125
References	128
Appendices	141
Appendix A <i>Estrategia</i> Game Flow	142
Appendix B Exit Informational Questionnaire	143
Appendix C Metacognitive Awareness Listening Questionnaire	148
Appendix D Language Strategy Use Survey	149
Appendix E Sample Interview Questions	151

List of Figures

Figure 1. Stages in the metacognitive pedagogical sequence for listening instruction	21
Figure 2. Integration of game content and curriculum.	44
Figure 3. Stages in the metacognitive pedagogical sequence for listening instruction	46
Figure 4. Word audio quiz.	48
Figure 5. Strategy presentation using whiteboard animation.	49
Figure 6. Character provides context for video.	52
Figure 7. Cartoon video featuring characters from course textbook's instructional resources.	53
Figure 8. Game level completion award.	54

List of Tables

Table 1. Listening Strategies Presented in Whiteboard	
Animations.	50
Table 2. Coding of LSUS Sub-categories.	62
Table 3. Game Levels Played.	65
Table 4. Levels Not Played by Learners.	66
Table 5. Average Scores for MALQ Problem-Solving.	70
Table 6. Average Scores for MALQ Planning & Evaluation.	71
Table 7. Five Most Improved MALQ Scores.	72
Table 8. Listening Strategies Presented in Whiteboard	
Animations.	76
Table 9. Significance Testing for Strategy Use Coded by Game	
Level.	77
Table 10. Average Scores for LSUS - Level 1.	78
Table 11. Average Scores for LSUS - Level 2.	79
Table 12. Average Scores for LSUS - Level 3.	80
Table 13. Average Scores for LSUS - Level 4.	81
Table 14. Five Most Improved LSUS Scores.	82
Table 15. Ranking of Game Components by Usefulness for	
Strategies.	87
Table 16. Rating of Whiteboard Animations (Ranked #1).	88
Table 17. Rating of Phrase/Image Quiz Sub-level (Ranked #2).	89

Table 18. Rating of Feedback for Correct Responses (Ranked #3). 90

Table 19. Rating of Word/Image Quiz Sub-level (Ranked #4). . 91

Table 20. Rating of Feedback for Incorrect Responses (Ranked #5). 92

Chapter 1

Introduction

Many students of foreign language find themselves struggling to communicate competently in the target language even after extended periods of study in traditional language classrooms. Students often find that the time spent exposed to language in the classroom, and even through supplemental activities outside the classroom, is not sufficient to allow them to carry on a conversation in the target language (Cubillos, Chieffo, & Fan, 2008). According to Price and Gascoigne (2006), while more and more college students value foreign language study, many are often disappointed to find that, after a few semesters of college-level Spanish, they cannot communicate adequately in the foreign language. They may have developed reading and writing skills in the language, however, their speaking and listening skills do not allow them to communicate effectively with native speakers. This is still the case today even though recent trends in foreign language education have emphasized communicative language teaching over traditional rote learning. Using mobile devices as language learning tools may be one way to lessen this gap between foreign language instruction and the development of

communicative competency in students. Savignon (1985)

concretely defines communicative competence as:

... the ability to function in a truly communicative setting--that is a dynamic exchange in which linguistic competence must adapt itself to the total information input, both linguistic and paralinguistic of one or more interlocutors. Communicative competence includes grammatical competence (sentence level grammar), socio-linguistic competence (an understanding of the social context in which language is used), discourse competence (an understanding of how utterances are strung together to form a meaningful whole), and strategic competence (a language user's employment of strategies to make the best use of what s/he knows about how a language works, in order to interpret, express, and negotiate meaning in a given context) (p. 130).

The mobile learning game used as the intervention in this study focuses on the area of strategic competence. More specifically, the game is designed to guide students through a process that leads to increased awareness and use of strategies that can be utilized to improve listening comprehension.

Problem Statement

As a foreign language instructor who has been teaching for the past twenty years, I have often been asked by students what they can do to communicate better in actual conversations with native speakers. For many years, I have advised students that the absolute best and most efficient way for them to improve their speaking and listening skills is to travel to a country where they will be immersed in Spanish every day. However, for numerous students, study abroad has not been an economically feasible option. Additionally, study abroad learning experiences are not always as effective as we might hope or expect them to be (Freed, 1998).

Fortunately for those students, emerging technologies such as virtual worlds, video games and synthetic immersive environments (Sykes, Oskoz, & Thorne, 2008) hold increasing promise for providing experiences that are similar to those of effective study abroad programs. In some ways, emerging technologies may be able to succeed in areas where study abroad programs sometimes do not. In recent years, a great deal of work has been done that examines the use of virtual worlds (such as Second Life) as tools for second language instruction (Cooke-Plagwitz, 2008; Deutschmann & Panichi, 2009; Molka-Danielson & Deutschmann, 2009; Stevens, 2006).

Work has also been done in the use of mobile learning devices in foreign language instruction (Chinnery, 2006; Kukulska-Hulme & Shield, 2008). However, less work has been done that focuses specifically on educational mobile digital games constructed for the purpose of foreign language teaching and learning.

While listening is a skill that is vital to learning a foreign language, relatively little class time (in comparison to reading, writing or even speaking) is spent teaching students how to listen. The majority of classroom time spent on listening instruction involves testing of comprehension with little time spent on how learners can use specific strategies to improve their listening ability (Vandergrift & Goh, 2012). Mobile games are particularly well suited to the development of such strategies because they allow for situated learning in which students engage in meaningful interactions in the target language while benefitting from both the scaffolding and feedback mechanisms that can be made available to the learner in a mobile game space. Using mobile games as language learning tools may be one way to lessen this gap between foreign language instruction and the development of listening skills in students.

Purpose of the Study

Many students of foreign language find themselves struggling to communicate in the target language even after extended periods of study in traditional language classrooms. Students often find that the time spent exposed to language in the classroom, and even through supplemental activities outside the classroom, is not sufficient to build strong language skills. Using mobile devices as language learning tools may be one way to lessen this gap between foreign language instruction and the development of communicative skills in students. The aim of this research is to investigate the use of a mobile learning game as a teaching and learning tool to facilitate the development of listening comprehension strategies in college-level students of Spanish.

Research Questions

The study is guided by a main research question and three sub-questions.

The main research question is:

In what ways does use of a mobile learning game impact learners' development of listening comprehension strategies?

Sub-questions to be addressed are:

- 1) *To what extent does playing the game impact learners' metacognitive awareness of the strategies and processes involved in successful listening?*
- 2) *To what extent does playing the game impact learners' perceived listening strategy use?*
- 3) *What aspects of the mobile learning game impact listening comprehension strategy development?*

Theoretical Framework

Marc Prensky (2001), who first popularized the term digital game-based learning, has advocated a rather non-academic approach to using games for learning and training. He recommends an eclectic approach to game-based learning in which designers and teachers draw upon whatever theory suits their specific learning needs and goals. This may be appropriate given the numerous types of games that digital game-based learning encompasses, including everything from simple drill and practice to much more complex games played in immersive virtual environments.

However, in focusing on the use of more complex digital games in educational settings, game-based learning has a strong connection to constructivist and motivational theories. One of the theories important to game-based learning is

activity theory, given that games provide learners an opportunity to explore and actively participate in non-threatening, virtual spaces. Squire (2002) explains in more detail how activity theory applies to games:

Activity Theory provides a theoretical language for looking at how an educational game or resource mediates players' understandings of other phenomena while acknowledging the social and cultural contexts in which game play is situated. Learning is conceptualized not as a function of the game itself - or even a simple coupling of the player and game; rather, learning is seen as transformations that occur through the dynamic relations between subjects, artifacts, and mediating social structures. (p. 10)

Situated learning theory can also be applied to game-based learning as the games are able to safely situate learners in a variety of virtual environments. For language learning, this means a low-risk practice environment where students can try out their language skills without the possible embarrassment often experienced when making mistakes during conversations with real-world speakers of the target language. The idea of situated learning was first brought forth as a means of bridging the gap between the learning of

abstract facts and the actual application of that knowledge. According to situated learning theory, knowledge should be presented within the settings and situations that would normally involve that knowledge (Lave & Wenger, 1991). Gee (2008) draws upon these theories to construct his "Situated Learning Matrix" which explains how games can supply the context within which learning takes place. Gee goes on to touch on the idea of communities of practice and distributed intelligence as he describes how players form "cross-functional" teams inside the gaming environments to share their various areas of expertise in order to solve a problem or achieve a goal.

Another important idea, for game-based learning is related to motivation and comes from Csikszentmihalyi's Flow Theory of Optimal Experience. As related to games, flow is a state of intense, motivating focus in which the player is completely immersed in the game experience. According to Csikszentmihalyi (1975), increased flow leads to improved attitudes, decreased anxiety, heightened creativity and problem-solving skills. In a game-based learning environment, these conditions lead to optimal learning as well. Therefore, one of the goals of the designer should also be to maintain the flow state of the learner by maintaining a consistent

story and environment that does not distract the learner from being immersed in the gameplay experience.

Limitations

There are various limitations that arise in a study relating to technological issues surrounding the use of innovative technologies in teaching. One of the threats concerned whether or not the participants would have consistent access to Wi-Fi, as students would not be able to play the game if they were unable to connect to the Internet. As much as possible, the researcher tried to create alternative lesson plans allowing instructors to either complete the game using desktop computers in the university's language learning center or to use the wired Internet access in their classroom computers to complete the game as a whole class activity if the language lab was not available.

Another potential limitation involved the possible loss of data collected online for the entrance and exit questionnaires. During the time when the questionnaires were collected, the researcher backed up the results daily to a secure external hard drive in an attempt to safeguard data and to avoid potential data loss.

Significance of the Study

Based on my experiences as both a student and teacher of Spanish as a second language, I have found that foreign language teaching methodology in the United States better prepares students in the areas of reading and writing than it does in the areas of speaking and listening. When we learn our native language, we first develop listening skills and later we develop speaking skills. It is generally not until we begin our formal schooling in our native language that we begin to develop our reading and writing skills. However, when we learn foreign languages in the classroom, this order of skill acquisition is reversed. I believe that this is a factor in the underdevelopment of speaking and listening abilities, which results from a gap in classroom instruction that needs to be addressed.

Over the past few years, technology has developed to a point where it is now possible to create virtual environments that can help to simulate real-world Spanish-speaking experiences more realistically than ever before. It is even possible for college students to access these types of environments through many of the mobile devices (cell phones, tablets, etc.) that they carry with them every day. The purpose of this study is to investigate how a mobile learning

game can be utilized to help students develop and practice listening comprehension strategies in a low-risk learning environment. The results of this research have potential application as an aid to curriculum decision-making for future Spanish courses at the southwestern university where other mobile learning games have been previously implemented. The findings from this study may also provide useful information to others who are considering how to incorporate listening strategy instruction into second and foreign language (L2) classrooms.

Summary

This study aims to utilize a mobile learning game in an attempt to fill a gap in current instructional practice in the area of listening comprehension in the Spanish language classroom. A major goal of the game's design is to provide a low-anxiety learning environment in which students can practice their Spanish listening skills and develop appropriate strategies in a way that is more productive and engaging than traditional listen and test methodology. Through the current study, the use of a mobile learning game as a teaching and learning tool is examined to determine what impact it may have on the development of listening comprehension strategies in college-level students of Spanish.

Chapter 2

Literature Review

The review of literature presented in this chapter will address a number of topics relevant to this study. The discussion of relevant literature will begin with a brief history of listening instruction and instructional technology used in the second and foreign language (L2) classroom and will continue with a discussion of listening comprehension strategies and listening strategy instruction. This review will also include the following topics related to mobile games: mobile assisted language learning, mobile games for listening strategy development, digital game-based learning and game-design principles.

L2 Listening Instruction and Instructional Technology

Although listening has long been considered a fundamental skill in language acquisition, it is the most often neglected skill in the foreign language classroom (Oxford, 1993; Vandergrift & Goh, 2012). While research into L2 listening processes and strategies has increased in recent years, it continues to be the least understood and least researched of the four language skill areas: reading, writing, speaking, and listening (Vandergrift, 2007a). Despite the fact that aural input is increasingly being recognized as vital to

second language acquisition, Vandergrift and Goh (2012) point out that many language learners do not get enough exposure to listening materials and they rarely receive specific guidance as to how to approach listening texts. In fact, it is often the case that students in college-level foreign language courses only hear the spoken language during three, fifty-minute classes each week. Given this situation, there is a need for self-assessed listening materials to supplement classroom instruction.

In the past, such materials have often taken the form of activities in which students simply listened to a recording in the foreign language and answered written comprehension questions based on the content of the recording. While these types of exercises have tended to test listening skill rather than teach it, they still represent a vast improvement over early forms of instruction. During the early years of language instruction, behavioristic approaches to language instruction were central to language teaching and learning. In this grammar-translation approach to L2 learning, teachers provided students with the vocabulary and rules of grammar required to produce the translations that were a key component in this type of instruction (Flowerdew & Miller, 2005). Teachers used first the blackboard and, in later years, the

overhead projector while students relied on pencil and paper to produce L2 translations of L1 (first language) texts.

Grammar remained the main focus of foreign language instruction until the audio-lingual approach was introduced after World War II. This approach attempted to achieve language learning through oral repetition and behavioristic habit formation. Listening was taught through drill and practice by listening to a recording and then repeating what was heard. Technologies that were still relatively new at the time, such as LP records and reel-to-reel tapes, were quickly adopted by adherents of the audio-lingual method. The construction of audio language labs soon followed, guided in part by the idea that students, through the use of language drills, would be able to hear and practice difficult sounds in the lab while freeing up teachers' valuable class time for other language learning activities (Jones, 2008). In the mid 1960's, technologies such as the portable tape recorder and filmstrip projector came to be used in both the classroom and the language lab (Erton, 2006). Language labs enjoyed popularity in the 1960's and 1970's. However, by the late 70's, the use of language labs, as well as the audio-lingual approach that spawned them, was in decline.

As Salaberry (2001) points out, the end of language labs and the audio-lingual approach coincided with the adoption of computer-assisted instruction and soon language labs were replaced by computer labs. Computers have been used in L2 language learning since the 1960's. The first computer programs that were designed for language instruction utilized only reading and writing skills. These early programs were strongly influenced by behaviorism and consisted mostly of drill and practice exercises (Flowerdew & Miller, 2005). Similar activities are today often referred to by many as "drill and kill" due to the monotony of such exercises.

As computer technology advanced and L2 teaching methodology evolved, the "drill and kill" types of computer exercises began to give way to more meaningful computer-mediated language practice. In the late 1970's and early 1980's, communicative language teaching methodology led to widely adopted L2 teaching practices that are still in use in today's foreign language classrooms (Jones, 2008). In contrast to earlier approaches, the communicative approach focuses on using language to carry out tasks based on meaning rather than form. In accordance with principles outlined by Morrow (1981), communicative activities in the classroom began to reflect and imitate the types of communication that

students would encounter in real-life situations. This led to a greater focus on authentic materials and authentic listening texts that included songs, movies and recordings of conversations. Portable cassette recorders/players and video cassette recorders/players made it possible for teachers to easily bring these authentic materials into the classroom.

Over the years, with ever-advancing computer technologies, authentic materials are more accessible than ever and multimedia computer-assisted language learning is now far more interactive. The addition of the Internet in the 1990's has led to even greater potential for computer-mediated language learning activities as students and teachers have access to information and people across the globe. One-way listening texts may now be delivered as digital audio, podcasts, digital video, or through multimedia environments. Interactive listening, in which the listener speaks as well as listens, can even be achieved through online audio and video conferencing. However, despite the evolution in L2 pedagogy and the advances in instructional technology, in many L2 textbooks and classrooms, listening is still the most neglected of the four skills. Additionally, when listening activities are the focus, they are most often carried out as tests of successful comprehension rather than exercises that

teach students how to listen (Vandergrift and Goh, 2012). The current study seeks to fill this gap by providing students with listening strategy instruction along with guided listening practice as part of a digital learning game delivered via mobile devices. Mobile language learning environments are particularly well-suited to listening strategy instruction due to the portability of hand-held devices and because such devices afford students the opportunity to access listening texts individually and at their own pace. The ability to include just-in-time individualized feedback and scaffolding in mobile learning games make them particularly well suited for learning and practicing listening comprehension strategies.

