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App Assisted Language Learning: How Students Perceive Japanese
Smartphone Apps

by

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Abstract

Computer Assisted Language Learning (CALL) has been used in second language classrooms since the 1960's. With the advancement of technology, new resources are becoming available to assist language learning. The widespread use of internet-capable cell phones and the thousands of apps available for smartphones creates a new market for potential language learning. This study explores whether students are aware of Japanese apps, if teachers are aware of and share these language apps with their students and what features of these apps the students find useful. The results show that just over half of the students are aware of Japanese apps, however, very few students heard of the apps from their teachers. Dictionaries are the most popular app downloaded by the students, followed by kanji practice.   However, there is no app currently available that includes all the features the students stated they would like to see in an app.

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CHAPTER 1

INTRODUCTION

Computer Assisted Language Learning (CALL) has progressed over

the years with the introduction of new technology. When I first started

learning Japanese in high school, our textbook had an accompanying CD,

which only the teacher had a copy of, to do listening exercises. Japanese

movies and music were also used to introduce us to the Japanese culture.

When I entered university, we began using the computer and WebCT for

online quizzes and oral reading assignments. In my university classes, which

had more students who had been to Japan, electronic dictionaries were

becoming increasingly popular for the ease to look up a word or kanji as

opposed to a paper dictionary. Students who had a Nintendo DS bought a

Japanese-English dictionary program with a focus on kanji. Only after my

Japanese studies concluded developers began making smartphone

applications (apps) to learn Japanese. These apps include travel guides,

phrase books, dictionaries, kanji practice, and a variety of cultural apps.

However, since smartphones and apps are a relatively new technology, very

little research has examined whether and how they can be integrated into

language classes, or language learning in general. Are students aware of this

new method of learning Japanese for supplementing their language classes?

Are teachers interested or willing to use them in class and share them with

their students?

One of the main aims of this thesis is to examine the use of Computer

Assisted Language Learning (CALL) for Japanese learners, particularly the

use of smartphone apps as a resource. Are students aware of this resource

and do they use Japanese apps? What kind of apps and features are learners

looking for? The ultimate goal is to see if there is a potential for apps to

become a resource for second language learners and what features would be

most effective for learning Japanese. CALL has been in language learning

classrooms for many years and has become an integral part to second

language learning. The rapid evolution of information and communication

technology (ICT) has made great changes in society and education. The

Internet is one of the most important technologies as it is a useful tool for

communication and can also act as a venue for experiencing other cultures

(Park & Son, 2009). Since the Internet and computers have become part of

our everyday life, more educators are looking at implementing this

technology into the classroom. The findings from this study will inform

educators about this new resource for their students and inform developers

of what features students like to see in Japanese kanji apps. Since kanji,

Chinese characters, is notoriously difficult for learners of Japanese as second

language, this study focuses on kanji learning apps. While what students

wants the most is not always what is best for them pedagogically previous

studies show that students are more motivated to use CALL if they have

interest in it (Gillespie & McKee, 2010; Barrs, 2012). Students have different

learning styles not all features will be effective to all students, and factors like

proficiency level, first language, and learning environment may also play roles in determining what features should be included in language apps. Among many positive features associated with apps is the easiness to modify input to cater to the student's learning style to allow for a more individualized approach to language learning. While more research is needed to examine whether and how this kind of technology can be incorporated into the classroom teaching, it is hoped that the finding from this study will serve as a stepping stone toward further research as to how this technology can be best incorporated in language learning.

Japanese Language System

Kanji is difficult for second language learners, therefore there are many kanji apps found in the app stores. The Japanese language is usually written in a combination of three different alphabets: hiragana, katakana, and kanji. Hiragana is the most basic and used for function words, inflectional endings as well as for all native Japanese words. Katakana is used for foreign or borrowed words and words for sounds. Kanji, which originated in China, are used for content words, such as nouns, verbs and adjectives (Makino, Hatasa & Hatasa, 1998, p. 2). As seen in Appendix A, both hiragana and katakana have been derived from kanji characters through a different path. Katakana were formed by taking one part of the kanji and hiragana were formed by simplifying the Chinese character.

Kanji are made up of subset components that are constructed by unique sets of strokes ranging from one to many. The sequence of strokes is not random, as the components must fit together internally while the strokes are executed in a conventional manner. For centuries the learning of the correct stroke order has been an essential element in handwriting instruction. Traditionally, it was an aid for correct reproduction of the characters, to facilitate better penmanship, as well as easy memorization, and to save energy in writing. The formation of components in a character follows a general basic pattern, left to right and top to bottom, which remains the same if the component appears within another character. These components, also called *radicals*, are generally used to help find kanji in the dictionary. The radical may be a component with a clear meaning, such as

艹 (grass), 宀 (roof), or 刂 (sword), but that meaning may have little to do with the significance of the whole kanji. Radicals, however, allow kanji to be categorized into groups and make it easier to look them up in the dictionary. Most radicals can't stand on their own, they can only exist as a part of other characters. Each kanji consists of at least one radical, even if the radical is the entire kanji (Kushner, 2009).

In order to read Japanese, second language learners must learn all three of these alphabets, with kanji being the hardest. Not only are kanji difficult to write correctly with the proper stroke order, they are also hard to read. Most kanji have at least two ways of reading them: the *on-yomi* is the Chinese way of reading and the *kun-yomi* is the Japanese way of reading. For

example the character 山 (mountain) has the *on-yomi* '*san*' and the *kun-yomi*

'*yama*'. Normally the *on-yomi* is used in compounds consisting of two or

more characters while the Japanese pronunciation is used when the

character is found in isolation. An additional complication is the multitude of

Chinese readings for a particular character. This complicates things as the

same character can have two or three different Chinese readings. For

example, the character 行, which has the Japanese reading *i-(ku)* as in 行く 'to

go', has a variety of Chinese readings including *gyoo* as in *gyoogi* 行儀

'manner', *koo* as in *kooshin* 行進 'marching', and *an* as in *angya* 行脚

'pilgrimage' (Shibatani, 1990, p. 130).

  Kanji dictionaries are a good resource for students to look up

unknown characters. However, students prefer to use electronic dictionaries

to look up kanji due to the complexity of paper dictionaries. Paper kanji

dictionaries allow the user to search via radicals, the character's readings or

the number of strokes. In the radical search the user has to first determine

the radical for the character, which is not always easy to find. The radical is

then looked up in one section of the dictionary to see what page it starts on.

On this page there is a list of kanji, which include the searched radical,

ordered by stroke count. Once the character is found information such as the

pronunciation is given. Some kanji dictionaries include a section where the

reading of a kanji is listed and all kanji with that reading are listed below. If

the user knows the reading of the kanji they can use this section to find the

kanji they are looking for. In addition, kanji can be searched by stroke count.

In this section of the dictionary kanji are listed by the number of strokes. Once the number of strokes is found the user looks through the list to find the correct character. All these methods can be very tedious with a paper dictionary. Electronic kanji dictionaries allow learners to search for a kanji in similar methods but present the kanji in a way to make them easier to search. In the multi-radical search users are able to select multiple radicals to easily narrow down their search to find the correct character. By only presenting the characters, and not the dictionary entries as well, the search becomes more streamlined and less confusing for learners.

Thesis Outline

This study was designed to determine how students perceive smartphone apps in language learning. Specifically, it attempted to answer three questions: (i) are students and teachers aware of Japanese smartphone apps, (ii) where do students hear about apps from, and (iii) what features of apps do students find useful. The study consisted of two parts: In the first part, which was designed to answer the first two of the three questions, students from all four levels of Japanese study at the university were surveyed to find out if they were aware of the different Japanese smartphone apps available to help learn Japanese, and if they use them. The teachers of these classes were also surveyed to see if they were aware of the Japanese apps and if they told their students about this resource. The app features study, conducted in the second part of the research, compared two kanji

learning apps to answer the third questions as to which features students prefer to see in an app. Students were asked to explore the app then answer a questionnaire on the features found in each app. At the end of the questionnaire students were able to state what features they would like to see in their ideal app. The results from this thesis are hoped to aid app developers and teachers to create useful apps and inform students about the different apps available to supplement their language learning.

This thesis consists of seven chapters, the first two of which are relevant literature review. Chapter 2 covers past research on CALL and CALL studies on the Japanese language. This chapter also includes past studies on students' and teachers' perceptions of CALL. The introduction of Mobile Assisted Language Learning (MALL) and apps is covered in chapter 3, where an overview of the two kanji apps used in my study is given. Chapter 4 discusses the methodology of the study, while chapter 5 reports the findings of the surveys and questionnaires. The results are discussed in chapter 6 and brought into the big picture of how smartphone apps can assist in language learning in post secondary institutions. Finally, chapter 7 concludes the thesis by tying together the findings and giving possible next steps for app research and the future for language apps.

CHAPTER 2

CALL RESEARCH

In this chapter I will start out by giving a definition of CALL and what types of technologies it includes. Then I will discuss previous research in CALL, specifically learning outcomes, how it helps long-term retention, and if students are motivated to use this technology for language learning outside the classroom. Following this I will give an overview of CALL done on the Japanese writing system. Finally, I will discuss some of the benefits and limitations of CALL and the perceptions of students, teachers, and developers.

Definition of CALL

There has been a lot of discussion of the appropriateness of the term CALL to describe the use of technology in second language learning. In fact, many acronyms have been used over the last several years, including CALL/CELL (computer-assisted/enhanced language learning), CASLA (computer-assisted second language acquisition), TALL/TELL (technology-assisted/enhanced language learning), and more recently MALL (mobile assisted language learning). According to Stockwell (2012, p. 10), CALL encompasses all these acronyms since some acronyms such as CASLA, and MALL can quite feasibly be used as sub-terms under the umbrella of CALL. While TELL seems to be broader in scope than CALL, this is not the case as "almost any electronic device that may be used as a part of the language

learning process must have a computer of some shape or form at its heart"

(Stockwell, 2012, p.11). MP3 players, electronic dictionaries, and mobile

phones all contain a type of computer that allows it to function as they do.

Mobile phones are becoming more powerful that they can be considered a

handheld computer.

Since the invention of the computer, various definitions of CALL have

been formed as the technology kept on advancing. Suppes (1966) defines

computer-assisted instruction as a way to individualize educational

curriculum to adapt to individual learners. While this definition of CALL is

outdated, it still includes the underlying concept of using computers to allow

students to learn at their own pace. Historically, most CALL programs are

based on how the system processes and stores information, rather than how

learners can acquire language skills. By the mid 2000's most CALL programs

continued to use this outdated approach to teaching. Clifford and Granoien

(2008) suggest that a CALL program should be capable of interacting with

the learner, of recording, analyzing, and interpreting learner output, and

providing feedback for correction, all in a context of meaningful tasks with

authentic input. Stockwell (2012, p. i) defines CALL as "an approach to

teaching and learning languages that uses computers and other technologies

to present, reinforce, and assess material to be learned, or to create

environments where teachers and learners can interact with one another and

the outside world." These three definitions show how CALL has evolved over

the years from simply being a language tutor to including language output

and interactivity. Since technology is ever changing, the definition of CALL

will change with the times.

Warschauer (2010) outlines five areas in language learning that

technology appears promising for meeting learners' needs: multimodal

communication, collaborative writing, language analysis and structure,

online networking, and one-to-one and mobile computing. (a) Multimodal

communication involves combinations of linguistic, visual, audio, gestural

and special modes of meaning. Some examples include podcasts, Skype,

Google Talk, or other peer-to-peer voice-over-internet-protocol tools. (b)

Collaborative writing allows students to work together to create blogs and

wikis. Students are able to read and respond to each other's posts and later

use them for class assignments. (c) Language analysis and structure includes

text scaffolding, speech recognition, and online concordance tools that have

been developed to provide more direct linguistic support to students. Text

scaffolds come with many resources such as dictionaries, grammar mode to

assist students in identifying parts of speech, language detective activities to

explore the words' meaning, and writing modes to allow students to respond

to the text they have read. (d) Online networking includes multiuser virtual

environments, such as Second Life, and social networks. Second Life allows

learners to practice their language skills through role playing scenarios and

communicating with native speakers in a virtual world. Virtual

environments also allow students to experience another culture such as

going to a Japanese temple or sitting at a café in Paris. (e) One-to-one and

mobile computing includes providing one computer for every student. Since many students own their own laptop or have access to a computer lab this is becoming less of a problem. Mobile phones allow students to access learning activities anytime and anywhere it can be an attractive option for busy students.

As technology keeps on advancing, new programs are being made that combine all five of these aspects together. Mobile phones and tablets are becoming increasingly more popular and there is a good chance that they will eventually make their way into more classrooms. Mobile websites and smartphone applications (apps) are created combining many of these areas together. Since mobile phones are small handheld computers, students are able to use both the Internet and apps for language learning anytime and anywhere. Even though apps are a new technology, the more effective apps have a good foundation from existing CALL programs.

Previous Research on CALL

Over the last 20 years Second Language Acquisition (SLA) theory has looked for insights into the design of materials, evaluation of materials and tasks, and the design and interpretation of research (Chapelle 2009). These SLA theories can be brought into the research on CALL design and practice. Chapelle (1998) states that there are seven hypotheses relevant for developing multimedia CALL in regard to Second Language Acquisition (SLA) theory: (a) the linguistic characteristics of target language input need to be

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made salient by highlighting input materials to make them more noticeable. (b) Learners should receive help in comprehending semantic and syntactic aspects of linguistic input. This can be modification of the output such as repetition, simplification, elaboration, reference material or added redundancy. (c) Learners need to have opportunities to produce target language output. It is important for learners to have an audience for their output so they construct meanings for communication rather than solely for practice. (d) Learners need to notice errors in their own output and have the opportunity to recheck the question before entering it. (e) Learners need to correct their linguistic output. Corrections can come from the learner's own hypothesis testing, from other learners, or from explicit correction. (f) Learners need to engage in target language interaction whose structure can be modified for negotiation of meaning. When the student engages with the computer they need to move toward a task goal and stop progress along the way to focus on the language. And (g) Learners should engage in tasks designed to maximize opportunities for good interaction. The tasks must focus on accomplishing a goal through the use of language rather than solving linguistic problems. In addition to this CALL programs should be meaning focused, offer information at an adequate level for the learner, provide language that students will encounter beyond the classroom and provide a positive impact to working on the tasks (Chapelle, 2009).

Among the central issues addressed in previous research in the area of CALL is its effectiveness in the classroom. In the past, language learning

was only from a textbook, whereas today most textbooks have an accompanying CD and a companion website. Some textbooks are distributed with online material in a learning management system from the publisher and the instructor may also have a WebCT or Moodle course set up as well (Chapelle, 2010). In addition, students may also use external resources such as electronic dictionaries to supplement their language learning.

Since textbooks play such a key role in education, publishers should call on the judgments of authors, editors and reviewers to develop material teachers and students will like, as stated by Chapelle (2010). However, it has also been argued that CALL should better combine the textbook with technology. Over the years a number of studies have examined computer-based textbooks and the use of Natural Language Processing (NLP), which allows for the program to give instant feedback to the student (Nagata, 2010; Amaral & Meurers, 2011). These systems include exercises where NLP components are used to generate feedback either in English or in the target language, depending on the level of the student. The advantage to an online textbook is that it is interactive and can provide immediate responses to students' answers. Unlike a printed textbook, online textbooks can easily integrate listening activities into the text. Audio files can even give students immediate feedback to the correct pronunciation of words, and they can hear target sentences and vocabulary. Robo-Sensei: Personal Japanese Tutor (Nagata, 2010) was designed as a supplement to standard Japanese textbooks. The program is used in the classroom for group exercises and

role-playing between students. Groups can use Robo-Sensei to check their

answers and make progress on their own, allowing the teacher to focus on

higher-level issues and to distribute attention more evenly across the groups.

Students that require more time to complete an activity can complete the

assignment at home and submit the assignment for marks. Nagata found that

overall the students found the program to he helpful in learning Japanese. A

majority of the students found that the online flashcards were more useful

than traditional printed ones.

CALLJ (Wang , Waple & Kawahara, 2009) is another CALL program

that organizes lessons covering elementary grammar points and vocabulary

from levels 4 and 3 of the Japanese Language Proficiency Test (JLPT). The

students are shown a picture representing a certain situation and asked to

describe the situation with an appropriate Japanese sentence using either

text input or speech input. A hint system was also introduced allowing the

student to reveal each part of the sentence in stages, thus allowing them to

receive just the amount of help they need to complete the task. The system is

able to provide corrective feedback of errors and then gives details of the

error to the student. To provide students an idea of how they are

progressing, the system penalizes students for mistakes as well as for using

hints to answer a question. Thus, students are motivated to use fewer hints

in order to obtain higher scores. Wang et al. showed that elementary

students more often use the hints than the intermediate students, and that

they turn to the base-form (complete word) hints in most cases. Generally,

the students enjoyed using the system and found it useful for language learning.

Some studies indicate that the use of technology in language learning can aid in long-term retention of information (Swann, 1992; Gorjian, Moosavinia, Kavari, Asgari & Hydarei, 2011; Nagata, 1998). Swann(1992), for example, developed the Computer Assisted Grammar of English program to explore the potential and limitations of drill and practice software in language learning. This program allows users to work though a large number of items with the goal of improving their speed and accuracy through the use of drilling methods, time limitations on the quizzes, and score keeping. All students improved their pre-test scores after using this program, which indicates that drill and practice software is good for long-term retention. Gorjian et al.(2011) investigated the impact of asynchronous CALL on vocabulary retention. The participants were assigned into two groups based on proficiency and were administered a pre-test, immediate post-test, and delayed post-test. The results indicate that the high achievers benefited more from the CALL program since their immediate and delayed post-tests were significantly higher than their pre-tests. However, the low achievers did well in the immediate post-test, but failed on the delayed one. Nagata(1998) tested an input-focused computer program and an output-focused program on comprehension and production of Japanese honorifics in order to determine if output-focused exercises are more beneficial to language learning than input-focused exercises. Test results show that both

groups did equally well on comprehension tasks while the output group
scored significantly higher on production tasks. The post-tests showed
similar results as the previous test with the output group scoring higher on
production of honorifics.   These results indicate that output-focused practice
is more effective than input-focused practice in the long term in both written
and oral production of Japanese honorific sentences. This study also
indicates that it is beneficial for the students to be tested with both input and
output in these programs since output is the most difficult part of language
learning.

Some other studies also examined CALL programs that allowed
students to practice language learning outside of the classroom. Barrs
(2012) examined computer-mediated communication in an ESL class, in
Japan over an extended holiday period, to see if students would be self-
motivated to converse with each other through moodle, on various topics in
English. The results show that when the students have interest in a topic,
they are more likely to create a post and reply to other posts. On the other
hand, Gillespie and McKee (2010) found that email and the web were much
more popular than CALL programs for independent study. Students enjoyed
using the web and email for personal interest and to enhance their language
learning.

In addition to computer-based programs, the rapid growth of the
Internet has caught the attention of language teachers and the number of
presentations on online language teaching greatly expanded in the mid-

1990s (Warschauer, 1997). Felix (2004) investigated web-based content in language learning. The results show that the students considered the best way to use web materials was in class as an addition to face-to-face teaching. Since the students were computer literate they enjoyed using the material in class and found it useful for language learning. The students liked the web material since it gave meaningful feedback, logically organized content and easy navigation. Kawaguchi and Di Biase (2009) argue that blended learning, a combination of face-to-face teaching and CALL, can achieve better outcomes than traditional learning. In their study, students were introduced to Bebo social networking, tandem language learning through instant text messaging, and an e-movie project. For example, the lesson on 'talking about yourself, your family and friends', students had to set up their Bebo site and upload their personal profile in Japanese. For the 'Show & Tell' assignment students uploaded a video clip describing an item. Kawaguchi and Di Biase found that social networks increased motivation in students since it used technologies closer to the students' lifestyle, increases students' opportunity for autonomous self-study and promotes collaboration among students. This study emphasizes that CALL is not simply a replacement of face-to-face teaching as some teachers seem to believe, instead it offers far greater opportunities than the traditional language classroom for self-paced language production and comprehension.

These previous studies demonstrate that technology not only increases the level of performance covered in the textbook, it can also change

and expand the intended learning outcomes. Learning outcomes of CALL can include students' increased competence in using the technology as a source for help, causing greater autonomy, as well as a greater cultural understanding through communication with members of the target culture as argued by Chapelle (2010).