Defining Listening Comprehension Strategies

Listening comprehension strategies are the actions and mental processes utilized to aid in understanding aural input. Grounded in cognitive theory, several taxonomies of learning strategies have been put forth (O'Malley & Chamot, 1990; Oxford & Cohen, 1992; Rubin, 1981). However, each of these taxonomies has been necessarily selective given that "dozens and perhaps hundreds of such strategies exist" (Oxford, Lavine & Crookall, 1989, p. 29).

In terms of second language learning and communication, listening comprehension strategies are divided into a number of distinct categories. For the current study, the most relevant categories are: language learning strategies vs. language use strategies and metacognitive vs. cognitive strategies. A.D. Cohen (2011) further divides listening comprehension strategies (which he includes under a general umbrella referred to as "language learner strategies") into several categories. He first distinguishes between "language learning strategies" that are utilized by someone trying to learn a language for the first time and "language use strategies" which is used with "material that has already been learned to some degree" (p. 682). A.D. Cohen goes on to state that what are commonly referred to as "communication strategies" could be considered a type of language use strategy. This distinction between "use" strategy and "learner" strategy is important to the current study as the focus was on strategies that students employed to understand spoken Spanish and not the strategies they employed to learn how to listen.

Another distinction important to this study is one that defines listening comprehension strategies as either cognitive or metacognitive. These strategies are fundamental in any

learning process and can be more effective when they are taught explicitly (Vandergrift & Goh, 2012). A.D. Cohen (2011) defines cognitive strategies as those that "deal with the crucial nuts and bolts of language use since they involve the processes that learners go through in both learning the target language (e.g., identification, grouping, retention, and storage of language material) and in using it (e.g., retrieval of language material, rehearsal, comprehension or production of words, phrases, and other elements of the target language)." Metacognitive strategies, on the other hand, are those that "allow learners to control their language learning by planning what they will do, checking on progress, and then evaluating their performance on a given task" (p. 682). Vandergrift (2003) provides the following definition: "metacognitive strategies or self-management strategies, oversee, regulate or direct the listening process. Cognitive strategies are the actual mental steps listeners use to understand what they hear" (p. 427). According to Vandergrift and Goh (2012), metacognitive strategies include four fundamental processes: planning, monitoring, problem-solving and evaluating. Metacognitive strategies involve thinking about the way information is processed and stored and taking appropriate measures to manage and regulate these cognitive

processes, including the choice of which cognitive strategies to apply to a given task. For example, inferring the meaning of unknown words based on the meaning of known words would be a cognitive strategy, while deciding if inference would be a good strategy to use while listening to a newscast would be a metacognitive strategy.

L2 Listening Strategy Instruction

Of course, each listener uses these strategies in different ways, and some use them more effectively than others. Studies have shown that direct strategy instruction can lead to improvement of listening comprehension skills (Cohen, A.D., 1998; Goh, 1998; O'Malley, Chamot, Stewner-Manzares, Russo, & Kupper, 1985; Oxford, 1990; Vandergrift, 2003). Vandergrift and Goh (2012) and Weaver and Cohen (1994) have put forth specific recommendations for strategy-based language instruction. Vandergrift and Goh (2012) recommend a sequence of instruction (Metacognitive Pedagogical Sequence) that asks students to listen repeatedly to an aural text while employing metacognitive strategies in four areas: planning, monitoring, problem-solving and evaluating (see Figure 1). Weaver and Cohen recommend that explicit strategy instruction be embedded into regular classroom activities. They suggest that strategy instruction should teach specific strategies to

students directly, inform students about the purpose of using the strategies and allow for the opportunity to practice those strategies through contextualized activities tied to the curriculum of the class.

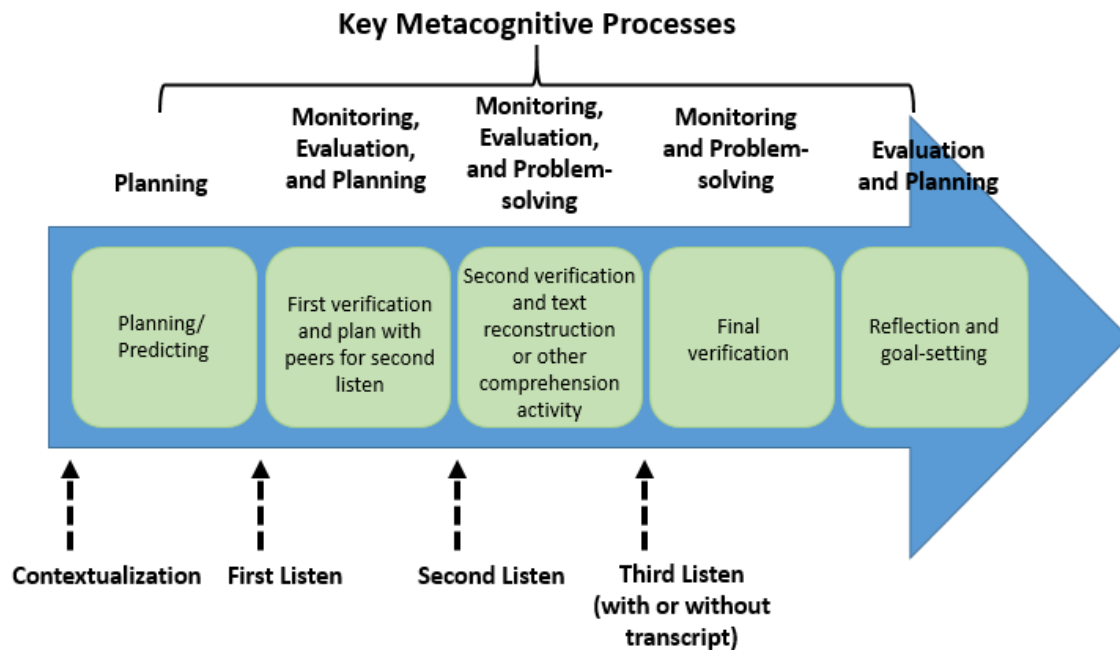


Figure 1. Stages in the metacognitive pedagogical sequence for listening instruction (Adapted from Vandergrift & Goh, 2012, p. 109)

The design of the mobile learning game which was used as the primary instructional tool for this research made use of insight drawn from both sets of authors. Specific cognitive strategies are explained and practiced as part of the gameplay, while the structure of the game leads learners through a sequence of metacognitive processes and strategies. The structure of the game closely followed the Metacognitive

Pedagogical Sequence, while both the instruction and its integration with course content followed the recommendations of Weaver and Cohen. The whiteboard animations, which were used to deliver explicit strategy instruction, detailed how and why specific strategies are used. Moreover, the game was included as a class activity and incorporated content that was already part of the regular course.

Mobile Assisted Language Learning

Language learning is already being supported and enhanced in a variety of ways by mobile devices. This approach is referred to as MALL or Mobile Assisted Language Learning. MALL is an offshoot of CALL (Computer Aided Language Learning). However, MALL differs from CALL in that, rather than rely on a desktop or laptop computer to access language learning, a variety of handheld mobile devices (smart phones, tablets, personal digital assistants, etc.) are utilized. In recent years, these devices have been used in a variety of innovative ways in order to deliver language learning content as well as to provide students an opportunity to practice their language skills whenever and wherever they may be. The integrated features (SMS, voice and video recording, etc.) common to most smart phones today allow students to use them as tools for communicative language practice as well as a

means of accessing authentic content and completing homework assignments (Chinnery, 2006).

MALL has been particularly useful in providing interactive listening and speaking activities in order to improve student performance in these areas, which often lag behind the student's general level of proficiency in reading and writing. Audiovisual devices of all kinds (reel-to-reel, phonographs, radios, televisions, VCRs, etc.) have been used in the past for language learning. However, newer audiovisual devices can do the job better and faster while often providing opportunities for student collaboration as well. Whereas previously students and teachers had to record and share audio cassettes and audio CDs in order to access or evaluate oral work, they may now easily record MP3 files through various, readily available devices (smart phones, digital voice recorders, etc.) and send them directly to one another using devices with Internet connectivity. Additionally, as the bandwidth and sound quality of such devices is continually improving, students may even interact directly in the foreign language with instructors, tutors or other students via VoIP (Voice over Internet Protocol) applications thus creating a collaborative learning environment (Kukulska-Hulme & Shield, 2008).

Probably the most versatile of the mobile devices used in MALL are smart phones, like the iPhone and Android, which provide access to the Internet. These devices provide the most flexible platform for the creation of materials and activities because they can transmit web-based information. Therefore, these devices have been used for many different types of learning in MALL. They have been used for web-based learning applications that range from simple practice-type drills to more complex interactions. They have also been used to provide students timely access to course content through learning management systems. Most recently, they have also been used for the delivery of mobile learning games.

As MALL is still an emerging field of research, there is not yet an extensive body of work in this area, with the majority of recent studies focusing mainly on vocabulary acquisition (Agca & Özdemir, 2013; Cavus & Ibrahim, 2009; Hayati, Jalilifar, & Mashhadi, 2013; Lu, 2008; Stockwell, 2010; Wong, Chin, Tan, & Liu, 2010). With the invention of podcasting, MALL saw an increase in the number of studies which examined mobile devices as a means to improve L2 listening comprehension (Abdous, Facer, & Yen, 2012; Ducate & Lomicka, 2009; Rosell-Aguilar, 2007). A few other studies have investigated mobile devices as tools for L2 listening as

well (Chen & Chang, 2011; Nah, 2011), however, listening strategy training has received very little attention in the MALL research field in recent years. There have also been a few studies that focused on game-based learning (Fotouhi-Ghazvini, Earnshaw, Moeini, Robison, & Excell, 2011; Holden & Sykes, 2011; Sandberg, Maris, & De Geus, 2011) but none of these were aimed at the development of listening comprehension strategies.

Advantages of Mobiles Games for L2 Listening Strategies

There are many aspects of mobile gaming that make it an especially useful tool for the learning of second language listening comprehension strategies. Most importantly, mobile games provide an opportunity for situated learning. Additionally, they can provide valuable learner support in the form of scaffolding and feedback. Other advantages of mobile games for L2 listening strategy instruction include: increased exposure to aural input, decreased anxiety, less monotony of repeated listening within a game narrative that relates the repetition to specific game objectives, chunking of aural material in levels and interactive simulated dialogs as well as the self-paced nature of mobile games. Furthermore, aspects that are beneficial in other mobile learning

environments, such as portability and motivation, are also advantageous for mobile language learning games.

Despite the great potential of mobile games for situated learning (George & Serna, 2011), a quick scan of Apple's App Store demonstrates that most applications currently marketed for language learners feature mostly behavioristic learning of vocabulary and grammar forms. This reality is quite at odds with the fact that game-based learning has a strong connection to constructivist theories and specific theories related to situated learning.

In relation to the current research project, mobile games make it possible to situate learners in a simulated environment that provides a space for the practice of L2 listening comprehension strategies. While most classroom or workbook listening activities involve only one-way listening (e.g. newscasts, phone messages, radio commercials, etc.) mobile games have the potential to allow learners to carry out interactive virtual conversations with non-player characters. Game design can incorporate task-based learning in a virtual environment where learners interact in meaningful ways that simulate real-world experience.

Within this virtual practice space, learners can be aided in the language learning process through the addition of

scaffolding. The term scaffolding came into being when it was coined by Wood, Bruner, and Ross (1976). The concept is based on ideas that Vygotsky (1978) developed in the 1920's and 30's about the Zone of Proximal Development (ZPD) which represents the distance between the level that a learner can achieve on his own and the level that he can achieve with assistance. Therefore, scaffolding is a process of assisting learners to solve problems that would normally be beyond their grasp if they were left unaided. Scaffolding in games can take on many forms: progression of difficulty level, feedback, hints/prompts, internal and external resources, etc. (Melero, Hernández-Leo, & Blat, 2011). For the game used in this study, scaffolding was incorporated into the game design in the form of levels that became progressively more challenging as the player advanced, learner input in written rather than spoken form, responses as choice of given options (as opposed to open-ended responses), and feedback in the form of hints and clues incorporated into the game characters and environment.

Another advantage of mobile games for the development of L2 listening comprehension strategies is the opportunity for practice in an environment that causes less anxiety than face-to-face interactions or even in-class interactions.

Vandergrift and Goh (2012) point out that students often feel nervous about listening because they are put on the spot to demonstrate how much of a listening text they have understood, or to show what they did not understand. That anxiety increases even more when learners are also required to respond appropriately to what the person is saying. Mobile games can provide a low-anxiety practice space for the development of listening strategies.

Just as there are not enough hours in the day, there are never enough hours in the classroom to expose students to the amount of aural input needed to assist them in improving their listening skills at a pace that makes them feel fully successful as language learners. A potential benefit of mobile games is that gameplay outside of class increases the time a learner spends hearing the target language. A related advantage is that the need to listen to an audio clip repeatedly can be written into the game narrative so that it is related to a specific game-related objective and is, therefore, less monotonous than stand-alone listening exercises scripted for textbooks. Furthermore, mobile games allow for the chunking of aural material. For example, whereas a textbook listening activity might have one person talking for a minute or two, interactive segments of a mobile

game can be used to expose learners to snippets of audio that represent one side of a conversation between the player and the non-player character.

Finally, the two most commonly touted advantages of mobile games are portability and motivation. With the growth of mobile technologies, L2 teachers and students are more able than ever before to practice the target language almost anywhere at any time. The portability of mobile games is, therefore, yet another aspect that is beneficial for language learners who wish to have ready access to learning materials. Lastly, mobile games that are designed to be both fun and challenging have vast potential to motivate and engage students in ways that is often not possible with more traditional methods of instruction.

Disadvantages of Mobile Games for L2 Listening Strategies

While there are numerous advantages to the use of mobile games for language learning, there are also a number of disadvantages. Among the more important to consider are: student access to mobile devices, the investment of time, money and skills required for the creation of mobile games, lack of a standardized format for programming games for different devices, limitation of the mobiles devices and the

possible frustration related to technical difficulties (Shudong & Higgins, 2006).

One of the first disadvantages that must be factored into the equation is students' access to mobile devices. While the number of college students who have smartphones is ever increasing, that number has not yet reached 100%. Therefore, teachers who wish to make mobile games a required part of their classes must take this into consideration and arrange for the funds required to make sure that all students would be able to borrow a device on which to play the mobile game if necessary.

Another very important consideration concerns the time, money and skills required for the creation of mobile games. As George and Serna (2011) succinctly state, "The design and development of mobile learning games is complex and time consuming." Given the workload of most teachers and professors, it is likely that many will be unwilling or unable to take on the extra investment. Additionally, although there are a few game-programming options that are accessible to non-programmers, many language instructors do not feel confident that they have the skills needed to create a successful mobile learning game. Even for those who do feel confident in their ability to create a mobile game, the lack of a standardized

format for programming games represents yet another challenge. Programming a game that will work on one student's iPhone does not mean that you have a game that will also work on another student's Android. So, even if all students had access to smartphones, access to a particular mobile game would still not be universal.

An additional point to consider involves the problems and limitations related to the device itself. Luckin, Brewster, Percy, & du Boulay (2003) encountered a few of these when users complained about small screen sizes, crashing and data loss. While crashes and data loss are certainly problematic, most students who are now familiar with mobile devices and use them every day are less likely to complain about screen size. However, if gameplay requires students to play the game outdoors, players may have trouble viewing their screen to read text and choose options because of glare and the dimness of the phone's screen. Another common issue concerns problems with connectivity and Internet service providers (Attewell, Savill-Smith, & Douch, 2009). This can be a challenge when depending upon public Wi-Fi access for connectivity.

A further limitation related specifically to the mobile game used in the current study stems from the addition of the audio component required for listening comprehension practice.

Depending on the immediate environment, students may have difficulty hearing the device through the phone's built-in speakers due to interference of external sounds (wind, traffic, talking, etc.). This can also be a problem that students encounter when trying to play in pairs or groups in class. In these situations, students need to use headphones.

Digital Game-Based Learning

While "digital" and "mobile" are relatively new terms, the idea of using games in the classroom is not a new one. The term game-based learning has traditionally been used to refer to the games used by teachers in the classroom to engage and motivate students during lessons. However, in reaction to advances in technology, today the term game-based learning also refers to an instructional approach that incorporates educational digital games. As the popularity of commercial video games has increased as a form of entertainment, interest in the use of digital game-based learning in the realm of education has also increased. The term digital game-based learning was coined by Marc Prensky (2001) to describe an approach to learning that incorporates the use of serious games, commercial-off-the-shelf games and simulations to engage and motivate a new generation of students that he calls *digital natives*.

Reinhardt and Sykes (2012) further distinguish game-based learning from game-enhanced learning. While game enhanced learning works with digital games that are commercially available, game-based learning utilizes games that are purposefully geared toward L2 teaching and learning.

Reinhardt and Sykes point out that relatively few games of this type exist and go on to list a few of the games that fall into this category. However, only two of six games listed are freely available (*Mentira* and *Zon*). The other games mentioned in this category are either prototypes (*Croquelandia*), demos (*Language Island*), beta versions (*MIDDWorld Online*) or commercial products intended for use by members of the military (*Tactical Language and Culture Training Systems*). There are currently no examples of games designed for L2 teaching and learning that are aimed specifically at strategy instruction for improved L2 listening comprehension. *Estrategia* represents the first game of this type.

Game Design Principles

For many proponents of game-based learning, the key to effectively using games for educational purposes is to harness the motivating power of games to actively engage students in learning activities. In order to achieve this end, various models and criterion have been proposed.

Prensky (2001) has put forth a model to demonstrate that effective digital-game based learning must focus equally on engagement and learning. The model contains three categories: pure game, computer-based training, and digital game-based learning. Prensky proposes that an emphasis on engagement results in pure games, while a focus on learning with less attention to engagement results in computer-based training. Therefore, in order for games to be optimally effective as learning tools, the levels of both engagement and learning must be high.

In order to achieve this end, according to Prensky (2001), designers must take into account the target learners, the content to be learned, the technology and resources available as well as the method of distribution. He explains the process in rather simple terms by stating that: "we need to select or create a game style that will engage and a learning style that will teach what is required (each with the other in mind), and then somehow blend the two" (Prensky, 2001, p. 151).

Gredler (2003) agrees that good educational games must hold the players interest as well as necessitate the implementation of certain skills or knowledge in order to

achieve the goals of the game. She outlines five specific design criteria aimed at creating such games:

1. Winning the games should not be a matter of chance, but rather should only be possible through the application of knowledge and skills that are the educational focus of the game.
2. The content delivered through the medium of the game should be meaningful and significant.
3. The game should provide a level of challenge appropriate to the target learners while not distracting the learners with non-essential sounds or graphics.
4. Students should not be punished for wrong answers by losing points.
5. Games should not be winner-take-all. Instead, success should be determined by reaching a certain level or a certain number of points.

These are all important factors to consider in designing game-based learning. However, they fail to take into account the importance of instructional support that has been pointed out by Ke (2009). Her meta-analysis of the research highlighted the importance of instructional support and the learning setting in the implementation of game-based learning.

Ke noted that studies in this area commonly find that students who do not have the benefit of instructional support often learn to play the game instead of the content integrated into the game. This is an essential aspect to consider when designing and implementing games in the classroom. One strategy proposed to help address this issue is to include a debriefing phase in which the instructors guide students in reflection about the game in order to aid them in making meaningful connections between the game, content or skills, and real-life experiences (Gee, 2008; Peters & Vissers, 2004). This is an essential piece in the learning puzzle that allows students to better transfer knowledge and skills gained during gameplay to different situations and learning contexts.

In short, well-designed educational games must meet two basic requirements. First, the game must possess the engaging qualities exhibited by commercial video games. This is the aspect that is most important for maintaining student interest and motivation in the game. Secondly, the game must function as an effective pedagogical tool. In order to play and master the game, the student must also be required to master the content or skills being taught through the game itself. Combining these two essential elements in one game is the aspect of game-based learning that perhaps poses the greatest

challenge for instructional designers and teachers. Designers should also keep in mind that using games as a stand-alone tool has been found to be less effective than using them in conjunction with sufficient instructional support. Therefore, instructional designers should strive to create games that are fun, while meeting the learning objectives within a learning setting that supports connections between the games and the learning goals to be achieved.

Summary

Over the years, there have been many changes that impact the L2 teaching and learning. Evolution in pedagogy has changed the methodology employed by teachers while advances in technology has increased the numbers of ways in which teaching and learning can be achieved. However, in spite of the opportunities that these changes provide, listening in the L2 classroom oftentimes still consists of having students listen to a passage before responding to comprehension questions. Essentially, these listening activities serve to test listening comprehension rather than teach the skills required for successful L2 listening.

Studies have shown that approaches to L2 listening that include explicit strategy instruction can lead to improved listening comprehension skills. Furthermore, many aspects of

mobile games (low-anxiety practice space, feedback, scaffolding, motivation, etc.) make them particularly well-suited for the delivery of such instruction. The current study seeks to investigate how mobile learning games can be used as pedagogical tools for the development of listening comprehension strategies.

Chapter 3

Methodology

This chapter details the specific methods and procedures utilized in this study to examine the research questions. The participants, instruments, and procedures for data collection and analysis are discussed in detail.

Research Design

A mixed methods design was chosen for this study. By applying a combination of methods to this particular research problem, the researcher was able to collect rich, detailed qualitative descriptions of the process involved in language learning through mobile games as well as quantitative data which offer insight into how the game impacts the development of listening strategies. Also, utilizing mixed methods to examine the use of mobile games for second language learning provides the opportunity to collect data from a variety of sources in order to better triangulate the methods by being able to compare and contrast the quantitative results with qualitative data in order to validate findings (Creswell & Plano Clark, 2011).

The use of mixed methods to investigate mobile learning is also recommended by several researchers in this field.

Taylor (2006) points to a need for mobile learning researchers to move beyond a purely "pre-post" kind of study:

Traditionally, evaluators might relate the success of a design to the success with which learners can achieve pre-identified learning outcomes. The nature of learning outcomes in the mobile age needs to be adaptive. For example, they may relate to the extent to which someone has assimilated information into their own experience and developments, rather than how well they can reproduce knowledge in a pre-post questionnaire style study.

Success may also be measured by how and how much they use their mobile devices: e.g. do they look for new functionality? Does its use change the nature of the 'talk'? (p. 27)

Van't Hooft (2009) echoes these sentiments and adds that mobile learning research needs to make use of several sources and types of data to fully understand what is happening in the mobile learning environment. By looking at different types of data (game data logs, self-reports, direct observation, etc.) and looking for patterns of behavior, we can obtain a fuller picture of the process and what it means in terms of student learning.

Research Methods

As a mixed methods study, both quantitative and qualitative data were collected. The analysis of the data was also quantitative and qualitative in nature.

Participants

The participants in this study included eighty-three students enrolled in six sections of SPAN 202 (Intermediate Spanish II) at a four-year university in the southwestern United States. This course is one of many offered through the Department of Spanish and Portuguese. Students must take a placement evaluation test to determine which course level is most appropriate for them.

The majority of students who were observed as part of this research are traditional, college-age students. The instructors for the SPAN 202 level courses in this study are teaching assistants who are graduate students in the Spanish department. They teach two classes each semester following syllabi provided by the Spanish program coordinator who supervises the lower-level Spanish courses.

Instruments

The instruments used in this study include a mobile learning game, entitled *Estrategia*, as the primary instructional intervention as well as three quantitative

measures. The first of these measures was an entrance-exit informational questionnaire which included questions about students' language learning experience, self-evaluation of their language abilities and their use of technology. Additionally, it included questions regarding their perceptions of classroom activities related to listening comprehension and to the game. Two other pre-post surveys were also used to examine students' perceived use of listening comprehension strategies and the impact of the game on the students' metacognitive awareness of strategies and processes used while listening to Spanish.

Estrategia. The primary instructional intervention used during this research project was a mobile learning game entitled *Estrategia*. The game was designed and created by the researcher using the authoring tool, Adobe Captivate 7. The game was distributed to students during their regular class time using a learning management system and iPod Touch devices provided by the university's language center. The game was played during six different class periods throughout the semester and only one game level was completed during each class period. The class periods when the game was played corresponded to the dates when the listening comprehension segment of the chapter was to be covered in class. The game

was played during weeks 4, 6, 9, 10, 11 and 12. The game content was fully integrated with the course curriculum and both the vocabulary and the videos were drawn directly from the textbook chapters covered as part of the course (see Figure 2). Participation in the game was graded as the listening comprehension component of the students' grade and accounted for 5% of the students' total grade. Participation was graded on a pass/fail basis and students received a score of 100% for each game level they attempted.

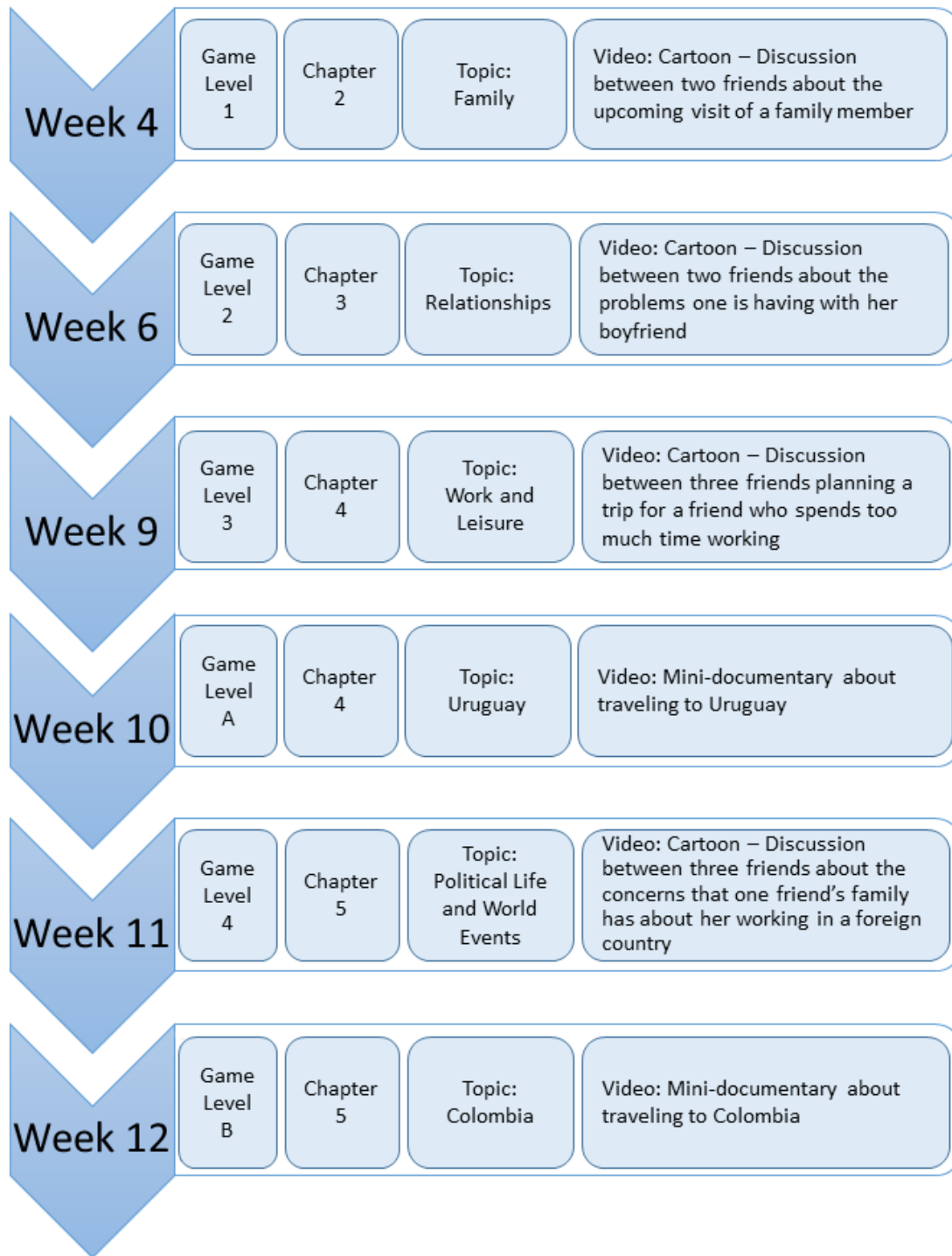


Figure 2. Integration of game content and curriculum.

As mentioned previously in chapter two, *Estrategia* was designed to guide students through the Metacognitive

Pedagogical Sequence proposed by Vandergrift (1999, 2004, 2007b) which includes the four key metacognitive processes: planning for the listening activity, monitoring comprehension, solving comprehension problems, and evaluating the approach and outcomes (see Figure 3). Appendix A shows the game flow of *Estrategia* and is labeled to demonstrate which elements of the game's design correspond to the various stages of Vandergrift's Metacognitive Pedagogical Sequence. This model for listening instruction is intended for one-way listening, where the listener is not required to respond to a speaker as is required in interactive listening. The videos that serve as the listening texts in the game are all examples of one-way, non-participatory listening.

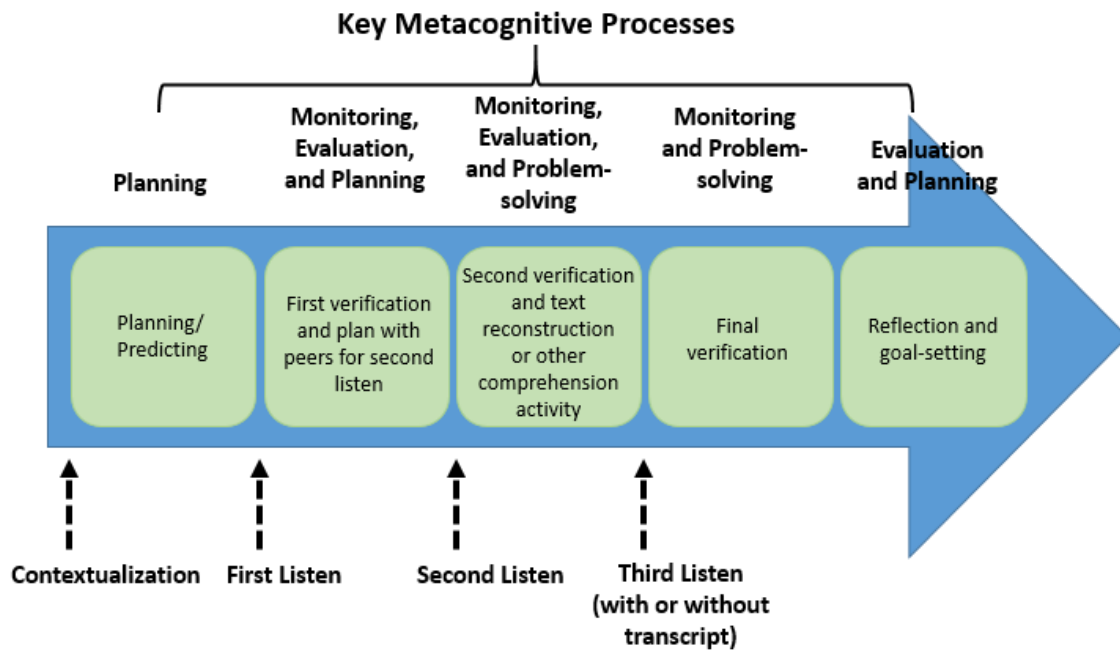


Figure 3. Stages in the metacognitive pedagogical sequence for listening instruction (Adapted from Vandergrift & Goh, 2012, p. 109).