CALL Research on the Japanese Writing System

In Japanese education, the writing system has been the target items for CALL programs because of the challenge it poses to learners. As observed by Geraghty and Quinn (2009), some material writers have avoided the Japanese scripts and opted for roman letters to represent Japanese sounds. While this method allows students to immediately learn speaking and listening skills, there are many disadvantages. This method deprives students of access to authentic Japanese materials and making student illiterate when they do go to Japan. In their study, Geraghty and Quinn tested a color-coded flashcard program to investigate alternative methods of teaching the Japanese scripts. On each flashcard, each color represents a different sound. For example, the character 'ka' has orange to represent the "k" sound and blue to represent the "a" sound. The program also allows sound files to be opened at the same time that an animated pencil demonstrated how the character is drawn. Overall, the students enjoyed learning at their own pace and liked being able to take the CD home to practice. This study reinforces the advantages of Language Learning

technology since it brings control over learning into the students' hands, and

they become completely engaged when using it. Learners are able to learn at

their own pace and the order in which they learn new characters, thus

lowering the stress felt by students compared to using other methods.

Tsai, Kuo, Horng, and Chen (2012) conducted a study to test whether

an interactive computer program can assist language learners learn kanji. In

the study one group of students practiced kanji using a pen-based workbook,

while the other group used an interactive computer-based program. The

worksheet method requires the learner to practice writing characters by

seeing the stroke order written, without precise movement indicating the

exact writing procedure. The computer-based method adds an animated clip

of the correct stroke order and the stroke's directionality for each character.

The program allows the user to practice sketching the character on a visuo-

spatial sketchpad with immediate feedback on the correct stroke order. The

novice learners with no prior experience had more confidence with the

computer program since this method reinforced the correct character

formation by giving immediate feedback that challenged their

misconceptions.

Komori and Zimmerman (2001) evaluated five online Japanese

learning programs to teach the kanji alphabet: WWKanji, Java Kanji Flashcard

500, Flash Kanji, Gahoh, and Joyo 96. Each program was examined for

acquisition-promoting features related to phonology, orthography,

practicing, grouping, memorizing, referencing and contextualizing. The

evaluation consisted of examining each program and determining whether these features were included for the learner to utilize for remembering kanji. Some of these sites did not include kanji in context, which Komori and Zimmerman claimed is important for memorizing kanji and their meaning. Other problems include confusing search functions, lack of a kanji search, small font size, and incorrect or inconsistent English translations. Improvements recommended by Komori and Zimmerman include ideographs, drills and quizzes. Ideographs can be helpful to associate the shape and meaning of kanji since learners may associate 山(mountain) with an image of three mountains side by side. Drills and quizzes allow the learners to hide the parts of the flashcard that they need to review, giving them an opportunity for processing the character. They may also promote meaningful practice or allow learners to use strategies to make connections between similar kanji. Since Japanese kanji have different readings determined by the surrounding characters, knowing how the character is used in compounds is essential for reading kanji. Komori and Zimmerman argued that when developing new software it is important to review the product to ensure most of the above features are included to give second language learners more options to how they learn the material. Since learners learn at different rates and have different learning strategies it is also important to encompass as much as possible to allow the majority of students to excel with the software.

CALL has been extensively studied to determine what types of programs are the most beneficial to students. These programs can allow students to work at their own pace or practice using the target language outside the classroom. In the Japanese classrooms CALL has been a useful tool for students to learn the different alphabets. However, the perceptions both students and teachers have towards CALL is important to investigate to determine which types of CALL are the most effective.

Students' and Teachers' Perceptions on CALL

CALL has been evolving over the years to include more advanced programs to help students learn a second language. There is a need for educators and educational institutions to understand the impact of ICT on language learning (Felix, 2005). The perceptions of CALL is important to look at since if the students do not like using it or find it too difficult to use, it will not be an effective teaching method. If teachers do not have time to learn the technology or do not like using CALL in the classroom, all the research and development will not be used. Past research has shown that teachers are aware of the benefits of using CALL, but there are also many disadvantages to using technology in class.

Chambers and Bax (2006) examined the ways in which CALL is currently used and why it is not used more extensively at two institutions in England. While the teachers in the study had experience in using CALL in the classroom, the teachers found the computer labs were difficult to book and

there was little training offered to teachers on using CALL in the classroom. Most teachers felt they did not have sufficient knowledge of CALL activities, especially the Internet, and they felt they did not have enough knowledge to plan a class and fit the technology into the lesson. Although most teachers were fairly competent in using the computer, some teachers were apprehensive about them and felt that their students may know more about the technology, causing them to 'lose face'.   In Park and Son's (2009) study, most of the teachers enjoyed using computers and felt comfortable using them in the classroom. They also thought that their teaching could be improved by using computers and agreed that CALL is an effective way of teaching a foreign language. One disadvantage they found was a lack of time, since they spent a large amount of time preparing for appropriate materials because they needed to modify, edit and combine the resources they had found from the web with textbook content. A lack of computer skills and facilities to use computers during class was also a problem for using CALL. Timuçin (2006) found that teachers initially felt that computers might replace their role in the future and the use of CALL would limit student-teacher interactions. However, at the end of the 34-week program most of the teachers found their role was essential and teachers could be involved in the CALL program by preparing support material and evaluating students' feedback. Acknowledging that they were important in the use of CALL made the teachers have a better outlook on the technology and realization that they will not be replaced by computers.

Wiebe and Kabata (2010) found that teachers have a lot of influence over their students' use of CALL even if they are apprehensive about using technology in the classroom. They surveyed students and teacher's perceptions on using Information Technology (IT) in the classroom, particularly WebCT. The teachers generally had positive perceptions on using WebCT, while only half the students found it useful. Wiebe and Kabata also found that whenever the instructor mentioned WebCT in class, more students would use the program. The results of the study indicate that the instructors and students do not have the same perceptions of IT use, but the instructors' encouragement to use these technologies affects the number of times students log into or visit the course website or CALL program.

Some studies, including Chambers and Bax (2006), show that even though the teachers enjoyed using CALL in the classroom, the integration of this technology with the textbook causes some problems. Teachers spend many hours preparing for classes in order to effectively combine the lessons in the textbook with computers or other media. A central aim for teachers and developers of CALL programs should be normalization, or the state in which technology will be as integrated into the lessons alongside course books, teachers and notepads. "Only when the technology is normalized, and therefore as invisible and natural as whiteboards and pens, will it have found its proper place in language education" (Chambers & Bax, 2006). It is indicated that to better integrate this material into the classroom teachers

and developers should be working together to create programs that fit into the curriculum and are effective for students of all learning types.

Jamieson, Chapelle and Preiss (2005) evaluated the perceptions of CALL between students, the teacher and the developers of the Longman English Online (LEO) level 3 program. To determine the effectiveness of the software the developers and the teacher were given a questionnaire, while the students were distributed questionnaires and weekly reflections. The teacher and some students were also interviewed to get more in-depth results. The results indicated that teachers and developers generally agree on the quality of the program, but students may not have the same perception. It is important for developers to obtain feedback from students to ensure that their software is user friendly and understandable. The teacher should always provide an orientation on new software used in the classroom since not all students understand how to use the technology. Some students got frustrated since they did not understand the interface that could have been solved if the students were introduced to the interface during the first class.

While students generally have positive perceptions about CALL, teachers may have to remind their students to use it, especially if it is not used in the classroom. Teachers have a lot of influence over what students may use as supplements to classroom learning so it is beneficial if they are knowledgeable of the different technologies and programs available for language learning. Educational institutions should provide teachers with

resources to learn about CALL programs so they can either integrate it into their teaching or provide it as an external resource for their students. Sending feedback to the developers about how the students are using the material and any problems they encounter can help produce better more effective programs for language learning.

Summary

CALL has been used in language learning for many years and the definition has adapted with the advancement of technology. Most of these programs are interactive and fun to use, thus students enjoy using them to learn another language. However, there are some drawbacks as not all teachers are comfortable or confident in using the technologies in the classroom due to a lack of technical support or knowledge of the technology. Technology used in language learning does not stop at computers; it can include mobile phones as well. Mobile phones are small handheld computers that can allow students to use a language program anytime and anywhere. Since the majority of post-secondary students own a mobile phone researchers and developers should look into this resource as a tool for learning. With smartphones becoming increasingly popular, do smartphone apps have a place in education?

CHAPTER 3

SMARTPHONES AND APPLICATIONS

In this chapter I will discuss the research that has been concerned with Mobile Assisted Language Learning (MALL) and how mobile phones are being used in education. I will then introduce smartphone Applications (Apps) and the Apple Education App Store. Finally, I will give an overview of two kanji apps that were used in the present study: KanjiBox and Kotoba!.

Previous Research in Mobile Assisted Language Learning

Currently most students own a mobile phone and the number of smartphone users is growing every day. Mobile phones allow students to use the devices to learn anytime and anywhere (Cheng, Hwand, Wu, Shadiev & Xie, 2010). Klopfer and Squire (2008) indicate that mobile devices have the following features: (a) portability, as handheld devices can be taken to different locations; (b) social interactivity, since they can be used to interact with other people; (c) context sensitivity, as handheld devices can gather real or simulated data based on a particular location; (d) connectivity, since they enable connection to data collection devices, other mobile devices, and to a network, and; (e) individuality, as they can provide scaffolding to meet personal needs and to undertake investigations of specific situations. However, Albers and Kim (2001) describe three limitations of handheld devices: (a) users find text on a mobile device screen more difficult to read than that on paper; (b) presenting graphical information is limited with

regard to the complexity of the image and size, and; (c) challenges to interactivity are increased due to the lack of a mouse and keyboard, as well as limited screen size. Despite these limitations, educators are exploring the possibilities of using mobile phones in language learning.

Cheng et al. (2010) present a system called Ubiquitous Computer-Supported Collaborative Learning, which incorporates a contextual application for English learning. Their program, StudentPartner campus English learning system, integrates multimedia maps of campus on their phone to help learn English. Students are able to use smartphones to record images, video, or audio when they want to describe the environment around them and share this with their peers. When students explore the campus, GPS tracking allows the student to receive contextually relevant information about their surroundings. Students can then post messages to practice their writing skills. Results from a small-scale user study shows that the students found the use of multimedia and GPS in a real-life context helped them learn English. These activities were useful and enjoyable, thus the students felt very interested in the activities offered.

In Japan, Internet capable cell phones are wide spread with most students owning a cell phone. In their study, Thornton and Houser (2005) polled 333 female Japanese university students on their use of mobile devices. All 333 students owned a mobile phone and used it mainly for email, while only 43% of the students sent email by computer. However, students were not yet using the mobile web for educational purposes possibly due to

the small number of Japanese teachers that offer web based course material. In the same study Thornton and Houser examined the "push" mode of operation, where teachers control the frequency and the timing of messages sent to learners. Short English mini-lessons for learning vocabulary were emailed to learner's mobile phones three times a day, using new words in multiple contexts to allow students to remember the meaning of the word. These students were compared against learners who only accessed the same materials on a website and learners who were only given the materials on paper. The study showed that learners who received the emails scored better on post-tests compared with the other two groups. Thornton and Houser concluded that mobile phones could be an effective learning tool but the perceptions that phones are not tools for studying would have to be overcome.