The game designed for this study consisted of six different game levels. Each level of the game was divided into six different sub-levels (see Appendix A) and used video supplements from the course textbook's instructional resources as the source of aural input. Four of the game levels contained an animated cartoon (entitled *Dibujo animado*) that depicted various situations involving five friends who are featured as characters throughout the chapters of the textbook. The content of these cartoon conversations reflected the vocabulary, structures and themes that were included in

the textbook. Two of the game levels, which were more challenging in terms of listening content, featured cultural and geographical information presented in the form of mini-documentaries. These were described in the textbook as video travel logs supposedly created by friends of the five characters featured in the cartoon videos.

Each game level began with two sub-levels that helped prepare students to view one of the videos by providing activities meant to activate their previous knowledge as well as aid them in associating words and phrases they heard with corresponding images. Each of the two beginning sub-levels included four to seven words or phrases depending upon the length of the video contained in that level. In the first sub-level (see Figure 4), students were presented with a word that was featured in the listening segment. As each word-quiz screen appeared, the student heard a word which was repeated three times. The student then pressed the screen to choose one of four photos in an attempt to match the word to the correct image. If the student chose correctly, he received positive feedback and a point. If the student chose an image that did not correspond to the word in the audio clip, he received feedback, was prompted to make another selection and the same word was presented again in order to give the student a second

opportunity to respond correctly while reinforcing an association between the spoken word and the corresponding image. The second sub-level worked in the same way, however, for this level the audio clips contained short phrases instead of single words.



Figure 4. Word audio quiz.

When students successfully completed both sub-levels, they were presented with a screen showing the total points earned and a whiteboard animation video was unlocked (see Figure 5). This whiteboard animation contained an explicit presentation of a listening strategy that students were encouraged to practice as they listened to the cartoon or mini-documentary presented later in the game level. The strategy was explained and modeled in Spanish as part of the whiteboard animation. In the animation, as the speaker talks, her words are illustrated by a hand drawing out images

associated with the message and/or writing out key words and phrases from the text of the strategy explanation. These whiteboard animations were narrated by the researcher and were created using VideoScribe, a commercial software program.



Figure 5. Strategy presentation using whiteboard animation.

The strategies included in the whiteboard animations were chosen by the researcher in accordance with recommendations made by Vandergrift and Goh (2012) for the selection of relevant listening strategies. Therefore, the strategies for each game level were selected based on the listening demands of the video included in that level. For example, while some strategies were more appropriate for the informal conversations heard in the *Dibujo animado* cartoons, others were better suited to the more academic content of the mini-documentaries about Spanish-speaking countries. Table 1 shows

the strategies that were included in the whiteboard animations of each game level as well as a summary of the content of each video that served as the listening text.

Table 1.

Listening Strategies Presented in Whiteboard Animations.

Level	Listening Strategy	Video
1	Identify and think about general context/theme/topic before listening.	Cartoon - Discussion between two friends about the upcoming visit of a family member
2	Ask questions of speaker or other listener(s) to clarify meaning. Ask speaker to slow down or repeat.	Cartoon - Discussion between two friends about the problems one is having with her boyfriend
3	Use visual cues and tone/intonation/pause clues to help determine meaning.	Cartoon - Discussion between three friends planning a trip for a friend who spends too much time working
4	Try to avoid word-for-word translation. Instead, listen for keywords that indicate main ideas and use those to predict meaning of other words.	Cartoon - Discussion between three friends about the concerns that one friend's family has about her working in a foreign country
A	Read about/investigate a subject before listening if the topic of the listening text is known prior to listening.	Mini-documentary about traveling to Uruguay

Level	Listening Strategy	Video
B	Write down keywords and note important concepts in abbreviated written form. After listening, organize notes using concept mapping to help find meaning.	Video: Mini-documentary about traveling to Colombia

Once students had viewed the presentation of the strategy in the whiteboard animation, they advanced to the planning sub-level which presented them with the general context of the video to be viewed. The context was presented by a character from the cartoon (see Figure 6). Students then completed tasks which required them to predict the content of the video in some way. This included activities such as generating or selecting from a list of words, phrases or themes they thought might be included in the listening text based on what they knew about the video up to that point in the level.



Figure 6. Character provides context for video.

Students then viewed the video (see Figure 7). At the end of the video, students were prompted to talk with a partner to verify what they understood from the first viewing of the video, assess which parts were not understood well, and think about which parts of the video they should focus on more during the second viewing. At this point, students viewed the video for the second time and another prompt asked them to discuss what they heard in groups to summarize the main points they had understood, identify which parts they did not understand as well, and discuss how they might approach the third viewing in order to increase understanding.



Figure 7. Cartoon video featuring characters from course textbook's instructional resources.

Students then watched the video for a third time. When the video concluded, students were presented with several comprehension questions. For all levels, students chose their answer from a list of four possible written responses. Students received feedback for both correct and incorrect responses after each answer was submitted. Once students had completed all the comprehension questions, they were presented with a congratulatory level completion award screen (see Figure 8). This was followed by the final game level screen which showed the points earned for correct responses, demonstrating that the student had earned enough points to advance to the next level of the game.



Figure 8. Game level completion award.

At this point in each class period, the researcher led the class through a debriefing process. After completing the game level, students were asked to reflect on what challenges or difficulties they encountered during the listening task, what strategies they used to try to better understand what was said during the video, and which strategies worked well and which did not.

Informational questionnaire. The informational questionnaire (entrance and exit) for this study included both open-ended and Likert scale questions covering the following topics: demographic information, academic information related to the course (Spanish courses taken, expected grade in course, overall GPA), student perception of second language study, perceived language level in each of four skills areas

and familiarity with technology. The questionnaire was adapted (with permission) from the informational entrance and exit surveys used in the dissertation research conducted by Dr. Julie Sykes (2008). The exit questionnaire is included in Appendix B.

Metacognitive Awareness Listening Questionnaire (MALQ).

Both before beginning to play *Estrategia* in class and again after the completion of the game, students were asked to complete the Metacognitive Awareness Listening Questionnaire. The MALQ is a Likert scale questionnaire designed to assess second language learners' metacognitive awareness of the processes involved in successful listening as well as their perceived use of strategies while listening.

In order to complete the MALQ, students respond to twenty-one statements such as "I have a goal in mind as I listen" or "I try to get back on track when I lose concentration." Students respond to the statements by indicating the degree to which they agree with each statement according to a 6-point scale where 1 indicates *strongly disagree* and 6 indicates *strongly agree*.

The MALQ (Vandergrift, Goh, Mareschal, & Tafaghodtari, 2006) was developed based on a three-part model of metacognitive knowledge (person, task and strategy) that was

created by Flavell (1979). The questionnaire provides measures of L2 listening strategy metacognitive awareness in five distinct areas: problem solving, planning and evaluation, lack of mental translation, personal knowledge and directed attention. Based on exploratory and confirmatory factor analysis ($N = 966$), the MALQ has shown high reliability and factorial validity (Vandergrift et al., 2006). With permission from the author, it was adapted for use with learners of Spanish by changing the word English to Spanish whenever it appears in a question (See Appendix C).

Language Strategy Use Survey (LSUS). In addition to the Metacognitive Awareness Listening Questionnaire, students also completed the listening section of the Language Strategy Use Survey (Cohen, Oxford, & Chi, 2002) which was designed to assess second language learners' perceived use of language learning strategies. The listening strategy use portion of the survey consists of twenty-six strategies such as "Focus on the context of what people are saying". Students respond to each strategy by selecting how often they use the strategy. Based on exploratory and confirmatory factor analysis ($N = 300$), the LSUS has been shown to be a reliable and valid instrument for the measurement of listening comprehension strategies (Paige, Cohen, & Shively, 2004). The listening

segment of this survey can be found in Appendix D. With permission from the author, only the listening portion was used in this study.

Data Collection

Before the students began working with *Estrategia*, they were asked to complete two pre-surveys and an entrance questionnaire. The entrance and exit questionnaires were delivered online and completed outside of class. The pre and post-surveys were completed in class. The researcher attended all classes for which the lesson plans contained activities related to the content of the *Estrategia* game. To the extent possible, the researcher took written notes during class and later transcribed them into full narrative form as typed field notes.

The researcher collected qualitative data through direct observation of classes and gameplay during class time as well as interviews of student volunteers from each class. Quantitative data was collected in the form of gameplay logs produced by the authoring software and was also collected from the pre-post surveys. Additionally, the researcher observed at least six class periods (for each of the six classes, totally more than thirty-six instructional hours) in which students participated in activities related to the game. In order to

best triangulate data, the researcher conducted twenty-seven semi-structured interviews (see Appendix E for sample questions) with volunteer participants in order to inquire about what it was like for them to play *Estrategia* as part of their Spanish course. These interviews were each approximately thirty minutes in length. Once students had completed the *Estrategia* portion of their coursework, information was collected through an online exit questionnaire. This questionnaire asked students to briefly respond to open-ended questions and Likert scale questions concerning what they found helpful or what was not helpful to them based on their experiences with *Estrategia* overall and in terms of improving their listening comprehension strategies. The researcher also administered the post-surveys (MALQ and LSUS) in class after the completion of *Estrategia* as well.

Data Analysis

For each class period observed, the researcher transcribed written notes from her observations into full narrative form as typed field notes. For the interviews, she used word processing and voice recognition software to create typed transcripts.

For the coding of data, the researcher used a web-based qualitative analysis program called Dedoose. She used this

program first for open-coding and then for grouping codes through the process of axial coding recommended by Corbin and Strauss (2008). Using constant comparison (Glaser & Strauss, 1967), she first searched for similarities in the data that would allow for the development of themes that are common to learner experiences related to playing *Estrategia*.

After the initial general coding was completed, interview transcript data was also coded to find patterns in participants responses specifically related to listening comprehension strategy development. Finally, the interviews were coded to find how participants perceived the utility of the thirteen aspects of the game that were ranked as part of the exit questionnaire.

The researcher analyzed the quantitative gameplay data generated by the authoring software by calculating the number of levels played by each student. Additionally, frequencies were calculated to determine how many students missed playing each of the six game levels. This analysis was conducted by first downloading the data set in the form of an Excel spreadsheet. All extraneous data columns such as "student email" were then removed. Next, the researcher used Excel functions to calculate the frequency of gameplay and to determine how many students did not play each of the levels.

In order to investigate possible changes in students' metacognitive awareness and overall language strategy use, results from the MALQ and the LSUS were compiled and analyzed using Statistical Package for the Social Sciences (SPSS), to determine whether the differences in pre- and post- scores for each area of the surveys were statistically significant. As paper-based versions of these surveys were administered in class, the researcher manually entered scores for each item into an Excel spreadsheet. Several steps were taken by the researcher in order to eliminate any possible data entry errors. After all scores were manually entered, the researcher printed out the spreadsheet and physically compared the information contained in the spreadsheet to the completed survey forms. In this manner, several data entry errors were found and corrected. Additionally, the researcher employed a second method of verifying data entry to make sure that the data analyzed in Excel and SPSS exactly matched the data collected on the surveys. For this second method of data entry verification, the researcher created voice recordings by reading aloud the scores of each survey. These recordings were then played back and compared to a printout of the Excel spreadsheet and any errors found were corrected in the final spreadsheet.

The survey scores were then imported into SPSS. Once the Excel file was converted to SPSS format, the following variables were recoded: pretest and posttest LSUS scores were recoded to reflect a low to high ordering of the possible responses. Additionally, six questions (3, 4, 8, 11, 16 and 18) from the pretest and posttest MALQ were reverse coded due to the fact that they are negatively worded. Once the recoding was completed, skewness and kurtosis tests were ran in SPSS in order to check that the data met assumptions of normality before running paired samples *t* tests on the overall survey scores and sub-scores.

In addition to the overall MALQ score, the means representing Problem-solving and Planning & Evaluation were calculated as well in order to determine if any gains were made in the two main categories suggested by the authors of the instrument in their unpublished guide for scoring and interpreting the MALQ (Vandergrift & Goh, 2011). In the guide, the authors indicate that a combined score of questions 5, 7, 9, 13, 17, and 19 represents metacognitive awareness in the area of problem-solving, while a combined score of questions 1, 10, 14, 20 and 21 represents awareness related to planning and evaluation.

In order to measure the impact of playing the game on perceived strategy use, the overall pretest and posttest LSUS scores were calculated. Scores for four sub-categories were also calculated and analyzed. These four sub-categories resulted from coding the LSUS questions that corresponded to the specific content covered in the strategy-based instruction contained in levels 1-4 of the game. Table 2 shows which questions corresponded to the strategies included in each of the four levels.

Table 2.

Coding of LSUS Sub-categories.

Level	Strategy Topic	Questions
1	Identify and think about general context/theme/topic before listening.	10, 18, 24, 25
2	Ask questions of speaker or other listener(s) to clarify meaning. Ask speaker to slow down or repeat.	20, 21, 22
3	Use visual cues and tone/intonation/pause clues to help determine meaning.	9, 13, 14, 15, 23, 26
4	Try to avoid word-for-word translation. Instead, listen for keywords that indicate main ideas and use those to predict meaning of other words.	12, 17

Finally, in order to examine which game aspects were perceived to be most beneficial in terms of listening strategy

development, the exit questionnaire included a section (Question #13) which asked participants to evaluate the use of the game based on their own experiences. This section of the questionnaire asked participants to rate thirteen different components of the game according to how useful learners found the various aspects of the game to be in helping develop listening comprehension strategies. This section asked respondents to rate each game component using a 5-point Likert scale ranging from *Not useful at all* to *Extremely useful*, with *Don't know/Did not use* included as a final option. The responses were downloaded as an Excel file from the online survey service used to collect the data. Using Excel functions, once the *Don't know/Did not use* responses were excluded, average scores for each game component were calculated and ranked. Additionally, the five highest ranking scores were further analyzed to determine patterns of score responses for each of the items based on the frequency of each response.

Chapter 4

Results

This study addressed one main research question and three sub-questions in order to identify the ways in which the use of a mobile learning game impacts learners' development of listening comprehension strategies. This chapter reports the findings of the main research question and the three related sub-questions.

Main Research Question

In what ways does use of a mobile learning game impact learners' development of listening comprehension strategies?

The main research question focuses on the investigation of how playing a mobile learning game influences learners' development of listening comprehension strategies. Therefore, it is first important to determine that learners did, in fact, play the game that served as the intervention for this study. In order to verify this, the gameplay data collected by the learning management system that hosted the game was examined. This data showed that, of the eighty-three learners who completed both the pre- and post- surveys used to measure strategy development, the majority played all or most of the

game. Table 3 displays the number of game levels played by the learners.

Table 3.

Game Levels Played.

Number of levels	<i>N</i>	%
3	3	4%
4	7	8%
5	32	39%
6	41	49%
Totals	83	100%

As can be seen in Table 3, almost half of the learners ($N = 41$, 49%) played all of the six levels of the game. The second largest group played five of the six levels ($N = 32$, 39%). Only seven (8%) of the participants played four of the six levels and three (4%) played three of the four levels. None of the participants played less than three levels. All participants played at least half the game levels.

Because students generally attended class more regularly at the beginning of the semester than the end of the semester, more of the learners played the first levels than the last levels. Table 4 displays the number of learners who did not play each level of the game.

Table 4.

Levels Not Played by Learners.

Level	Number of Learners	% of Total Students
1	0	0%
2	8	10%
3	8	10%
A	14	17%
4	15	18%
B	11	13%

None of the students were absent on the first day on which the game was played in class, therefore all of the learners played Level 1. For Levels 2 and 3, eight learners missed playing each of these levels. Fourteen learners missed playing Level A and fifteen missed playing Level 4. For Level B, eleven learners did not play this level. These numbers demonstrate that each level of the game was played by at least 80% of the total number of students in the participant group.

To what extent the fact that learners played this game actually influenced their metacognitive awareness and perceived strategy use is the focus of the first two sub-questions. The third sub-question seeks to identify specific components of the game that influence the development of

listening comprehension strategies. The findings in each of these categories is reported in the following sub-sections based on an analysis of the triangulated data from surveys, online informational questionnaires, and participant interviews.