To study the difference in language learning activities on mobile and PC platforms Stockwell (2010) conducted a three-year study with English language students at Waseda University, Tokyo. Class time was dedicated to listening activities and learners were required to study vocabulary outside of class using either their computer or mobile phone. These activities included choosing the appropriate word for an English sentence, choosing the appropriate English word for a Japanese meaning, choosing the appropriate English word for an English definition, writing a word in English for an English definition and writing the appropriate English word for an English sentence. The results show that a majority (58.8%) of students did not use

the mobile phone at all in 2007. In 2008 the rate rose to 78% and dropped to

42.2% of students not using the mobile phone at all in 2009. In 2009 there

was a much wider spread of the percentage of activities performed on a

mobile phone with a larger portion of students using it for more than 80% of

activities compared to the other years. While there was no difference in

scores, activities done on the mobile phone took significantly more time than

on the computer, which may have contributed to the lower numbers of

students performing the tasks on a mobile phone. It is difficult to tell if the

extra time on the mobile phone was from the mobile interface or other

environmental issues that might arise when completing tasks on a mobile

phone.

Mobile phones took a huge step in functionality with the arrival of

smartphones. What used to be phones with added-on computing capabilities

have changed into mini-computers, which can also make phone calls. Initially

Apple encouraged developers to create Web apps, HTML-based programs

that used JavaScript and CSS to provide interactivity. However, developers

were not satisfied with this approach, which prompted Apple to open the

App Store to allow 3rd party native application for the iPhone that has full

access to the capabilities of the iPhone (Godwin-Jones, 2011).

Smartphone Applications and the Apple Education App Store

One of the major problems faced with mobile sites is usability due to

the small screen size and lack of a mouse. Smartphones such as the iPhone,

Google Android, and the Blackberry have introduced third party applications that can be downloaded onto your mobile device. These applications are built specifically for mobile phones, thus are usually more user friendly in their design. In July 2008 with the release of the iPhone App Store, over 10 million apps were downloaded in just 3 days (Bowcock & Pope, 2008). By March 2012 over 315 million users have downloaded over 25 billion apps from the store (Miller & Monaghan, 2012). The App Store offers more than 550,000 apps for the iPhone, iPad and iPod touch and more than 170,000 apps specifically for the iPad. This boom in applications has influenced the technological market. With pretty much an app for everything, language learners can turn to this new technology to help supplement their language classes.

The Education App Store offers apps in various subjects: English language arts, math, science, history and geography, reference, productivity and collaboration, and language development. These language development apps include dictionaries, phrase books, translators, and language learning software for many languages. In Japanese, kanji has been notoriously difficult for second language learners to memorize with few effective programs available to students. Most of the resources available to students outside of class are web-based programs or dictionaries. In addition, students have bough electronic dictionaries or a dictionary game for the Nintendo DS to use in class. The Nintendo DS software, Kanji Sonomama Rakubiki Jiten, like some electronic dictionaries, allows the user to search for

words by either inputting the reading of the word or drawing the kanji with a stylus. However, both Kanji Sonomama Rakubiki Jiten and electronic dictionaries do not provide a way to learn or practice kanji. For kanji study, students are reliant on their Japanese textbook or limited web-based programs. With the introduction of the smartphone app stores students are able to download kanji learning programs directly to their cell phone. In order to determine if students are aware of these resources and what features they find effective I conducted a two-part study. In the app features study I conducted a small user test on KanjiBox and Kotoba!, two apps to help learn Japanese kanji.

Overview of Two Kanji Learning Apps

The two apps KanjiBox and Kotoba! have been selected for the present study because they are both affordable for students with KanjiBox costing $4.99 (as of January 2012) and Kotoba! being a free app. In order to determine if students prefer learning kanji through flashcards or looking them up in a dictionary I chose KanjiBox, which is a flashcard-based app, and Kotoba!, which is a dictionary-based app . Most of the dictionary-based apps contain similar features, and Kotoba! was chosen since it included many useful features and was an appealing cost for students. KanjiBox was considered better than other flashcard-based apps since it contained both drills and quizzes. Both of these apps had good reviews in the App store and I could see students using them for kanji practice. Below, I provide a brief

overview of each app, and outline some of their features that were rated by the students in the app features study.

KanjiBox (duVerle, 2012) is a web-based program built to help learn kanji and Japanese vocabulary for fun or exams such as school exams or the Japanese Language Proficiency Test (JLPT). In January 2007, KanjiBox became a Facebook application, where anyone could add it to their Facebook profile and compare test scores with their friends. This program includes drills, quizzes and study modes to practice kanji, vocabulary, reading and kana (Figure 1). February 2009 KanjiBox was released as an iPhone/iPod/iPad app in the App Store. This version includes all the features found in the web-based version, but allows the user to practice Japanese even without an Internet connection. This app is also optimized for the smaller touch screen and makes using the program more user friendly.

Figure 1. Screenshots of the Drill mode for Kanji, Vocab, Reading and Kana.

KanjiBox incorporates three different methods of learning Japanese through the Drill mode, Quiz mode and Study mode as shown in Figure 2. The Drill mode is multiple choice where the user chooses the correct answer. In the Kanji Drill the student is given the word in hiragana with the definition and has to choose the corresponding kanji. In the Vocabulary Drill the user is given the English translation and has to choose the correct word. The Quiz mode is similar to the Drill mode except that it is timed and points are rewarded. One point is given for each correct answer and points are taken away exponentially for every consecutive wrong answer. The points then allow the user to compare their scores with their friends. The study mode is similar to flashcards where the word is on one side and the answer is on the flip side.

Figure 2. Screenshots of the Kanji Drill, Kanji Quiz and Kanji Study modes.

KanjiBox includes four important features to enhance how the kanji is tested. Since the quizzes are multiple choice, the answers for each question consist of closely similar answers. For example, in kanji mode you may be presented with the following kanji: 電(electricity), 友(friend), 右(right), and 雨 (rain).   This feature makes the quizzes harder so the user learns to distinguish between different characters. The second feature is that in drill mode KanjiBox remembers your answers and uses this knowledge to quiz you more or less often on a given entry according to an adaptive algorithm. This means that if you consistently give the incorrect answer, it will appear more often until you start getting it right. The third feature is the quiz mode. Since the quiz scores are shared across all users the questions appear randomly to reflect an unbiased set. However, your answers are still recorded by KanjiBox and are used to control the drill mode and your statistics. The fourth feature is in the quiz mode the questions are offered in a progression starting from below your level, all the way up to slightly above it. This helps make the quizzes more engaging and help better differentiate players in the final scores.

In addition to the above features KanjiBox includes statistics for all five levels of the Japanese Language Proficiency Test (JLPT). The JLPT level N5 is the easiest level testing basic Japanese where level N1 is the most difficult level. KanjiBox allows the user to choose their appropriate level of study and only learn the kanji in the specified level or below. Kanjibox includes a statistics page, which gives an overview of the kanji tested (See

Figure 3). All entries start off as white and turn from dark green to bright

green the more times it is answered correctly and from orange to red the

more time it is answered wrong. This feature allows the user to easily see

how they are doing at a certain level.
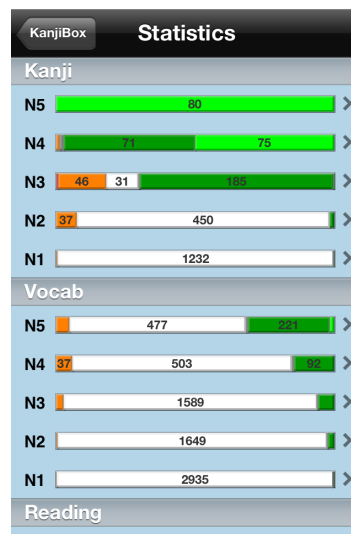
Figure 3. Statistics page on KanjiBox by JLPT level.

Kotoba! (di Costanzo, 2012), which was recently renamed [i mi wa]?,

is a multi-lingual Japanese dictionary for the iPhone and iPod. This app

consists of a dictionary section and a kanji section, which has more detailed

information about kanji. In the dictionary section of the app each entry

displays the kanji (if applicable), reading in hiragana, English meaning,

examples and kanji decomposition as seen in Figures 4a and 4b. When

looking up verbs, a conjugation page is included to give the correct

conjugation for the verb such as conditional, passive, causative, imperative,

etc. This is useful for irregular verbs, which are difficult for second language

learners to memorize. Figure 4c shows the conjugation for the word 来る

(ku•ru) "to come", which is an irregular verb. The negative form of the word

is 来ない (ko•nai), the past tense form is 来た (ki•ta), and the past negative

form is   来なかった (ko•nakatta). In the example pronunciation of the kanji

changes from "ku" to "ko" or "ki" depending on which word it is used in. The

conjugation chart is helpful since it includes hiragana to differentiate the

many readings.

(a)   (b)   (c)

Figure 4 Screenshot for the dictionary entry of *ongaku* "music" on the left (a),
example sentences for "music" in the middle (b), and (c) the conjugation page
for the verb 来る (ku·ru) "to come".

In the kanji section words can be inputted in kanji, kana, romaji, or

English. There are six different methods to look up kanji in the kanji search

window: text-based search, SKIP, multi-radical, JLPT level, school grades and

Chinese radicals. The text-based search is similar to a dictionary search

where you can look up a word in Japanese or English. The SKIP search, as

seen in Figure 5a and b, classifies each kanji by patterns determined by the

stroke order: left-to-right, top-to-bottom, enclosure or solid. For example the kanji 始 has a left-to-right pattern 3-5 since the left kanji has 3 strokes and the right kanji has 5 strokes. The multi-radical search (Figure 5c) allows the user to select all the radicals that the kanji consists of in order to find the kanji without knowing how to say it. In this particular case, Kotoba! shows that the character 始 has the radicals 女,ム, and 口. The JLPT search separates the kanji into those tested for each level. These levels differentiate the beginner, basic, lower intermediate, intermediate, and advanced kanji. This search is useful when studying for the JLPT, but is not the best method for looking up an unknown character. The school grades search separates the kanji into groups based on what grade Japanese children learn the characters. Similar to the JLPT search, these lists are useful to see where you compare to Japanese students, but it is difficult to search for a particular kanji. The Chinese radical search is similar to the multi-radical search except that each character has only one Chinese radical. This search is not as useful to non-Chinese speakers since they may not know which Chinese radical is associated to each kanji.

Figure 5. SKIP search method on the left (a) and center (b). Multi-Radical Search on the right (c).

Each kanji information page includes a short clip of the stroke order, the *on* (Chinese) reading, the *kun* (Japanese) reading and the English translation as seen in Figure 6. The page also contains information related to the search categories such as stroke count, radicals, components, school grade and JLPT level. By clicking on 'view kanji compounds' you are brought to a list of words the kanji appears in with the reading and English translation. Clicking on one of the words in the list brings up the dictionary page for that word, including an example sentence.

Figure 6. Kanji information page for the character 始(to commence) and a list of compounds the kanji appears in on the right.

Summary

Since most students own a mobile phone teachers are able to take advantage of this in language learning. Students are able to use their phone to access language learning resources anytime and anywhere. With the introduction of smartphones and the massive app stores, language learning is being brought to a whole new level. Students are able to download a variety of different apps such as dictionaries, phrase books, and apps to help learn the kanji alphabet. Since most of these apps are free students do not have to go out and buy expensive electronic dictionaries when they can get a similar app for their phone. However, not all apps are the same quality when it comes to language learning. There are many different features apps may

include and not all of them are useful to students. This study was designed to
see what features of these apps students like and find useful for language
learning.

CHAPTER 4

METHODOLOGY

This study is a preliminary attempt to determine whether smartphone

apps can be a good resource for language learning. As a step towards this

question, the study examines the current usage patterns of smartphone apps

by Japanese learners.   The study specially asks (i) if students and teachers

area aware of these apps, (ii) where students find out about language apps

and if teachers are one of these resources, and (iii) what features of these

apps do students find useful. In order to ask these questions, the study was

broken into two parts: a survey-based study and an app features study.

The first part was survey based and was designed to examine what

factors affect whether students are aware of smartphone apps, and which

apps they download. It is predicted that more students in the upper level

Japanese and Japanese majors and minors will be more aware of Japanese

apps since these students generally have a greater interest in the subject and

look for external references. Students who have been to Japan before usually

have an interest in Japanese and the culture, thus are more likely to use

Japanese resources. For this reason we expect students who have been to

Japan to be more aware of apps. As stated in Chapter 3, the Apple app store

has thousands of educational apps, as well as the Google Play store for

Android phone, so more students who own an iPhone or Android would be

aware of the apps. Since the Blackberry does not have good support for the

Japanese language so it was expected that students who own a blackberry would not be aware of Japanese apps.

The second part of the study investigated app features and what kinds of features students like. It was expected that the students would like KanjiBox since it is a flashcard based app and tests kanji in a game-like manner. Since flashcards are a popular method for studying many students are predicted to prefer this style of app. By using the results from the studies we hope to see what factors influence whether a student is aware of apps and what kinds of apps they prefer using.

Study Design

The study consists of two parts to determine how students perceive language apps. The survey study is survey-based and attempts to answer the two questions: Are Japanese language learners aware of the smartphone apps available and do they use them as a supplement to their classes, and how do students find out about these apps and whether teachers are one of these resources. Questions were asked if the student owned a smartphone, which operating system they have and whether they are aware of Japanese apps or not. If the student answered that they were aware of Japanese smartphone apps they were asked how they found out about the apps and what kinds of Japanese apps they download. To determine which apps are the most popular among students we asked them to write down the names of all the apps they use and state how frequently they use the app. To

determine how the students' use of apps might be influenced by the instructors' view on smartphone apps, we asked the students if they were allowed to use the apps in class (including which apps they use) or why they do not use the apps in class. The survey was concluded with a rating system based on the likert scale on whether smartphone apps are helpful to supplement Japanese class (please see Appendix B for the entire questionnaire). The student survey also asked eight demographic questions about their age, gender, year of study, Japanese classes taken, languages spoken, and if they have been to Japan before.

The instructor survey was similar to the one for students. Demographic information such as age range, whether they own a smartphone and the operating system was asked. In addition, to determine how comfortable they were with technology, the teachers were also asked to identify any technology they used in class. If the teacher had a smartphone they were asked whether they knew of any Japanese smartphone apps, where they found out about them and if they tell their students about these apps. Lastly, the teachers were asked if they allow smartphone apps to be used in class and how useful they think they are. The complete list of the questionnaire is provided in Appendix C.

The app features study was designed to determine what features or factors of these language apps students prefer and find effective. To do this we had students test out two different kanji apps and answer a questionnaire about the features. At the end of each questionnaire the students were asked

which features they liked the best and which features they disliked. They

were asked to rate the overall design of the app using a ten-point scale and

rate how useful they found the app. Lastly, the students were asked if they

know of any similar apps and how likely they would download the app. A

demographic questionnaire was given to collect information on the

languages spoken, whether they have been to Japan, if they own a

smartphone and which Japanese apps they use. If they use Japanese apps

they were asked what features of the apps they liked. At the end of the

questionnaire the students compared both kanji apps and described which

style of app they liked better and why. If there was time at the end the

students were asked what features they would include in their ideal app and

why these features are important. The complete list of the questionnaires is

provided in Appendix D.

Participants

The participants for the survey part of the study were 139 university

students enrolled in a Japanese language class at the University of Alberta. Of

the 139 students, 45 were in the first year class, 48 were in second year , 31

were in third year and 15 were in fourth year. Since there were many JAPAN

102 and 202 classes offered, two classes from JAPAN 102,202 and 302 were

surveyed. Since there was only one JAPAN 402 class offered we only

surveyed the one class. Student participation was voluntary, and all

information collected remained anonymous. The students were told that

completion of the survey would not affect their marks and their survey would not be shown to their instructors.

Table 1 describes the overall demographic distributions of the survey respondents.

Table 1

Demographic Information of the Student Participants for the Survey Study

Language level: JAPAN		102	202	302	402	Total
N		45	48	31	15	139
Gender	Male	22	18	11	4	40%
	Female	23	30	20	11	60%
Age	Under 21	21	25	12	1	42%
	21-29	24	23	19	14	58%
Year of study	First	6	1	0	0	5%
	Second	24	34	5	1	46%
	Third	9	9	16	1	25%
	Fourth	6	4	10	12	23%
	Grad				1	1%
Field of Study	Major	0	9	8	7	17%
	Minor	5	20	16	5	33%
	Elective	40	19	6	3	49%
Proficient Languages	Chinese	29	23	13	4	50%
	Korean	5	2	3	1	8%
	French	1	5	4	3	9%
	Vietnamese	2	2			3%
	Filipino		4		1	4%
	Other		1	5	1	5%
Time in Japan	Never	38	34	17	5	68%
	< 1 month	4	7	9	2	16%
	1-12 months	3	7	4	4	13%
	> 1 year			1	4	4%

The teacher of each class was asked to complete a survey to determine if there is a correlation between if the teacher was aware of smartphone apps

and their students. In order to get the most varied results, classes with the

same teacher were eliminated from our list of classes to survey. Due to the

teaching schedule two teachers surveyed taught two classes that were

surveyed. One teacher taught both JAPAN 202 and 302 and the other teacher

taught both JAPAN 202 and 402. The other JAPAN 302 instructor whose

class was surveyed did not complete a survey.

Table 2

Demographic Information for the Teacher Participants in the Survey Study

		Number of Teachers
Class taught	JAPAN 102	2
	JAPAN 202	2*
	JAPAN 302	1*
	JAPAN 402	1*
Age	30-39	2
	40-49	2
Technologies Used in Class	Textbook CD	4
	Japanese movies	1
	Japanese music	1
	Wikis or blogs	1
	Moodle / WebCT / Vista	4
	Email with Japanese students	2
Own a Smartphone	Yes	3
	No	1
Operating System	Apple iOS	3
Aware of Japanese Apps	Yes	3
	No	1

* Denotes a teacher who taught two classes that were surveyed.

The participants for the app features study consisted of thirteen

students studying Japanese at the University of Alberta. The students who

indicated interest on the consent form for the survey study were contacted by email. To include students in the Japanese classes not surveyed, I visited all the Japanese classes and explained the study at the beginning of class and passed around a signup sheet to gather more volunteers for the study.   Four students in first year Japanese, five students in second year Japanese, and four students in third or fourth year Japanese agreed to participate. As seen in Table 3, six of the students were proficient in Chinese and this was taken into account when analyzing the responses of the kanji apps. Since kanji is derived from Chinese characters we expect the Chinese students to know how to write the kanji, but have to memorize the Japanese reading of each character.

Table 3

Demographic Information for the Student Participants in the App Features Study

Language level: JAPAN		102	202	302/402	Total
N		4	5	4	13
Proficient	Chinese	1	4	1	6
Languages	French	1	1	1	3
Time in	Never	3	3	3	9
Japan	< 1 month	1	1		2
	1-12 months		1	1	2
	> 1 year				
Own a	Yes	4	4	3	11
Smartphone	No	0	1	1	2

Procedure

In the survey study I emailed instructors in all four levels of Japanese language classes at the University and request them if I could conduct a survey in class, which was designed to take less than ten minutes. Upon consent from the instructors, I selected two 102 classes, two 202 classes, both 302 classes, and the one 402 class offered. Since there were more than two sections of 102 and 202 classes offered the two classes were chosen at random.

At the beginning or end of class I came and explained to the students the purpose of the study and distributed the consent forms and surveys. On the backside of the consent form was a place where the student could leave their email address if they wished to be contacted for the app features study. While the students filled out their survey the teachers were also asked to fill out a survey similar to the one for the students. In order to see if there is a correlation between if the teacher knows about the apps do the students, the teacher's survey was collected and kept together with the students' surveys.

During the second part of the study students came to a classroom on campus to test out two different kanji learning apps. In order to allow up to two students to take part in the study at the same time an iPhone or an iPod Touch were prepared for the students to use. To decrease any bias related to the order of apps tested, half the students tested Kanji Box first while the other half tested Kotoba! first. The students were asked to examine the app for a few minutes then answer some questions related to the features of each

app and the overall design. Once the student was done with the first app the same process was repeated with the second kanji app. The complete list of questions asked can be found in Appendix D. After testing both apps the participants were asked to fill out a demographic questionnaire and specifically compare the two apps. If time permitted the students were asked at the end what features they would like to see in an ideal app for learning kanji.