Sub-question #1

To what extent does playing the game impact learners' metacognitive awareness of the strategies and processes involved in successful listening?

This question seeks to address the effects of using the mobile learning game on the learners' metacognitive awareness of the processes and strategies that lead to successful listening. Moreover, this question seeks to determine whether or not playing the game in this study led students to better understand the processes involved in such a way that they were then able to regulate those processes in order to successfully apply listening strategies. Both qualitative survey data and quantitative interview data were analyzed in order to answer this question. In analyzing the quantitative survey data, the overall pretest and posttest scores of the Metacognitive Awareness of Listening Questionnaire (MALQ) were calculated as well as sub-scores in two main categories, Problem-solving and Planning & Evaluation. Qualitative data from twenty-seven

individual interviews was also examined as part of the analysis aimed at answering this sub-question.

The Metacognitive Listening Awareness Questionnaire was administered as part of this study to determine whether or not Spanish language students ($N = 83$) who played a mobile learning game experienced an increase in their metacognitive awareness of the strategies and processes involved in successful L2 listening. Eighty-three college-level Spanish students completed the questionnaire in which they self-reported their level of metacognitive awareness both prior to and after playing a mobile learning game as part of their coursework. The means from pretest and posttest were calculated and a paired samples t test with a .05 level of significance was conducted to evaluate whether a statistically significant difference existed between the mean survey scores before and after playing the mobile learning game. Assumption testing indicated no gross violation of assumptions. The results of the paired samples t test were not significant, $t(82) = .18$, $p = .860$, indicating that there was not a significant increase in metacognitive awareness scores from the pretest ($M = 3.83$, $SD = .42$, $N = 83$) to the posttest ($M = 3.82$, $SD = .50$). Based on the survey results, the mean

decrease from pretest to posttest was 0.01. The researcher retained the null hypothesis.

In addition to the overall MALQ score, the means representing Problem-solving and Planning & Evaluation were calculated as well in order to determine if any gains were made in the two main categories suggested by the authors of the instrument (See Chapter 3 for a detailed discussion of coding for these categories). The means for pretest and posttest scores for the Problem-solving remained almost constant before and after playing the game, suggesting very little change in students' metacognitive awareness of L2 listening strategies and processes related specifically to problem-solving. For this category the mean score decreased from the pretest ($M = 4.70$, $SD = .52$) to the posttest ($M = 4.60$, $SD = .55$). The decrease in mean was .10. Table 5 displays the questions in the problem-solving category as well as pretest and posttest averages for each item included in this category.

Table 5.

Average Scores for MALQ Problem-Solving.

Question	Pre	Post	Difference
5. I use the words I understand to guess the meaning of the words I don't understand.	5.10	4.92	-0.18
7. As I listen, I compare what I understand with what I know about the topic.	4.45	4.43	-0.02
9. I use experience and knowledge to help me understand.	4.89	4.87	-0.02
13. As I listen, I quickly adjust my interpretation if I realize that it is not correct.	4.43	4.27	-0.16
17. I use the general idea of the text to help me guess the meaning of the words that I don't understand.	4.92	4.82	-0.10
19. When I guess the meaning of a word, I think back to everything else that I have heard, to see if my guess makes sense.	4.42	4.33	-0.09

For the second category, Planning & Evaluation, the means for pretest and posttest scores suggest that minimal gains were made in this area after playing the game. For this category, the mean score increased from the pretest ($M = 3.44$, $SD = 1.04$) to the posttest ($M = 3.60$, $SD = 1.06$). The increase in mean was .16, showing a small, yet positive, change in students' metacognitive awareness of listening strategies and processes that relate to planning and

evaluation. Table 6 displays the questions in the Planning & Evaluation category as well as pretest and posttest averages for each item included in this category.

Table 6.

Average Scores for MALQ Planning & Evaluation.

Question	Pre	Post	Difference
1. Before I start to listen, I have a plan in my head for how I am going to listen.	3.19	3.36	0.17
10. Before listening, I think of similar texts that I may have listened to.	3.28	3.58	0.30
14. After listening, I think back to how I listened, and about what I might do differently next time.	3.24	3.67	0.43
20. As I listen, I periodically ask myself if I am satisfied with my level of comprehension.	3.51	3.42	-0.09
21. I have a goal in mind as I listen.	3.96	3.95	-0.01

It is noteworthy that three of the questions included in the Planning & Evaluation category were among the top five most-improved scores overall. The fact that the design of the game followed the planning and evaluation process for listening recommended by Vandergrift (1999, 2004, 2007b), may have been a factor in the small gain seen in this area. However, more research is needed to determine whether or not

that is the case. Table 7 shows the five questions that demonstrated the greatest gains from pretest to posttest.

Table 7.

Five Most Improved MALQ Scores.

Questions Ranked by Gain in Scores	Pre	Post	Difference
1. Question #14 - After listening, I think back to how I listened, and about what I might do differently next time.	3.24	3.67	0.43
2. Question #10 - Before listening, I think of similar texts that I may have listened to.	3.28	3.58	0.30
3. *Question #8 - I feel that listening comprehension in Spanish is a challenge for me.	2.67	2.89	0.22
4. *Question #4 - I translate in my head as I listen.	2.64	2.83	0.19
5. Question #1 - Before I start to listen, I have a plan in my head for how I am going to listen.	3.19	3.36	0.17

*These items were reverse coded because a lower score is the desirable outcome. A positive score indicates improvement in these scores.

In addition to the quantitative data that was analyzed to answer this sub-question, qualitative data collected during individual interviews ($N = 27$) was examined as well. The pattern of responses indicates that most of the participants exhibited a general awareness of listening comprehension strategies. In 16 of the 27 (59%) interviews, a general

awareness was observed in participant responses. This can be seen in the following examples.

Participant 18:

I am more aware of what type of strategies I use when listening to Spanish now. Before I had used some of the strategies subconsciously. Now I'm more aware of how I listen when I'm listening.

Participant 1:

At first, it was a little hard to figure out but once I did, I saw the process and I liked it, and I saw how it helped me improve my understanding and my listening skills.

It is important to note here that mentions of specific cognitive strategies and their utility were far more common in the interview data. While the majority of participants appear to understand the general concept of how they approach their own listening comprehension, they do not appear to perceive that aspect as being as useful as cognitive strategies in allowing them to better understand what they hear in the foreign language.

Overall, a combined analysis of both the qualitative and quantitative data from this study does not support a significant relationship between the use of the mobile

learning game and learners' metacognitive awareness. Results from the MALQ survey indicated that there was no statistically significant difference between the pretest and posttest scores on that measure. The increase in the score for Planning & Evaluation category of the MALQ does suggest that metacognitive awareness in this area improved slightly. However, this is the only area in which gains, although minimal, were observed. Additionally, while interview responses did show a general awareness of listening strategies, the qualitative data did not demonstrate any significant improvements in this area.

Sub-question #2

To what extent does playing the game impact learners' perceived listening strategy use?

This question seeks to determine to what degree using the mobile learning game influences the learners' perceived use of listening comprehension strategies. In order to answer this question, both qualitative survey data and quantitative interview data were analyzed. An analysis of survey scores provided the quantitative data. The overall pretest and posttest scores of the listening portion of the Language Strategy Use Survey (LSUS) were calculated as well as sub-scores in four main categories which were created by coding

questions in relation to each of the four main levels of the mobile learning game. (See Chapter 3 for a detailed discussion of coding for these categories). The qualitative data that was used in the overall analysis to determine an answer to this question came from individual interviews conducted after all game levels had been played during class.

The Listening Strategy Use Survey was administered as part of this study to determine whether or not Spanish language students ($N = 83$) who played a mobile learning game experienced an increase in their perceived listening strategy use. The means from pretest and posttest were calculated and a paired samples t test with a .05 level of significance was conducted to evaluate whether a statistically significant difference existed between the mean survey scores before and after playing the mobile learning game. Assumption testing indicated no gross violation of assumptions. The results of the paired sample t test were significant, $t(82) = -4.28$, $p < .001$, indicating that there was a significant increase in listening strategy use scores from the pretest ($M = 3.07$, $SD = 0.37$, $N = 83$) to the posttest ($M = 3.26$, $SD = 0.39$). Based on the survey results, the mean increase from pretest to posttest was 0.19. The researcher rejected the null hypothesis. A calculation of J. Cohen's d for these two sets of scores ($d =$

-0.47) was nearing moderate value range based on J. Cohen's conventions (1992). These findings support a positive relationship between the use of the mobile learning game and learners' perceived strategy use.

In addition to the overall LSUS mean score, means were calculated and compared in four other categories that correspond to the topics of strategy-based instruction included in each of the four main levels of the game. Questions from the LSUS were coded according to the strategies that were presented in the animation in each level. Table 8 identifies the strategies that were the focus of the animations presented in each level.

Table 8.

Listening Strategies Presented in Whiteboard Animations.

Level	Topic
1	Identify and think about general context/theme/topic before listening.
2	Ask questions of speaker or other listener(s) to clarify meaning. Ask speaker to slow down or repeat.
3	Use visual cues and tone/intonation/pause clues to help determine meaning.
4	Try to avoid word-for-word translation. Instead, listen for keywords that indicate main ideas and use those to predict meaning of other words.

The means from pretest and posttest were calculated for categories corresponding to each of four game levels and a paired samples *t* test with a .05 level of significance was conducted to evaluate whether a statistically significant difference existed between the mean survey scores before and after playing the mobile learning game. The results of the paired sample *t* tests were found to be statistically significant for three of the four levels. These results are summarized in Table 9.

Table 9.

Significance Testing for Strategy Use Coded by Game Level.

Level	Mean	Standard Deviation	Significance Level
1	-.22	.65	.002
2	.18	.67	.018
3	.19	.66	.009
4	-.08	.82	.351 (n.s.)
alpha level of .05		n.s. = not significant	

The results for Level 1, $t(82) = -3.14$, $p = .002$, indicate that there was a significant increase in the listening strategy use scores from the pretest ($M = 3.28$, $SD = .53$, $N = 83$) to the posttest ($M = 3.50$, $SD = .45$). Based on the survey results, the mean increase for survey items

corresponding to the instruction in Level 1 from pretest to posttest was .22. This is shown in Table 10.

Table 10.

Average Scores for LSUS - Level 1.

Question	Pre	Post	Difference
10. Try to predict what the other person is going to say based on what has been said so far.	2.64	3.14	0.50
18. Focus on the context of what people are saying.	3.65	3.81	0.16
24. Make educated guesses about the topic based on what has already been said.	3.49	3.53	0.04
25. Draw on my general background knowledge to get the main idea.	3.33	3.52	0.19

The results for Level 2, $t(82) = - 2.42$, $p = .018$, indicate that there was a significant increase in the listening strategy use scores from the pretest ($M = 3.39$, $SD = .65$, $N = 83$) to the posttest ($M = 3.56$, $SD = .57$). Based on the survey results, the mean increase for survey items corresponding to the instruction in Level 2 from pretest to posttest was .17. These results are summarized in Table 11.

Table 11.

Average Scores for LSUS - Level 2.

Question	Pre	Post	Difference
20. Ask speakers to repeat what they said if it wasn't clear to me.	3.58	3.65	0.07
21. Ask speakers to slow down if they are speaking too fast.	3.12	3.40	0.28
22. Ask for clarification if I don't understand it the first time around.	3.48	3.64	0.16

The results for Level 3, $t(82) = -2.67$, $p = .009$, indicate that there was a significant increase in the listening strategy use scores from the pretest ($M = 2.82$, $SD = .64$, $N = 83$) to the posttest ($M = 3.01$, $SD = .70$). Based on the survey results, the mean increase for survey items corresponding to the instruction in Level 3 from pretest to posttest was .19. This is shown in Table 12.

Table 12.

Average Scores for LSUS - Level 3.

Question	Pre	Post	Difference
9. Pay special attention to specific aspects of the language; for example, the way the speaker pronounces certain sounds.	3.22	3.14	-0.08
13. Listen for word and sentence stress to see what native speakers emphasize when they speak.	2.78	2.99	0.21
14. Pay attention to when and how long people tend to pause.	2.11	2.30	0.19
15. Pay attention to the rise and fall of speech by native speakers - the "music" of it.	2.40	2.80	0.40
23. Use the speakers' tone of voice as a clue to the meaning of what they are saying.	3.10	3.39	0.29
26. Watch speakers' gestures and general body language to help me figure out the meaning of what they are saying.	3.33	3.47	0.14

For Level 4, the results of the paired sample *t* test were not significant, $t(82) = -.94$, $p = .351$, indicating that there was not a significant increase in listening strategy use scores from the pretest ($M = 3.43$, $SD = .63$, $N = 83$) to the posttest ($M = 3.51$, $SD = .64$). Based on the survey results,

the mean decrease from pretest to posttest was 0.08. Level 4 results are summarized below in Table 13.

Table 13.

Average Scores for LSUS - Level 4.

Question	Pre	Post	Difference
12. Listen for key words that seem to carry the bulk of the meaning.	3.63	3.65	0.02
17. Try to understand what I hear without translating it word-for-word.	3.24	3.39	0.15

In addition to significance testing for these four categories, the strategies that exhibited the greatest gains from pretest to posttest were calculated by ranking the difference found between pretest and posttest for the average score of each question. Table 14 shows the five questions that demonstrated the greatest gains from pretest to posttest.

Table 14.

Five Most Improved LSUS Scores.

Questions Ranked by Gain in Scores	Pre	Post	Difference
1. Question #10 - Try to predict what the other person is going to say based on what has been said so far.	2.64	3.15	0.50
2. Question #11 - Prepare for talks and performances I will hear in the target language by reading some background materials beforehand.	2.20	2.71	0.51
3. Question #15 - Pay attention to the rise and fall of speech by native speakers - the "music" of it.	2.40	2.80	0.40
4. Question #23 - Use the speakers' tone of voice as a clue to the meaning of what they are saying.	3.10	3.39	0.29
5. Question #5 - Practice sounds in the target language that are very different from sounds in my own language to become comfortable with them.	2.48	2.77	0.29

Three of the most improved scores are for questions included in one of the four game-level categories. The score that improved most from pretest to posttest was the one for Question #10. This question deals with predicting what will be said based on what has already been said. Question #10 corresponds to the content in Level 1 of the game where the strategy instruction focused on identifying ideas and themes

in order to predict meaning. The questions that ranked third and fourth in terms of improved strategy use were Question #15 and Question #23. These two questions correspond to the content in Level 3 of the game where the strategy instruction targeted the use of visual and auditory cues as ways to determine meaning. The question that ranks as number two, Question #11, reflects a strategy that is more appropriate for formal situations such as presentations or classroom discussions. This strategy requires that listeners read about topics that they will hear about in the listening situation. Level A focused on this strategy as one of the main listening strategies appropriate for academic settings. The fifth-ranked question, Question #5, represents the practice of unfamiliar sounds from the target language. This strategy was not part of the instructional content presented in the game developed for this study.

In addition to the quantitative survey data that was examined to answer this sub-question, qualitative data collected during individual interviews was also analyzed. Patterns found in the interview responses indicate that most of the participants felt that their ability to use listening comprehension strategies had improved after playing the game as part of their coursework. In 23 of the 27(85%) interviews,

participants mentioned specific strategies that they had learned to use as part of the game and stated that they consciously applied the strategies more often after playing the game than before playing the game. That is the case in the following examples.

Participant 6:

Well, the way we did... And 'cause we did it several different times in class, and then each time there was a different key strategy that was in the explanatory video. And I feel like with each strategy, you just kind of...Because you have to do things a couple of times, you just automatically start using the strategy. And then, for the next one, you have more strategies that you're using.

Participant 12:

Compared to before last semester, I'm better at listening for key words in dialogue and figuring out new words and slang based on context. I think that's partly because of the strategies presented in the *Estrategia* game and partly because of the extra practice that I got through the videos.