CHAPTER 5

RESULTS

This study investigated how students perceive apps and if they could be used as a supplement to language classes. In order to determine this two studies were conducted: the first was designed to see if students and teachers were aware of smartphone apps, and the second part looked at what features of apps students find useful.

Results for the Survey Study

The survey study was designed to answer the following main research questions:

1. Are Japanese language learners aware of the smartphone apps available and do they use them as a supplement to their classes?
2. How do students find out about these apps, and whether teachers are one of these resources?

In order to answer this we surveyed students in all four levels of Japanese study. This survey was developed to determine whether Japanese learners are aware of smartphone apps available and use them as a resource. The survey also was used to determine where students find out about these apps and if their teachers are one of these resources. The survey was created to answer the following research questions:

1. Does Japanese level affect knowledge of apps?
2. Does year of study affect knowledge of apps?

3. Do more Japanese majors know about apps?

4. Do students who have visited Japan know about apps?

5. Does the operating system students use affect their knowledge of apps?

6. What kinds of apps are the most popular?

7. Where do students hear about Japanese apps from?

8. Do students use apps in class?

The results from the survey data collected from the survey study indicate that over half the Japanese language students are aware of Japanese smartphone apps. 18 out of 45 (40%) of JAPAN 102 students, 35 out of 48 (73%) of JAPAN 202 students, 16 out of 31 (52%) of JAPAN 302 students and 11 out of 15 (73%) of JAPAN 402 students are aware of these apps. With a chi-squared value of 12.29 and P value of 0.0065, these values are statistically significant that the higher-level Japanese students are more aware of smartphone apps than introductory students. We can see from Table 4 that year of study does not influence the knowledge of Japanese apps since there is a chi-squared value of 1.83 and a P value of 0.77, which is not significant. Even though more 2nd, 3rd, and 4th year students are aware of Japanese apps, the difference is not significant enough to state that year of study affects knowledge of apps.

In Table 5 we can see that two out of three of Japanese Majors know about the apps, while students who chose Japanese as an elective are almost split in half between aware and not aware of these apps. With a chi-squared

value of 6.016 and P value of 0.0493 these results are significant, thus more

Japanese majors do know about these apps.

Table 4

Correlations Between Year of Study and Awareness of Apps

	1st Year	2nd Year	3rd Year	4th Year	Grad
Aware	3	39	19	18	1
Not Aware	4	25	16	14	0

Table 5

Correlation Between Area of Study and Awareness of Apps

	Major	Minor	Elective
Aware	16	32	32
Not Aware	8	15	36

Table 6 shows the distribution of students who are aware of apps

based on time spent in Japan. With a chi-squared value of 3.194 and P value

of 0.3627 we can see that there is no difference whether the student has

visited Japan or not.

Table 6

Correlation Between Time Spent in Japan and Awareness of Apps

	Never	< 1 month	1-12 months	> 1 year
Aware	51	12	13	4
Not Aware	43	10	4	2

Since most smartphone apps are device specific we looked at whether

there was a difference in the smartphone operating system and being aware

of Japanese apps. Table 7 shows that almost two out of three students using

each operating system were aware of Japanese apps.

Table 7

Correlation Between Smartphone Operating System and Awareness of Apps

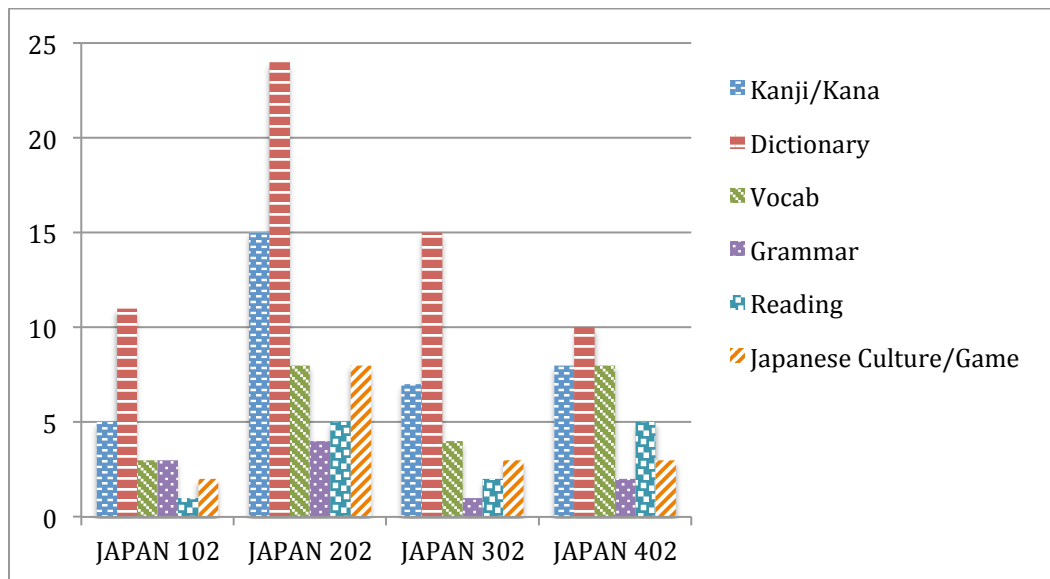|	Blackberry	Apple iOS	Android	Windows	None
Aware	10	45	21	1	10
Not Aware	5	18	9	1	24

Figure 7. Most popular Japanese apps downloaded per level of Japanese

Of all the Japanese apps downloaded by the students Figure 7 shows

that dictionaries are the most popular with a majority of the students in each

Japanese class indicating they were aware of apps. This does not come as a

surprise since dictionaries are one of the most common resources found in language classrooms. The next most popular app is kanji/kana apps followed closely by vocab and culture/games. Since Japanese kanji is difficult for second language learners it was expected that kanji practice apps would be popular both for studying for tests and the JLPT, which many Japanese students take.

Table 8 shows a list of the most commonly downloaded Japanese apps. The results show that there is a large list of Dictionary apps, kanji practice and Japanese culture apps. The dictionary apps are basically the same with a few different features, with the apps that cost more money including more features. The reading apps allow the user to select a word in email or the Internet and the app provides the English translating to help learners read anything on the Internet. The Japanese language apps include phrasebooks, pronunciation practice, and vocabulary quizzes. The kanji practice apps generally include flashcards and quizzes to help the user memorize different kanji. The kanji are normally categorized into groups such as Japanese Language Proficiency Test (JLPT) levels and school grade levels. The Japanese culture apps give info about Japanese bands (w-inds) and include different clocks that incorporate Japanese backgrounds or Japanese sentences along with the current time. Rilakkuma Photo allows the user to take pictures and add decoration to them just like *purikura*, decorated photos, which are very popular in Japan. In *neko no ooyasan* (The landlord of a cat), the user becomes the owner of a pet cat and looks after the cat and

plays with it. The entire menu and gameplay is in Japanese to practice

reading while playing a game. The *kukkupaddo* (Cook Pad) app is a Japanese

cookbook with recipes for Japanese dishes all in Japanese. This app is

another great way to learn Japanese since in order to follow the directions

you have to read and understand all the Japanese.

Table 8

A Listing of the Popular Apps Students Download

Type of App		
Dictionary	**Kanji Practice**	**Japanese Culture**
Midori	KanjiBox	Rilakkuma photo
Japanese	Kanjiflip	Bisei Tokei (Clock)
[I mi wa]? (Kotoba!)	JLPT study	w-inds. Official App
Japan Goggles	Japanese Flash	本気出す時計 (Honki dasu Clock)
Anki		
JED (Japanese English Dictionary)		
Reading	**Japanese Language**	**Misc**
Rikai Browser	i-Sokki Japanese Vocabulary	猫の大家さん (The landlord of a cat)
小説 viewer (novel viewer)	Learn Japanese	クックパッド (Cook Pad)

In order to determine whether teachers are a possible resource for finding out about these apps we asked the students where they found out about these apps from. Table 9 shows that overall 81% of students who are aware of apps found out about them by exploring an app store. The next most common method was close between browsing the Internet (49%) and classmates (48%). Teachers are the least common resource with only 23% of students saying they found out about apps from teachers. Since teachers are not a good resource for learning about apps we found that 1 out of 45 JAPAN 102 students, 12 out of 48 JAPAN 202 students, 1 out of 31 JAPAN 302 students and 8 out of 15 JAPAN 402 students use apps in class. This may be that students don't own apps, find apps useful or that the teachers do not allow their use in class. Four of the students in various classes mentioned that they felt rude using mobile phones in class or felt that they would be too easily distracted if they used their phone.

Table 9

Where Students Find Out About Japanese Apps by Japanese Level

JAPAN	102	202	302	402	Total
Classmate	6	16	8	8	38
Friend	4	14	9	3	31
Teacher	2	8	5	3	18
Explore store	9	30	16	10	65
Browse internet	7	15	11	6	39

To determine if students are allowed to use Japanese apps in class and if teachers were aware of these apps, we surveyed four Japanese teachers

who taught the classes being surveyed. We found that 3 of the teachers were aware of Japanese apps and 2 teachers actually downloaded and used Japanese apps. The last teacher was aware of apps but did not have a smartphone. Even though the teachers were aware of these apps none of the teachers surveyed told their students about the apps. One teacher felt that "students seem to know more about these apps than me", while another teacher said, "I don't have a smartphone, so I can't really give them instruction". When asked if they allowed Japanese apps in class two teachers said they were not allowed, while the other two teachers allowed their use in class. One teacher stated, "it's no different from using book dictionaries or electronic dictionaries. Students say they are useful". The two teachers who did not allow smartphone app use during class were both teaching JAPAN 102. One teacher said, "[N]o dictionary is needed at this level" and did not see a need for these apps at an introductory level.

In the survey study we found that students in higher Japanese levels and students specializing in Japanese were more aware of Japanese smartphone apps. There is no co-relation between the smartphone operating system or the length of time spent in Japan and being aware of apps. Our study shows that most of the students find Japanese apps by exploring an app store, browsing the Internet, or hearing about them from their classmates. Teachers are not a popular resource for learning about apps even though some teachers are aware of them. Dictionary apps are the most popular apps

to download across all levels of Japanese, but very few students use them in class even though many students think they are useful.

Results for the App Features Study

In the app features study we asked the question what features in Japanese apps students find useful. To determine this we divided the participants into three groups based on Japanese level to see if students at a different Japanese level find different features more useful: Beginner, lower intermediate and intermediate. The beginner group consisted of four JAPAN 102 students, the lower intermediate group had five JAPAN 202 students and the intermediate group had two JAPAN 302 and two JAPAN 402 students. We tested both KanjiBox and Kotoba!, two kanji apps which were outlined in Chapter 3. We asked the students to rate each feature using a five point likert scale.