In summary, these findings support the idea that use of the mobile learning game had a positive impact on learners'

perceived strategy use. The increase in mean scores from pretest to posttest were found to be significant for the overall survey score as well as for three of four categories that were coded according to strategy based-instruction content of the four main game levels. Additionally, patterns found in interview data indicate that most participants perceived an improvement in their ability to use listening comprehension strategies in order to better understand when listening in the foreign language.

Sub-question #3

What aspects of the mobile learning game impact listening comprehension strategy development?

This question seeks to identify which specific aspects of the game were perceived by the learners to be the most beneficial to them in terms of learning about and using listening comprehension strategies. The findings for this question are based on the analysis of responses from 47 learners who completed an online exit questionnaire (see Appendix B) as well as 27 interviews that were conducted after all game levels had been played.

In order to determine the answer to sub-question #3, the exit questionnaire included a section which asked participants to evaluate the use of the game based on their own experience.

This section of the questionnaire asked participants to rate thirteen different components of the game according to how useful learners found the various aspects of the game to be in helping develop listening comprehension strategies. This section asked respondents to rate each game component using a 5-point Likert scale ranging from *Not useful at all* to *Extremely useful*, with *Don't know/Did not use* included as a final option. The responses to this question provide the base for the answer to sub-question #3. This base is further supported and explained by interview response patterns.

Respondents ($N = 47$) ranked thirteen game components in response to the following question: *How useful did you find each of the following in helping you to learn about and use listening comprehension strategies?* Table 15 shows the thirteen categories that were rated as well the average score (on a five-point scale) along with rankings based on the averages.

Table 15.

Ranking of Game Components by Usefulness for Strategies.

Rank	Game Component	Average
1	Whiteboard Animations	4.00
2	Phrase/Image Quiz Sub-level	3.91
3	Feedback for Correct Responses	3.81
4	Word/Image Quiz Sub-level	3.79
5	Feedback for Incorrect Responses	3.66
6	Pair Interaction with Classmates	3.47
7	Comprehension Questions	3.40
8	Culture Videos	3.36
9	Watching Video Three Times	3.23
10	Group Interaction with Classmates	3.19
11	Animated Videos	3.15
12	Earning Points for Correct Responses	2.87
13	Level Completion Awards	2.49

These responses show that learners found the whiteboard animations that contained the instructional content for the strategy-based instruction to be the most helpful. The average rating for this component was 4.00 which corresponds to a rating of *Very useful* on the scale used for this

questionnaire item. The components that rank second, third and fourth, Phrase/Image Quiz Sub-level, Feedback for Correct Responses and Word/Image Quiz Sub-level, also display averages that were near the *Very useful* rating. The average scores for the remaining components were all rated between the *Useful* and *Very Useful* range.

In order to analyze the pattern of responses more precisely, the frequencies and percentages for the five top ranked game components were calculated in addition to the averages for each question. Participant responses for Whiteboard Animations, Phrase/Image Quiz Sub-level, Feedback for Correct Responses, Word/Image Quiz Sub-level, and Feedback for Incorrect Responses are reported in Tables 16-20 and discussed below.

Table 16.

Rating of Whiteboard Animations (Ranked #1).

Responses	N	%
Not useful at all	2	4%
Not very useful	1	2%
Useful	10	21%
Very useful	11	23%
Extremely useful	22	47%
Don't know/Did not use	1	2%
Totals	47	100%

In rating how useful the whiteboard animations were in helping learners to develop learning comprehension strategies, the majority of the participants found this component to be *Extremely useful* ($N = 22, 47\%$). The second most frequently selected response for animations was *Very useful* ($N = 11, 23\%$). The third highest ranking for this item was *Useful* ($N = 10, 21\%$). The remaining responses show a very small number of participants rating this item on the low end of the scale. Those response rates are: *Not very useful* ($N = 1, 2\%$), *Not useful at all* ($N = 2, 4\%$), and *Don't know/Did not use* ($N = 1, 2\%$).

Table 17.

Rating of Phrase/Image Quiz Sub-level (Ranked #2).

Responses	N	%
Not useful at all	0	0%
Not very useful	4	9%
Useful	10	21%
Very useful	19	40%
Extremely useful	14	30%
Don't know/Did not use	0	0%
Totals	47	100%

For the Quiz Sub-level in which learners' matched the phrase heard to a corresponding image, participants most

frequently rated this component of the game as *Very useful* ($N = 19, 40\%$). The next largest group found this item to be *Extremely useful* ($N = 14, 30\%$), while the third largest group found it to be *Useful* ($N = 10, 21\%$). Four (9%) participants reported that this component of the game was *Not very useful*. No participants rated this item as *Not useful at all* and none responded *Don't know/Did not use*.

Table 18.

Rating of Feedback for Correct Responses (Ranked #3).

Responses	<i>N</i>	%
Not useful at all	0	0%
Not very useful	2	4%
Useful	20	43%
Very useful	10	21%
Extremely useful	15	32%
Don't know/Did not use	0	0%
Totals	47	100%

In the responses for the item rating feedback for correct responses, we find that the most commonly chosen response was *Useful* ($N = 20, 43\%$), with the next two most frequently selected ratings being *Extremely useful* ($N = 15, 32\%$) and *Very useful* ($N = 10, 21\%$). Again, we find here that few ratings were recorded on the low end of the scale as only two (4%)

participants indicated that this component of the game was not very useful. No participants rated this item as *Not useful at all* and none responded *Don't know/Did not use*.

Table 19.

Rating of Word/Image Quiz Sub-level (Ranked #4).

Responses	N	%
Not useful at all	0	0%
Not very useful	5	11%
Useful	14	30%
Very useful	14	30%
Extremely useful	14	30%
Don't know/Did not use	0	0%
Totals	47	100%

As shown in Table 19, the three highest rating levels for the Word/Image Quiz Sub-level each contained an equal number of responses: *Extremely useful* ($N = 14, 30\%$), *Very Useful* ($N = 14, 30\%$), and *Useful* ($N = 14, 30\%$). Five (11%) participants indicated that this game component was *Not very useful*. Again for this item, no participants selected *Not useful at all* and none responded *Don't know/Did not use*.

Table 20.

Rating of Feedback for Incorrect Responses (Ranked #5).

Responses	N	%
Not useful at all	0	0%
Not very useful	4	9%
Useful	18	38%
Very useful	10	21%
Extremely useful	14	30%
Don't know/Did not use	1	2%
Totals	47	100%

In rating how useful the feedback for incorrect responses was in helping learners to develop learning comprehension strategies, the majority of the participants found this component to be *Useful* ($N = 18, 38\%$). The second most frequently selected response for this item was *Extremely useful* ($N = 14, 30\%$). The third highest ranking for this item was *Very useful* ($N = 10, 21\%$). The remaining responses show a small number of participants rating this item on the low end of the scale with four (9%) participants selecting *Not very useful*.

In order to achieve a deeper understanding of which aspects of the mobile learning game were perceived by the learners as being most beneficial, 27 exit interviews were

transcribed, coded and analyzed as well. Patterns in the interview data reinforced and expanded upon the results found through an analysis of the game component rankings from the online exit questionnaire. Interview participants felt that both the whiteboard animations and the word/phrase quizzes were important components of the game. However, while ratings from the online questionnaire showed that feedback was also an important element, patterns in interview data demonstrated that the group of interview participants found pair interaction with classmates and watching the videos multiple times to be more valuable than feedback in terms of listening comprehension strategy development.

When asked to identify which parts of the game most influenced participants' development of listening strategies, the whiteboard animations were mentioned most often by 21 of the 27 (78%) participants. This is demonstrated in the following interview excerpt.

Participant 22:

I liked that the strategies were explained in the animated video section. It was a good reminder to have directly before you tried to listen to the video. That way, when I started the video, I had like listening tools to better understand the spoken Spanish. I liked how they

were different each time and how the tips tried to relate to the video we were watching. Like...for example, the listening to tone of voice clip wasn't included in the cultural videos because we weren't listening to a conversation, so it wasn't as important for that video.

While participants expressed that the animations were most helpful in teaching them or reminding them about specific strategies that could be employed, an analysis of the interview data also showed that participants felt that practicing specific words and phrases related to the videos content before watching them was very important as well. Patterns that emerged in interview responses indicate that the participants felt practicing and listening to related vocabulary made the video more comprehensible and therefore allowed them to more easily practice applying listening comprehension strategies as they viewed the videos. This is shown in the example below.

Participant 3:

I liked that we did the vocabulary before the video. That also helped with the predicting aspect of it. But the vocabulary before the video helped understanding in the video when new vocabulary came up.

While the rankings from the exit questionnaire indicated that feedback for correct and incorrect responses ranked high in terms of their impact on strategy development, patterns in responses from participant interviews indicated that being able to watch the video multiple times after interaction with classmates was more helpful to them. Interview participants also indicated that discussing the videos with a classmate after the first viewing helped them to pinpoint information that they missed or did not understand, as seen here.

Participant 19:

And so I didn't do good on the first one, but after we had to watch a video three times, which was very helpful. The second time I didn't really get it that much, but working with a partner was good because she was like, "Well actually they're saying this, and if you listen to this word you can catch on and see what they're talking about." And then I just paid attention to that. And even though it was a cartoon video, I paid attention to body language and who they were talking to, and it was really helpful with that.

Patterns in the interview data suggested that this pair interaction with classmates led learners to feel more focused when trying to apply the strategies as they watched the video

a second time. This is expressed in the following interview excerpt.

Participant 5:

One of the things is that oftentimes in a language class we're expected to talk to each other and that does help build more confidence with it, but a lot of times watching a video and then figuring it out. I'm watching it once, and I'm watching it several more times after that, and having talked with peers in between really makes a difference because now I'm like, "Well, there was something about, I don't know, the old man. What was... What were they saying?" They were like, "Oh, I think it was this, I think it was that". So I'm like, "Oh okay," and the next time I watch it then I can really listen for whatever they were talking about.

Summary of the Findings

The results reported in this chapter aim at evaluating the impact of a mobile learning game on the development of listening comprehension strategies. Based on findings presented in this chapter, it can be concluded that the use of mobile learning games can have a positive impact on the development of listening comprehension strategies. However, playing the game was not found to have a statistically

significant impact on metacognitive awareness. Furthermore, the interview data did not demonstrate significant gains in this area either. Despite the fact that this study did not lead to a marked improvement in developing strategy awareness, increased strategy use among this group of learners was observed. It was found in this study that learners attributed this increased strategy use to the explicit strategy-based instruction and practice contained within the game. Further discussion of the findings from this chapter are presented in Chapter 5.

Chapter 5

Discussion and Conclusions

This chapter discusses the findings presented in Chapter 4 and includes a discussion of the implications of this study's findings as well as conclusions based on those findings. It will first examine the impact of using the game on learners' awareness of listening comprehension strategies based on the results of the Metacognitive Awareness Listening Questionnaire (MALQ). The chapter will then discuss the effect of playing the game on learners' perceived use of listening comprehension strategies based on the outcomes of the Language Strategy Use Survey (LSUS). It will next examine patterns found in interview data and ratings from the exit questionnaire in order to discuss which aspects of the game contributed to listening comprehension development. The discussion will conclude with a presentation of limitations of the study, implications for design, implications for pedagogy, future research and conclusions.

Main Research Question

In what ways does use of a mobile learning game impact learners' development of listening comprehension strategies?

The main research question in this study examines how playing a mobile learning game influences learners' development of listening comprehension strategies. The findings from Chapter 4 suggest that mobile learning games do hold promise as a pedagogical tool for the development of listening comprehension strategies. The following sub-sections will discuss to what extent playing the game impacted learners' metacognitive awareness and perceived strategy use as well as identify specific components of the mobile game that influenced the development of listening comprehension strategies.

Sub-question #1

To what extent does playing the game impact learners' metacognitive awareness of the strategies and processes involved in successful listening?

This first sub-question addresses the effects of using the mobile learning game on the learners' metacognitive awareness of listening comprehension strategies and processes. In order to answer this question, this section discusses the results of the Metacognitive Awareness of Listening Questionnaire that was used to measure change in awareness as well as the interview data related to metacognitive awareness.

In order to gauge the impact of playing the game on awareness, the overall pretest and posttest MALQ scores were calculated as well as sub-scores in two main categories, Problem-solving and Planning & Evaluation. Statistical analysis demonstrated that there was no statistically significant difference between the overall means from the pretest to the posttest. Therefore, it cannot be stated that playing the game had a positive impact on learners' metacognitive awareness of listening comprehension strategies and processes. A comparison of sub-scores for Problem-solving remained fairly constant, with a slight decrease in scores from pre to post, suggesting very little change in students' metacognitive awareness of language comprehension strategies related specifically to problem-solving. A comparison of pre to post scores in the area of Planning & Evaluation demonstrated that minimal gains were made in this sub-category of the survey, showing a small, yet positive change, in students' awareness of language comprehension strategies that related to planning and evaluation. However, overall, the results of data analysis for the MALQ do not support a significant relationship between the use of the mobile learning game and learners' metacognitive awareness of the strategies and processes involved in successful listening.

Patterns found in the interview data indicate that most of the participants exhibited a general awareness of listening strategies. However, based on the interview data, it is not possible to say that there was any specific increase or improvement in this area.

There are several different factors which may account for the lack of improvement seen here. The first possibility is that the use of the mobile learning game that was the intervention for this study was not an effective pedagogical tool for improving learning outcomes in the area of strategy awareness. The design of the game may have made it possible for learners' to complete in-game tasks without being consciously aware of the metacognitive processes involved in completing the tasks. While much of the game design followed Vandergrift's Metacognitive Pedagogical Sequence (1999, 2004, 2007b), which guides learners through a sequence of planning, monitoring and evaluating their listening comprehension, the game did not include explicit metacognitive instruction. However, the fact that the game was specifically structured to guide students through the processes of planning, monitoring and evaluation may have been a factor in the small gain observed in the Planning & Evaluation sub-category of the MALQ survey. Still, more research is needed to determine whether

or not that is the case. In order to effect greater change in terms of metacognitive awareness, future iterations of the game should include explicit metacognitive instruction in such a way that learners' are made aware of the processes they are employing to complete a specific learning task.

A second possibility is that the length of time spent using the game was not sufficient to have a measurable impact on metacognitive awareness. The game was played during only six class periods over a time period that spanned nine weeks of classroom instruction. Increased exposure to the intervention in this study may lead to greater improvement in terms of strategy awareness.

Further possible explanations for the lack of difference between pretest and posttest scores on the MALQ have to do with the way in which the instrument was employed in the study. The MALQ and the LSUS surveys were both administered during the same class period. Students first completed the 26-item LSUS and then immediately afterwards they completed the 21-item MALQ. Administering the surveys in this manner may have increased the effects of survey fatigue on survey results. The effect of survey fatigue was likely greater for the MALQ than for the LSUS, as the MALQ was completed after the LSUS.

Finally, relying on the MALQ as the only instrument used to collect data about metacognitive awareness may have led to a limited view of development in awareness of the strategies and processes involved in successful L2 listening. Using additional methods of data collection, such as verbal report and listening journals, to investigate change in this area could lead to a broader, more detailed understanding.

In summary, results from pretest and posttest scores on the MALQ showed very little overall change in development of metacognitive awareness. The only improvement was seen in the category of Planning & Evaluation. However, the increase in those scores was minimal. Furthermore, while interview data showed some patterns of general awareness, it did not point to a marked increase in metacognitive awareness. A few factors that may have contributed to this lack of change are: limited impact of the game on learning outcomes in this area, the relatively short amount of time learners played the game, survey fatigue, and the use of only one instrument to measure change in awareness. Further research is needed in this area in order to gain a broader understanding of how mobile learning games might best be utilized to achieve improved learning outcomes in metacognitive awareness of the strategies and processes involved in successful listening.

Sub-question #2

To what extent does playing the game impact learners' perceived listening strategy use?

This second sub-question addresses the effects of using the mobile learning game on the learners' perceived use of listening comprehension strategies. In order to answer this question, this section discusses the results of the Language Strategy Use Survey (LSUS) that was used to measure change in use as well as patterns of change in use found in interview data.

In order to measure the impact of playing the game on perceived strategy use, the overall pretest and posttest LSUS scores were calculated. Scores for four sub-categories were also calculated and analyzed. These four sub-categories resulted from coding the LSUS questions that corresponded to the specific content covered in the strategy-based instruction contained in levels 1-4 of the game (See Chapter 3 for a detailed discussion of coding for these categories). The increase in mean scores from pretest to posttest were found to be significant for the overall survey score as well as for three of four sub-categories. These results support the idea that use of the mobile learning game had a positive impact on learners' perceived strategy use.

These results seem to indicate that the explicit instruction and practice of cognitive listening comprehension strategies included as a main component of the game led to increased use of those strategies by the participants in this study. The impact of playing the game on perceived listening strategy use is further supported by the fact that the improvement in scores for sub-categories corresponding to three of the four game levels was also found to be statistically significant.

These results were also supported by patterns found in data obtained through individual interviews with twenty-seven of the participants. While a small number of students reported that they were already somewhat familiar with listening comprehension strategies, the majority of students reported that they had never received any instruction in listening strategies previously. A synthesis of interview data gathered from these participants showed that playing the game as part of their coursework was a positive and beneficial experience. The majority of participants reported that their knowledge of and use of listening strategies was improved after playing the game. Participants often mentioned that learning about or being reminded of specific strategies in the whiteboard animation left them feeling better prepared to

understand what they heard in the videos. Patterns in the interview data revealed that learners' perceived that the strategy-based instruction in the whiteboard animations paired with the opportunity to practice those strategies through multiple viewings of the same video was most helpful to them in terms of improving their use of language comprehension strategies.

This interview data, paired with the statistically significant results of the LSUS survey provides persuasive arguments for the use of mobile learning games as pedagogical tools to improve use of listening comprehension strategies. These findings are encouraging in that they suggest that such games have potential for successful integration in the L2 classroom to help address the current gap that exists in listening comprehension instruction. Ways in which this might be achieved are further discussed in the section addressing the pedagogical implications of this study.

Sub-question #3

What aspects of the mobile learning game impact listening comprehension strategy development?

This third sub-question addresses the specific aspects of the game that were perceived by the learners to be the most beneficial to them in terms of learning about and using

listening comprehension strategies. In order to answer this question, this section discusses a synthesis of findings from the online exit questionnaire and the individual interviews conducted as part of this study.

In order to gain a better understanding of which specific game elements had the most impact on strategy development, participants were asked in an online exit questionnaire to rank thirteen specific components of the game. Patterns in interview data were also analyzed to determine which game elements were perceived to be of the greatest benefit.

Data from both the questionnaire and interviews indicated that the aspect of the game that had the greatest impact on strategy development was the segment containing whiteboard animations. This element of the game contained the strategy-based instruction on specific listening strategies and prompted learners to practice their strategies as they watched the videos as part of the game. As was stated previously in the discussion of sub-question #2, participants felt that the instruction on specific strategies included in the whiteboard animations prepared them to better understand what they heard in the videos.

Another common thread found in the interview data was that this group of learners felt that the auditory vocabulary

quizzing level was very important in helping to prepare them for successful listening. In this level, learners heard a word or phrase and were asked to select one of four images that best corresponded to that word or phrase. Interview participants indicated that being able to hear and practice relevant vocabulary in this way left them better prepared by giving them some clues about the context and content of the videos. Learners also felt that the auditory vocabulary quizzing helped them to pick out specific words and phrases as they listened. Furthermore, participants indicated that recognizing those words and phrases in the videos boosted their confidence about what they understood and allowed them to focus more of their attention on practicing specific listening strategies.

In addition to the whiteboard animations and the auditory vocabulary quizzing, participants indicated that viewing the videos multiple times while being able to consult with a partner between viewings was an important aspect of the gameplay experience that helped them with strategy development. Participants felt comparing their understanding of the videos' content with a classmate after viewing the video for the first time helped them to evaluate what they did and did not understand during the first viewing. Learners'

indicated that doing so allowed them to focus their attention during the second viewing in order to better understand what they had missed when they first watched the video.

Importance of Engagement and Reduced Anxiety

While the research questions in this study were not aimed specifically at investigating students' levels of engagement or anxiety while playing the game, both ideas are briefly explored here as several students noted that these elements were important to this particular learning experience. The following excerpt from one of the student interviews is indicative of the ideas that many students expressed about how the game improved learning by providing a "fun", "relaxed" and "stress-free" environment:

Participant 6:

I think 'cause it feels more like an actual game, it's more interesting to the people doing it. 'Cause if it's just in a classroom, it's just like, "Oh, it's just another thing. It's not actually important and I don't care about it." But when it's like a game with something that you're invested in, then you're more likely to pay attention to it... A lot of times people get kind of frustrated by having to learn things, and so, when it's a stress-free type thing, your brain records more when it's

not stressed out, so it's... And also when you're having fun... So when it's more game-like, you're more likely to retain it. And I think also when it's more game-like, you're more likely to pay attention to what's happening 'cause you wanna know what's going on and stuff.

This student's response, and others like it, point to the importance of Prensky's (2001) idea that effective digital-game based learning must focus equally on engagement and learning. While this participant found the game to be more engaging than "just another thing" in the classroom, she also points to the motivational value of "having fun" and how the game can enhance learning because students are "more likely to pay attention to it" and "retain it".

The idea that the fun and low-stress nature of the game contributed to better learning outcomes was a common thread woven throughout many of the participant interviews. One student felt that the devices themselves helped to provide an environment that fostered learning:

Participant 11:

Honestly, I feel as though I learned more in a relaxed and fun environment, and I think that's what the mobile devices helped with.

While another student noted that some of the game design elements, like the use of whiteboard animations for the strategy instruction, contributed to the "more fun and relaxed" feel of the game.

Participant 5:

And it was kind of neat watching this..this little illustration and this person being drawn and it was just neat because then, not only do I hear like "Oh you know...do this or do that." But then I see this guy speaking Spanish and the students are watching like "Oh...so, that's it!" So you know?..I don't know...I think just throughout the visual it just made it more fun and relaxed.

Of the 27 participants, 19 mentioned that their experience with the mobile game positively impacted their learning because of the fun and/or low-stress nature of the game. Therefore, while this study was not intended to examine these aspects of the learning experience, future research related to the current study should take these factors into account.

Limitations of the Study

While every attempt was made to design and conduct this study in the best, most appropriate manner possible, there are

certain limitations to the study that should be addressed. First, the use of a convenience sample of college students from only one university decreased the overall generalizability of the findings. However, the fact that 83 of the total 111 students who originally enrolled in the course participated in the studies leads the researcher to feel confident that the findings are representative of the group of learners that were targeted for the intervention in this study. Additionally, even though the results of this study are not generalizable to larger populations, analyzing the findings within the context of this initial exploratory study does provide valuable information to help guide further research in this area.

Another limitation of the study's sampling lies in use of a smaller group of volunteers for the exit questionnaire ($N = 47$) and the individual interview ($N = 27$). While these groups were demographically similar to the larger group of students who participated in the game and surveys ($N = 83$), it is not possible to state that they are entirely representative of the overall group.

A further limitation of the study's design is that it was not possible to include a control group in this study. The addition of a control group would allow for a comparison of

development in listening comprehension strategies with a similar group of learners' who did not play the game that was the intervention in this study.

Finally, the last limitation to be addressed here is the use of self-report surveys as the main source of data used to measure development of listening comprehension strategies. As with any self-report data, there is always a risk that the participant may lack the introspective ability needed to accurately answer questions. Another risk involved with self-report data is that respondents may understand or interpret questions differently than the creator of the survey intended. Despite these risks, the surveys chosen as instruments for this study were tested for validity and reliability and have been shown to be viable research instruments (See Chapter 3 for further details). Future studies in this area might consider using additional data collection strategies such as verbal reports, listening diaries, portfolios, and user tracking of gameplay through use of screen capture software (Cohen, A.D., 2014; Vandergrift & Goh, 2012). Collecting data from additional sources would lead to improved triangulation of data and has the potential to provide a more detailed description of learners' development of listening comprehension strategies.

In spite of the limitations outlined here, the results of this exploratory study have important implications for the future design and use of mobile learning games for the development of listening comprehension strategies. While the results of this study are not broadly generalizable, they provide a base of empirical data that can be used by future researchers conducting similar studies.

Implications for Design

As is the case with any design, there is always room for improvement. Based on the findings of the current study, this section will outline suggestions for ways in which future iterations of the game could be improved in terms of design. These suggested modifications are intended to address either learning outcomes related to the development of listening comprehension or the overall gameplay experience of the learner.

While this game was originally designed to improve learning outcomes in the areas of metacognitive awareness and strategy use, the current study did not produce positive results in developing learners' metacognitive awareness. This may be due to a lack of focus on this area within the game. In an attempt to make students more conscious of their own

metacognitive processes while playing the game, the following design modifications are suggested:

1. Include explicit instruction about metacognitive strategies/processes as part of the instructional content contained in the whiteboard animations.
2. Include reminders about metacognitive strategies/processes between viewings of the video presented by non-player characters in the game in the form of pop-up questions and hints.
3. Include self-reflection questions and feedback that prompt learners to think about and reflect upon the ways in which they approach listening tasks within the game.

Additionally, observation of participants as they played the game as well as insights gained through the exit questionnaire and interviews point to several modifications that would better the game's design to improve the overall gameplay experience. Although more research is needed to better understand how changes to the game design might impact learning outcomes, the following modifications are suggested:

Whiteboard Animations

- Make the animations (currently 2.5 - 3.5 minutes long) shorter or split them into smaller segments.

- Make the strategy instruction portion more interactive by adding non-player characters who talk directly to the learner and pose questions.

Videos

- Include a greater variety of topics.
- Limit video repetition to two instead of three viewings or include a third viewing that contains a final portion of the video segment but presents new information not heard in the first portion of the video.
- As a scaffolding option, allow students to view the video with subtitles for comprehension verification after the first two viewings

Game Design

- Add more advanced levels that allow for interaction with a speaker (two-way, interactive listening) so that the learner participates in a conversation rather than just listening to a conversation (one-way listening).
- Add a feature that gives the learner the ability to track overall progress from one level to the next.
- Add a "library" feature that allows learners to view any whiteboard animations or videos from completed

game levels. For example, once students have unlocked a video explanation of a given strategy, it is earned as a game asset and they can go back and refer to it later if they choose to do so.

The results of this study suggest that mobile learning games do hold promise as a pedagogical tool for the development of listening comprehension strategies. However, future iterations of the game should consider how learners' experience with the game could be improved overall as well as how to achieve better learning outcomes in terms of strategy development.

Implications for Pedagogy

As the game in this study is intended to be used as a pedagogical tool, how it could be used for teaching and learning are important considerations. This section will address factors that should be considered when implementing a game like *Estrategia* in L2 instructional settings. These factors include: curricular integration, assessment and instructor support.

There are various ways in which the game could be used by teachers and students. Games, such as the one included in this study, could potentially be used to provide students with a safe environment in which to practice not only listening

comprehension, but other language skills as well. Instructors may wish to utilize mobile learning games as part of classroom instructional activities or they may choose to assign completion of game levels as homework to be done outside of class. Regardless of where the game is played, it is important that the content of the game be related to the curriculum in such a way that students do not feel that it is an "add-on" class activity. Both the game and its learning content should be mapped to match up with the topics and vocabulary that are covered in class so that they reinforce what is being learned as part of the curriculum. It was seen in this study that integrating the game and game content with the curriculum content in such a way helps learners to apply the information from the game across other areas of their coursework rather than having the benefits be limited only to listening comprehension.

Another factor to consider is that of assessment. Mobile learning games have potential for the purposes of both practice and assessment. For the game used in this study, formative assessment items were embedded within the game itself in order to allow learners to gauge their own progress. Gameplay data could also be used by instructors to show patterns of student progress as well as identify areas where

learning outcomes need to be improved. The way in which such assessments are calculated in terms of grades is also important to consider. In this study, students were assessed based on participation in the game rather than having grades tied to points earned within the game. Assessing gameplay in this manner has the advantage of allowing students to feel free to experiment with strategy use without the added pressure of feeling as though they are being tested.

Finally, the role of the instructor in the successful implementation of games in the L2 classroom is an important consideration. Some instructors may require training in order to successfully incorporate games into their classrooms. In particular, instructors will need to gain an understanding of how to best introduce and support the use of mobile learning games in a foreign language classroom. They will also need to learn how to incorporate a debriefing phase after the use of the game which allows students to reflect on their own experience and what they have learned. The way in which games are presented and supported by the instructor is key to successfully incorporating them as part of a varied and effective program of instruction.

Future Research

The results of this exploratory study have several implications for future research in this field. This section will discuss recommendations for research in the following areas: learning game design, impact of learning games on listening ability, and assessment of learning games in L2 classes.

While this study focused more on the impact of the game on strategy development than on the game itself, future research into which specific game elements have the most impact on learning outcomes are needed. Studies in which games that vary in terms of design and features are played by different groups of learners would help to pinpoint which aspects of the game are most beneficial in aiding students use and awareness of listening comprehension strategies. Any future research in this area should continue to focus on the specific game elements and design considerations that have the most impact on the desired learning outcomes.

Additionally, while this study focused solely on how the game affected the development of listening comprehension strategies, future studies should also take a look at how such games may influence listening comprehension abilities as well. It is important to assess whether or not use of a learning

game like the one used in this study leads to improved outcomes in terms of how well students are able to comprehend what they hear in a foreign language.

Another area that has not yet been thoroughly explored in this field of study is that of assessment. Given the type of experiential, exploratory learning common in digital game-based learning, effective assessment does indeed present a challenge. However, if digital learning games are to become effective tools within an educational system that places great value on assessment as a means of evaluating learning outcomes, further research is needed in this area.

While this exploratory study begins to lay the groundwork for a better understanding of how games can assist students in L2 listening, there is still much work to be done in this area. Further studies, like those described above, are needed in order to determine how mobile learning games can best be utilized as pedagogical tools for improved learning outcomes.

Summary

The purpose of this study was to investigate the use of a mobile learning game as a pedagogical tool for the development of listening comprehension strategies. A large part of the game design was influenced by Vandergrift's (1999, 2004, 2007b) suggested sequence for guiding learners' through the

metacognitive listening process. The game designed for this study was incorporated into the coursework of six sections of Spanish 202 (Intermediate Spanish II) over the course of one semester. It was played in class using iPod Touches over six different class periods. Data from gameplay ($N = 83$), pretest and posttest surveys ($N = 83$), exit questionnaires ($N = 47$), and individual interviews ($N = 27$) was collected and analyzed.

Gameplay data, collected and stored by the learning management system that hosted the game, showed that students played the game. This is an important finding in itself, as tracking participation in mobile learning environments can be challenging. All eighty-three participants played at least half of the game levels, with forty-one (49%) playing six of six game levels and thirty-two (39%) playing five of six levels.

Before the first game level was played in class, learners completed two surveys. The surveys were completed in class and both surveys were administered during the same class period. The Metacognitive Awareness Listening Questionnaire (MALQ) was administered in order to measure changes in learners' metacognitive awareness of the strategies and processes involved in successful L2 listening. The listening portion of the Language Strategy Use Survey (LSUS) was also

administered in order to measure changes in learners' perceived use of listening comprehension strategies.

Results from the MALQ showed no statistically significant differences between pretest and posttest scores on this instrument. This result could partly stem from a lack of explicit instruction about the listening process. While the design of the game guided students through specific stages of planning, monitoring and evaluating their listening comprehension, this was never explained explicitly to the learners. While interview data showed that the majority of the learners who participated in interviews exhibited general awareness of listening comprehension strategies, there was little evidence of a marked increase in awareness after playing the game.