Features liked and disliked about KanjiBox.

Since Japanese kanji have multiple readings for each character KanjiBox tests kanji knowledge in various ways. KanjiBox is a flashcard-based app, which tests reading of individual kanji, recognition of kanji compounds, vocabulary, and the reading of words including kanji. KanjiBox includes a Drill mode, Quiz mode and Study mode for each section. The Drill mode asks the user to choose the correct answer out of a possible four

choices. The Quiz mode is similar to the Drill mode except the user is given a certain amount of time to answer each question and gets rewarded points for each correct answer. The Study mode is similar to a two-sided flashcard with the question on one side and the answer on the reverse. When the user double taps the screen the answer for each question is given.

As we can see in Table 10, the Drill mode had a moderately high rating for usefulness across the board. We see that the beginner students rated the Kanji Definition and Missing Kanji higher than the other students. While the intermediate students rated the Vocab and Reading Drills the highest. However, there is not a large difference in rating between the three groups in the Vocab and Reading Drills. Overall, both the beginner and intermediate students rated the Drill mode higher than the lower intermediate students.

Table 10

Students' Rating of the Drill Mode

| | Kanji Definition | | Missing Kanji | | Vocab | | Reading | |
	AVG	STDEV	AVG	STDEV	AVG	STDEV	AVG	STDEV
Beginner	4.75	0.5	5.0	0	4.0	0.82	4.25	0.96
Low-Int	3.8	0.84	4.2	0.45	3.8	0.84	4.2	0.45
Intermediate	4.0	0.82	4.75	0.5	4.25	0.5	4.5	0.58

Table 11 shows the results from the Quiz mode, which is rated by the beginner students the highest in each category, although they do have a high standard deviation for both the vocab and the reading at 1.15 and 2.67 respectively. The lower intermediate students and intermediate students

rated the kanji quiz mode fairly similar with the lower intermediate students preferring the Vocab quiz and the intermediate students preferring the Reading quiz.

Table 11

Students' Rating of the Quiz Mode

	N	Kanji AVG	STDEV	Vocab AVG	STDEV	Reading AVG	STDEV
Beginner	4	4.75	0.5	4.25	0.96	4.33	1.15
Low-Int	5	4.2	0.84	4.2	0.84	4.0	0.71
Intermediate	4	4.25	0.5	4.0	0	4.25	0.5

In Table 12 the beginner students rated the Kanji Study section the highest, while there was not a large difference in the rating for the Vocab and Reading sections. There is a larger standard deviation among the beginner students in the Vocab and Reading sections, which indicates that there was a bigger discrepancy in whether it was overall a useful feature.

Table 12

Students' Rating of the Study Mode

	N	Kanji AVG	STDEV	Vocab AVG	STDEV	Reading AVG	STDEV
Beginner	4	4.75	0.5	4.25	0.96	4.33	1.15
Low-Int	5	4.2	0.84	4.2	0.84	4.0	0.71
Intermediate	4	4.25	0.5	4.0	0	4.25	0.5

Overall the students found KanjiBox easy to use and well presented with the beginner students rating it a 4.5 and 4.0, lower intermediate students rating it a 4.4 and 4.0 and intermediate students rating it a 4.75 and 4.25 respectively.

Features liked and disliked about Kotoba!.

Kotoba! is a dictionary app where the user can look up Japanese or English words. Each dictionary entry includes the word in both Japanese and English and example sentences. Kotoba! also includes a special kanji section, which includes the translation, stroke order animation, readings of the kanji, kanji compounds, and information on the radicals.

Overall, students found Kotoba! easy to use and well presented as shown in Figure 8. In both criteria the beginner students rated it the lowest, while the intermediate students rated the app the highest.
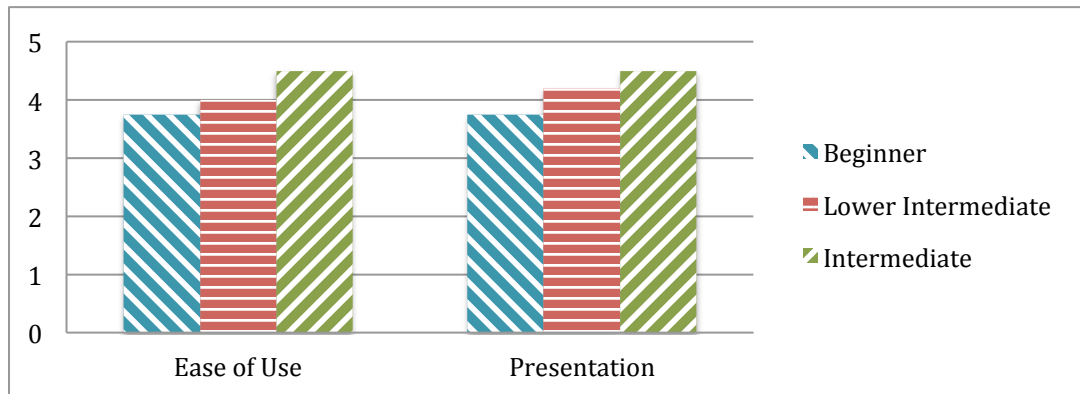
Figure 8. Overall impression of Kotoba!

Table 13 shows that the beginner students found the stroke order and stroke count more useful than the intermediate students. However, the radical list and compounds were rated the highest among the intermediate students with the beginner students rating compounds the lowest.

Table 13

Rating of Features in Kotoba!

	Stroke Order		Stroke Count		Radical List		Compounds	
	AVG	STDEV	AVG	STDEV	AVG	STDEV	AVG	STDEV
Beginner	4.5	0.58	4.5	0.58	4.0	0	3.5	1.0
Low-Int	4.4	0.96	3.6	0.5	3.2	0.5	4.0	0.96
Intermediate	4.0	1.15	3.0	0	4.5	0.58	4.25	1.5

Overall, three out of four beginner students and two out of five lower intermediate students disliked the multi-radical search since they were not at a high enough level to understand how it worked. One beginner student said, "I didn't see much use of the Chinese radicals section. However, it might be a greater study method once at a higher Japanese level." Many students also found that there was too much information included in the app. A lower intermediate student commented, "I don't think the app needs to include 'character sets', 'query codes' and 'external references sections with the kanji as it only wastes space." Most of the students liked the stroke order animations and example sentences to better understand the meaning and how to use the kanji in a sentence.

Comparison between KanjiBox and Kotoba!.

At the end of testing each app we asked the student to rate the overall

design of the app and tell us which app they preferred and why. Table 14

shows the students' ranking of the overall design using a 10 point likert scale.

With KanjiBox the ratings are pretty close together with a slightly lower

rating from the beginner students. Kotoba! had a more varied rating with a

higher standard deviation among all levels of Japanese and was preferred by

the lower intermediate and intermediate students over KanjiBox.   However,

the paired t-test had a two-tailed P value of 0.4783, indicating that the

different was not statistically significant.

Table 14

Overall Ranking of KanjiBox and Kotoba! on a 10-point Likert Scale

	KanjiBox		Kotoba!	
	AVG	STDEV	AVG	STDEV
Beginner	8.0	0.82	6.75	1.26
Low-Int	8.2	0.84	8.0	1.73
Intermediate	8.25	0.96	8.5	1.29

We can see from Table 15 that all levels of students found Kotoba!

more useful than KanjiBox. In both apps the Intermediate students rated the

apps the highest with the beginner students ranking it the lowest. Our paired

t-test yielded a two-tailed P value of 0.3370, which is not statistically

significant.

Table 15

Usefulness of KanjiBox and Kotoba! on a 5-point Likert Scale

	KanjiBox		Kotoba!	
	AVG	STDEV	AVG	STDEV
Beginner	4.0	0.82	4.25	0.96
Low-Int	4.0	0.71	4.4	0.96
Intermediate	4.5	0.58	4.75	0.5

Table 16 shows that overall most students would download each app, with Kotoba! having a higher intention of downloading the app. The beginner students would prefer to download KanjiBox, while both the lower intermediate and intermediate students would prefer to download Kotoba!. The intermediate students rated both apps fairly close and the standard deviations are similar. Our results are not statistically significant with a paired t-test result with a P value of 0.6656.

Table 16

Overall Rating on the Likelihood of Students Downloading the App

	KanjiBox		Kotoba!	
	AVG	STDEV	AVG	STDEV
Beginner	4.0	1.41	3.5	1.29
Low-Int	3.2	0.84	4.0	0.5
Intermediate	3.75	1.5	4.0	1.41

Beginners liked KanjiBox since it was "more user friendly" and "there aren't many 'game-style' apps that let me study a particular level of difficulty". One beginner student said, "KanjiBox would be more useful to

studying than Kotoba!, since Kotoba! seems more like a dictionary and requires more effort to find the kanji". An intermediate student stated, "I prefer Kotoba! [...] as a reference. While Kanji Box allows me to quiz and prepare myself, Kotoba! allows me to search specifically for the kanji that I'm looking for".

At the end of the study some anecdotal comments were collected on what features students would like to see in their ideal app. The students commented that they would like to see the use of the touch pad integrated into the app where the user can practice writing kanji. Kotoba! included sample sentences, however, they were sometimes complex and not used in casual, everyday speech. More example sentences for kanji and vocab were also popular among the participants. One student brought up optical character recognition, where you take a picture of a kanji and the app will display the dictionary page for that particular word.

Our study shows that the intermediate students prefer dictionary-like apps more than the beginner students, while students of all levels rated the flashcard app around the same. In all three levels students preferred the Drill and Study mode over the Quiz mode in KanjiBox. We can infer that students would prefer not being under pressure to answer the question in the given time while studying kanji. Students would like to see a Japanese app with more example sentences from everyday conversations, the ability to practice writing the character, and the ability to take a picture of unknown characters to look it up in the dictionary.

CHAPTER 6

DISCUSSION

This goal of this thesis was to determine how students perceive apps and if they can be a resource for language learning. This section discusses the three research questions addressed in this thesis in light of the results as presented in Chapter 5: (i) what factors influence whether students are aware of language apps, (ii) whether teachers know about these apps and inform their students about them, and (iii) what features of these apps students find useful.