A comparison of the pretest and posttest scores from the LSUS demonstrated that there was a statistically significant increase in learners' perceived use of listening comprehension strategies after playing the game. The change in scores from the pretest to posttest was found to show statistical significance on both the overall score for the survey as well as for three of four sub-sections of the survey that were coded to match instructional content from levels one, two, three, and four of the game. Comments from interview

participants support these findings as well. Most of these learners reported that they had little to no previous instruction related to listening comprehension strategy. They further reported that being taught about specific strategies and practicing them through the game helped them to better understand how to listen as well as improved their listening comprehension ability overall.

In order to determine which parts of the game influenced the development of listening comprehension strategies in this group of learners, the results of an online exit questionnaire ($N = 47$), and semi-structured individual interviews ($N = 27$) were analyzed. A synthesis of this data showed that participants' felt that the whiteboard animations that contained explicit instruction regarding different listening comprehension strategies were the most beneficial component of the game. Students' also reported that the auditory vocabulary quiz levels presented before watching the videos were very useful in terms of preparing them to understand the context and content of information presented in the videos. Patterns in interview data further indicated that students felt that being able to compare their understanding of the video with a partner after the first viewing helped them to focus their

attention on the parts that were not understood during the second viewing.

Overall, the results from this mixed-methods study demonstrate that the use of mobile learning games can have a positive impact on the development of listening comprehension strategies. Quantitative data, in the form of survey and questionnaire results, suggest that playing the game influenced development in the area of listening comprehension strategies use. Qualitative data from individual interviews support this finding as well. Both the quantitative and qualitative data point to the whiteboard animations, auditory vocabulary quizzing, and pair interaction with multiple exposure to the listening text as the components of the game that most influenced listening comprehension development in this study.

Conclusions

This exploratory study was undertaken to investigate the use of a mobile learning game aimed at developing the listening comprehension strategies of L2 students. In order to achieve this goal, both quantitative and qualitative measures of strategy development were examined. Based on the data compiled from this group of participants, the implications of this study are summarized here.

An analysis of the findings from this study demonstrate that the use of mobile learning games can have a positive impact on the development of listening comprehension strategies. Playing the game was found to have no statistically significant impact on metacognitive awareness. Interview data did not show improvement in this area either. Modifications in game design to make instruction in this area more explicit are recommended for future iterations of the game in order to improve learning outcomes in this area. Even though this study did not lead to significant improvement in developing awareness, important gains in perceived strategy use among this group of learners was noted. It was found in this study that learners attributed these gains to the explicit strategy-based instruction and practice contained within the game.

Although games are not new to education, emerging technologies have changed the way in which they can be used for teaching and learning. In both the design and implementation of digital game-based learning, it is imperative that teachers and instructional designers consider principles of good game design as well as the theories that inform good instructional design. Games that teach must be fun, but they should also achieve the goal of attaining

identifiable learning outcomes. This exploratory study sought to do both as well as to spark further, much-needed research in this area.

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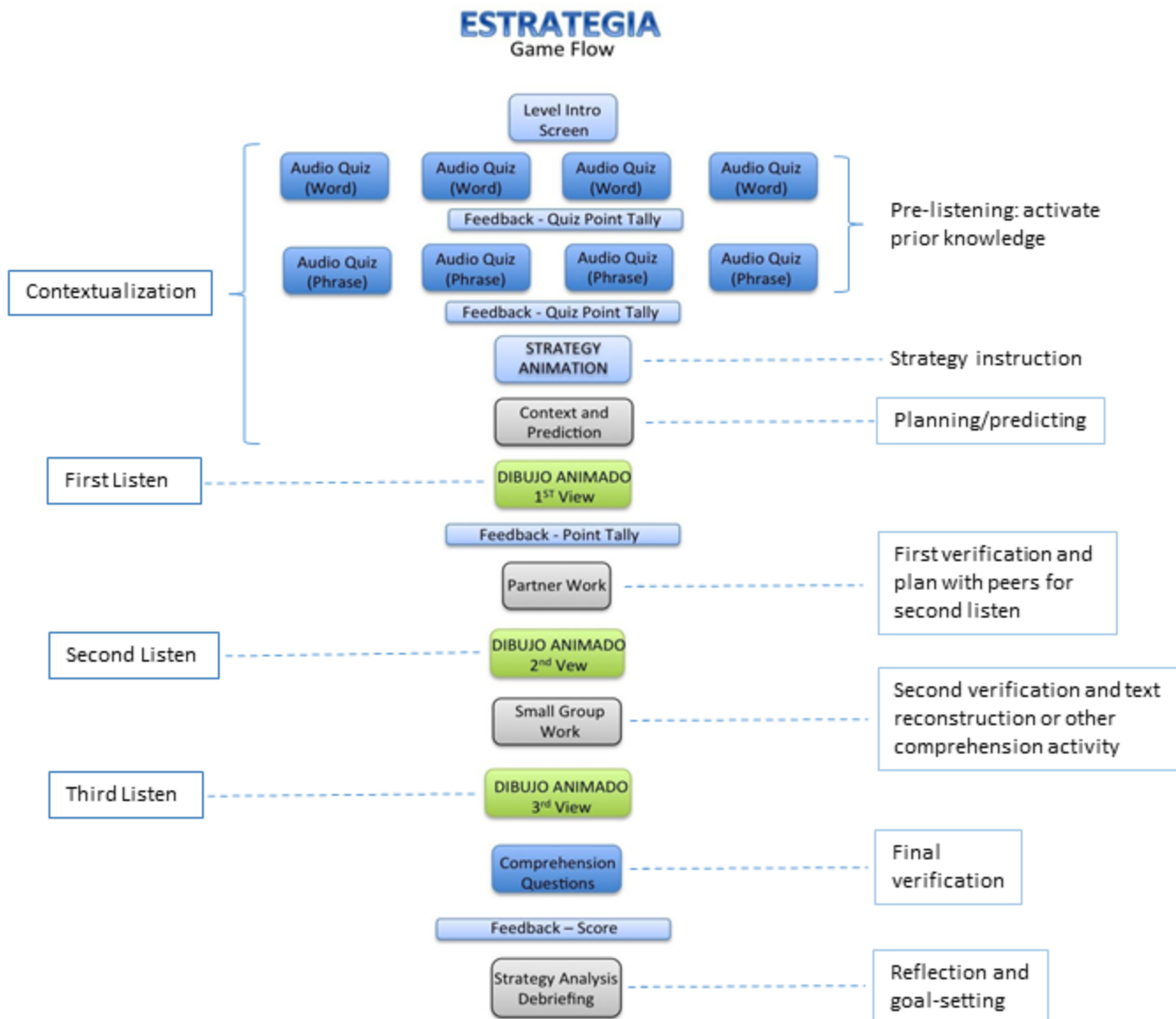
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Appendices

Appendix A	<i>Estrategia</i> Game Flow	142
Appendix B	Exit Informational Questionnaire	143
Appendix C	Metacognitive Awareness Listening Questionnaire	148
Appendix D	Language Strategy Use Survey	149
Appendix E	Sample Interview Questions	151

Appendix A

Estrategia Game Flow



Appendix B

Exit Informational Questionnaire

Exit Informational Questionnaire

Thank you very much for your participation! Please complete the following questionnaire regarding your experience with Estrategia. Upon completion of the study, all identifying information will be deleted. Remember, you may choose not to answer at any point. Thank you!

1.

Name:

Please respond to the following based on your experiences with Estrategia.

2.

My favorite part of Estrategia was...

3.

My least favorite part of Estrategia was...

4.

Other features and/or content I would like to see added to or changed in Estrategia are...

5.

What is your opinion of the strategy videos presented in Estrategia (whiteboard animations)?

6.

How do you feel about pair/group activities during Spanish class (not using Estrategia)?

7.

How did you feel about pair/group activities related to Estrategia?

8. Which videos did you prefer?

- Animated conversations
 Culture video blogs

What did you prefer about them?

9.

What other kinds of video would you recommend be included?

10. How important is it that the videos be related to the course curriculum (include vocabulary and themes from textbook)?

- Not important Somewhat important Important Very important
-

11. I would recommend that the Estrategia project continue as a part of SPAN 202.

- Absolutely not Probably not Maybe Yes Absolutely Yes
-

12. I feel that our work in class was....

- Unacceptable Not Very Good Average Very Good Excellent
-

My reading ability in Spanish in informal, social situations (i.e., your ability to understand the Spanish written by native-speaking friends and members of your peer group)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My reading ability in Spanish in formal, social situations (i.e., your ability to understand the Spanish written in formal social contexts such as wedding invitations, funeral programs, or graduation announcements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My reading ability in Spanish in academic situations (i.e., your ability to understand the Spanish written in textbooks and other educational reading materials)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My reading ability in Spanish in entertainment situations (i.e., your ability to understand the Spanish written in advertisements, magazines, and websites)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My writing ability in Spanish in informal, social situations (i.e., your ability to write Spanish to friends and members of your peer group)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My writing ability in Spanish in formal, social situations (i.e., your ability to write Spanish to superiors or people you do not know very well)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My writing ability in Spanish in academic situations (i.e., your ability to write academic papers or other educational materials in Spanish)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Save **Finish**

Appendix C

Metacognitive Awareness Listening Questionnaire

Metacognitive Awareness Listening Questionnaire

The statements below describe some strategies for listening comprehension and how you feel about listening in the language you are learning. Do you agree with them? This is not a test, so there are no “right” or “wrong” answers. By responding to these statements, you can help yourself and your teacher understand your progress in learning to listen. Please indicate your opinion after each statement. Circle the number which best shows your level of agreement with the statement. For example:

	Strongly disagree	Disagree	Slightly disagree	Partly agree	Agree	Strongly agree
I like learning another language	1	2	3	4	5	6
1. Before I start to listen, I have a plan in my head for how I am going to listen.	1	2	3	4	5	6
2. I focus harder on the text when I have trouble understanding.	1	2	3	4	5	6
3. I find that listening is more difficult than reading, speaking, or writing in Spanish.	1	2	3	4	5	6
4. I translate in my head as I listen.	1	2	3	4	5	6
5. I use the words I understand to guess the meaning of the words I don't understand.	1	2	3	4	5	6
6. When my mind wanders, I recover my concentration right away.	1	2	3	4	5	6
7. As I listen, I compare what I understand with what I know about the topic.	1	2	3	4	5	6
8. I feel that listening comprehension in Spanish is a challenge for me.	1	2	3	4	5	6
9. I use my experience and knowledge to help me understand.	1	2	3	4	5	6
10. Before listening, I think of similar texts that I may have listened to.	1	2	3	4	5	6
11. I translate key words as I listen.	1	2	3	4	5	6
12. I try to get back on track when I lose concentration.	1	2	3	4	5	6
13. As I listen, I quickly adjust my interpretation if I realize that it is not correct.	1	2	3	4	5	6
14. After listening, I think back to how I listened, and about what I might do differently next time.	1	2	3	4	5	6
15. I don't feel nervous when I listen to Spanish.	1	2	3	4	5	6
16. When I have difficulty understanding what I hear, I give up and stop listening.	1	2	3	4	5	6
17. I use the general idea of the text to help me guess the meaning of the words that I don't understand.	1	2	3	4	5	6
18. I translate word by word, as I listen.	1	2	3	4	5	6
19. When I guess the meaning of a word, I think back to everything else that I have heard, to see if my guess makes sense.	1	2	3	4	5	6
20. As I listen, I periodically ask myself if I am satisfied with my level of comprehension.	1	2	3	4	5	6
21. I have a goal in mind as I listen.	1	2	3	4	5	6

Appendix D

Language Strategy Use Survey

Language Strategy Use Survey

Andrew D. Cohen, Rebecca L. Oxford and Julie C. Chi (2002)

The purpose of this inventory is to find out more about yourself as a language learner and to help you discover strategies to help you master a new language. Check the box that describes your use of each strategy. Please note that "target" language refers to the new language you are learning.

	This strategy doesn't fit for me	I have tried this strategy and would use it again	I use this strategy and like it	I've never used this strategy but am interested in it
Listening Strategy Use				
Strategies to increase my exposure to the target language:				
1. Attend out-of-class events where the new language is spoken.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Listen to talk shows on the radio, watch TV shows, or see movies in the target language.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Listen to the language in a restaurant or store where the staff speak the target language.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Listen in on people who are having conversations in the target language to try to catch the gist of what they are saying.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies to become more familiar with the sounds in the target language:				
5. Practice sounds in the target language that are very different from sounds in my own language to become comfortable with them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Look for associations between the sound of a word or phrase in the new language with the sound of a familiar word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Imitate the way native speakers talk.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Ask a native speaker about unfamiliar sounds that I hear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies to prepare to listen to conversation in the target language:				
9. Pay special attention to specific aspects of the language; for example, the way the speaker pronounces certain sounds.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Try to predict what the other person is going to say based on what has been said so far.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Prepare for talks and performances I will hear in the target language by reading some background materials beforehand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	This strategy doesn't fit for me	I have tried this strategy and would use it again	I use this strategy and like it	I've never used this strategy but am interested in it
Strategies to listen to conversation in the target language:				
12. Listen for key words that seem to carry the bulk of the meaning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Listen for word and sentence stress to see what native speakers emphasize when they speak.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Pay attention to when and how long people tend to pause.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Pay attention to the rise and fall of speech by native speakers – the “music” of it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Practice “skim listening” by paying attention to some parts and ignoring others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Try to understand what I hear without translating it word-for-word.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Focus on the context of what people are saying.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Listen for specific details to see whether I can understand them.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Strategies for when I do not understand some or most of what someone says in the target language:				
20. Ask speakers to repeat what they said if it wasn't clear to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Ask speakers to slow down if they are speaking too fast.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Ask for clarification if I don't understand it the first time around.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Use the speakers' tone of voice as a clue to the meaning of what they are saying.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Make educated guesses about the topic based on what has already been said.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Draw on my general background knowledge to get the main idea.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Watch speakers' gestures and general body language to help me figure out the meaning of what they are saying.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix E

Sample Interview Questions

While the actual questions used varied depending on each individual being interviewed, below is a detailed sample of the types of questions asked.

Tell me about what it was like to play *Estrategia*.

Did you borrow an iPod Touch or did you use your own device?

(If borrowed) Had you used a Touch before?

(If no) What was it like when you first began using it?

When did you play the game?

Where?

With whom?

How many levels were you able to play?

Were you able to play the levels at the point where they were assigned in class?

Did you have any problems playing?

(If yes) What did you do when you ran into problems?

What do think about the game as a tool for learning Spanish?

What areas of Spanish tend to be more challenging for you (reading, writing, listening, speaking)?

If you had to rank them in order of your ability in each area, which would be first (most skilled)?

Which would be last (least skilled)?

What was it like to play in class?

What was it like to play with classmates?

What do you think about the difficulty level of the game?

Were you able to easily understand the language of the game?

Do you think it was too hard or too easy?

Did it seem to be the same level throughout the whole game?

Were some sections easier and some harder?

What did you do when you couldn't understand the language?

In what situations was it easier to understand what others said?

In what situations was it harder to understand what others said?

Can you tell me about a time when you had trouble understanding what someone was saying in the game?

How did you deal with that?

What did you do to try to understand?

How did visual/situational/contextual cues affect your ability to understand what people were saying to you?

Had you ever learned about listening comprehension strategies before playing this game?

Which strategies had you used before (if any)?

Can you tell me how you have approached listening situations in Spanish in the past, before this semester?

Can you describe to me what your approach to listening situations is like now?

Did you learn any new strategies while playing the game?

If so, what were they?

If so, what was it about playing the game that helped you to learn new strategies?

Which strategies do you think are most helpful?

Which strategies do you most often use when you don't understand something that was said to you in Spanish?

Were you able to understand what to do in the game?

(If no) What did you do at times when you didn't understand what to do in the game?

How long did it take you to figure out what buttons to push (how to navigate the game)? What was that process like?

Follow-ups

Tell me more about that...

Why do you think that was?

How was that different?

Why do you think it was....?

Do you think it is a good idea to use this game as part of this course next semester?

Why or why not?

If you were redesigning this game, what would you change?

Why?

How would you make it better?