Factors that Influence Knowledge of Apps

Our results show that Japanese level and whether Japanese is the major or minor affect whether the student is aware of smartphone apps. Year of study, whether they have been to Japan before, and the smartphone operating system was not significant in whether the students were aware of apps. This could be attributed to the increased interest in Japanese the higher you get in level. At the University of Alberta, the number of classes decreases from six JAPAN 102 classes to only one JAPAN 402 class, which means that there are a lot fewer students who have the interest to take higher level Japanese. By the time most students get to the third or fourth year courses, there is generally an interest in the material and the motivation to learn more about the subject outside of class. This result was inline with the findings in Barrs (2012) that the students only used CALL outside of class

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if they were interested and motivated to use it. Without the motivation to explore language learning outside the classroom the students are more likely to not be aware of Japanese smartphone apps. At the University of Alberta all arts students are required to take a second language, accounting for the increased number of introductory Japanese classes. Many of these students are only taking the class to fulfill their requirement and may not be interested in external sources to learn Japanese outside the classroom.

It was hypothesized that more upper year students would be aware of Japanese apps to help them learn Japanese, but it was only the upper year students who had Japanese as a major or minor who were more aware of apps. Since students can take Japanese at any time in their university education they could be fulfilling their language other than English requirement in their senior years and not have much interest in finding external resources for learning Japanese.

Traveling to Japan can increase interest in Japanese, however our results show that there is no significant difference whether the student has been to Japan and if they are aware of apps or not. There are many Japan travel apps available, yet none of the students surveyed indicated that they use these apps. Most of the travel apps tend to be simple phrase books for people with little or no language knowledge, so the students may have not needed these apps if they already knew Japanese. Since apps are still relatively new there is a good chance that most of the students were in Japan before apps came out.

Since apps are device specific it was hypothesized that students who used an Apple device would be more aware of Japanese apps since there is a large education app store available. Our results show that students using different operating systems were also aware of Japanese apps. This may be because the students were interested in learning more about Japanese and searched for Japanese apps on their phone. Similar to the findings by Thornton and Houser (2005) and Stockwell (2010), almost all the students surveyed owned a mobile phone and 75% of these phones were smartphones. Users who own an iPod Touch are able to download apps without owning a smartphone. A few students indicated that they used an iPod Touch but did not have a smartphone. Since not all students indicated if they had an iPod touch we are unable to determine if more students are using an Apple device than other smartphones.

Of the apps students download, dictionaries are the most popular with 72 out of 80 students in the study downloading them. This does not come as a surprise as dictionaries are a common resource to language learning. For years students have been using paper dictionaries or electronic dictionaries. Once students get to higher-level language courses the textbook is no longer able to provide the students with all the vocabulary that they may need in class. This is where dictionaries come in handy to look up unknown words or grammar points. With the introduction of smartphone dictionaries students are able to get access to an electronic dictionary for a fraction of the cost of

paper or electronic dictionaries. The results show that vocabulary and kanji practice apps were also popular among the students.

While over half the students in our study were aware of smartphone apps there are a few factors why students may not use Japanese apps. One is the cost that is associated with smartphones. Canada has one of the highest mobile plan rates in the world. In 2010, Canada had the most expensive phone plan at $67.50, followed by the US at $59.99 (Li, Ninan-Moses, & New America Foundation, 2010). Some students may not be able to afford these pricy smartphone plans and opt for a cheaper plan with a regular mobile phone. Some students may not see a use for a smartphone if their regular phone does everything they need. Another factor is that some students in the study were not aware that there were language or educational apps available for smartphones. Many students also did not know of any good apps even if they owned a smartphone.

There are a lot of factors that influence whether a student is aware of or uses smartphone apps to supplement language learning. Generally the more interest the student has in Japanese the more likely they are to search out resources to learning Japanese. Students in upper level language courses and majors or minors are more likely to be aware of smartphone apps and use them in language learning. Even if the student has an interest in the language the cost of a smartphone plan may deter the student from using this resource. In addition, students may not know of any good language learning apps or are unsure if they will be useful.

Do Teachers Allow Apps in Class

There are thousands of smartphone apps available but they are not always easy to find. Our study shows that a majority of students found the Japanese apps by exploring an app store. Since apps are still relatively new and there is a large selection of apps, students do not have a lot of guidance as to how to find good apps so they generally browse the app store or the Internet to find these resources. Another popular method of finding about Japanese apps is through word of mouth from classmates or friends. If someone finds a good app they are likely to tell their friends so that more people will be aware of the app. Students, however find out about the least amount of apps from their teachers.

Wiebe and Kabata (2010) found that teachers have a lot of influence over what resources their students use outside of the classroom and how often they use it. Our study shows that teachers are currently not a good resource for informing their students about smartphone apps since none of the teachers told their students about the smartphone apps available. One teacher did not tell students about smartphone apps since "[the] students seem to know more about these apps than me" and another teacher did not have enough knowledge of apps to share with their students. Even though the teachers did not tell their students about the apps half of the teachers allowed their use in class. This shows that the teachers feel smartphone apps can be useful to their students, especially the dictionary apps. All of the teachers who allowed smartphones in class found the apps to be no different

then using an electronic dictionary and their students said the apps were useful. Similar to other CALL studies, the teachers did not know much about the technology and felt their students knew more about smartphones than they did. Chambers and Bax (2006) found that teachers enjoyed using CALL in class but were hesitant due to a lack of knowledge and training in using the technology. This same problem is carried over to smartphone apps since they are relatively new and there is not much research in the field yet.

Most institutions do not provide support or the resources for teachers to browse the thousands of educational apps to find ones their students could use. However, some institutions are looking at promoting smartphone apps to teachers and providing the necessary resources to make this possible. The Institution for Innovation in Second Language Education, a section of the Edmonton Public School Board for grades k-12, has a center available to all the teachers where they are able to come and test out multiple smartphone apps without needing to own their own smartphone (J. Aubry, personal communication, August 2, 2012). The teachers can browse through the recommended apps and pick out the best apps to share with their students. Since the device and apps are provided, the teachers do not have to worry about buying a smartphone or browsing through the thousands of apps to find something their students may find useful. At the moment students are finding these apps by browsing an app store or hearing about them through their classmates and friends. While this can be a good way to find and share good apps, teachers have a better knowledge of what learning material can

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be beneficial to students. With more research on smartphone apps and support for teachers, apps could become a widely used resource for language learning.

Features of Apps Students Find Useful

Since all apps are not the same in quality or how they present the material it is important to look at the features that each app contains. In the study it was hypothesized that students would prefer KanjiBox for studying kanji and Kotoba! for looking up kanji. Both of these apps include many useful features and a few features that the students did not find useful. Based on the criteria outlined by Komori and Zimmerman (2001) Kotoba! would be a much better app since it includes more of the seven features they outlined as necessary to Japanese programs. However, the students rated both apps fairly similarly with the beginner students preferring the flashcard app and the intermediate students preferring the dictionary-based app. Most of the beginner students found that too much information was included in Kotoba!, making the app more confusing to use at their level.

At the end of the study the students were asked what features they would like in their ideal app. The students agreed that they liked the stroke order animation, search methods and example sentences of Kotoba! and the quiz method of KanjiBox. In addition to these features, students wanted to see an app where they could use the touchscreen to practice drawing the kanji. Tsai et al (2012) found that the students performed better on post-

tests if they used the computer-based program to practice writing kanji while

watching the stroke order animations. Since most kanji quizzes test the

ability to write the character correctly, just looking at the stroke order or the

character itself does not help all types of learners. Instead of practicing

writing the kanji on a separate sheet of paper, many students indicated that

they would like to see the ability to practice drawing each character

integrated into an app. The students also found that many of the example

sentences in Kotoba! were not examples they would see in every day

Japanese. Many students stated that they would prefer an app with more

example sentences of kanji used in everyday Japanese so they could better

understand the meaning of each word and the context they are used in. One

student said they would like to see an app where you are able to take a

picture of a character or word and the app would bring up the dictionary

entry for that word. This method is very useful if the user does not know

how to pronounce the word and does not want to take the trouble to look up

the character by stroke count or by radicals.

Although not tested in this study there are a few Japanese smartphone

apps available with many of the features the students indicated they would

like to see in a smartphone app. These features for dictionary apps are:

stroke order animation, example sentences, ability to practice writing kanji,

multi-radical and school grade search, list of compounds, and integration of

quizzes.

Midori (Japanese Dictionary) is a dictionary-based app with over 860,000 entries and 150,000 example sentences. This app includes over 12,000 kanji, each with the character's reading, meaning, stroke order animations and example compounds. Similar to Kotoba! you can search by text or by radicals. However, you can also search by drawing the character using the touchpad. This app also includes flashcards for bookmarked words and scratch paper for practicing writing kanji on an iPad. Unfortunately, this feature is not available for the iPhone or iPod.

The app, *Japanese*, is another dictionary-based app with over 166,900 entries and 52,000 examples. Similar to Kotoba!, this app includes stroke order animations and you can look up words by text, components or the SKIP code. In addition, just like Midori, the user is able to look up a word by drawing the character. This app has the ability to create your own vocabulary lists for practice, add notes to dictionary entries and to study kanji using an integrated flashcard system.

Japan Goggles uses optical character recognition to convert an image into machine-readable text to be able to look up a word or character. This app allows the user to translate Japanese words to English from live camera, still photo or album. The user does not need any knowledge of Japanese since the app gives the correct pronunciation of the word and the English translation. While the app does not always find the correct word from the scans, it is a good tool to use when reading a text with many unknown kanji

since it is quicker to look up the English translations than using other search methods such as the multi radical or SKIP search method.

The above three apps contain some of the features that the participants in the study said that they would like to see in their ideal app, but so far no app includes all the features. Both *Midori* and J*apanese* are very similar to Kotoba! and include many features that the students liked, but are the much more expensive than Kotoba! They both included stroke order animations, example sentences, a list of compounds, multi radical, and SKIP searches, and the ability to practice certain words with flashcards. However, only Midori offered the ability to practice drawing kanji, and it is only available with the iPad. This missing feature is important for Japanese language learners since in addition to character recognition, the ability to write each character correctly is still being tested in class.

It is important for developers to collect feedback on their apps since they do not always know what is the most effective learning method or how to cater to all learning styles. Some of the apps available were created as a self-study program and may not include most of the useful features. KanjiBox was created as a study program for the JLPT that the developer was studying for. At the time, he did not like any of the existing software for learning kanji so he made a program the way he wanted it (Dave duVerle, 2012). Since not all students learn the same way it is important for developers to receive feedback about their programs from users and teachers. Teachers know the most effective ways of teaching new material so this knowledge is important

for educational software. Jamieson, Chapelle and Preiss' (2005) study

demonstrates that the developers, teachers and students each had different

perceptions on the CALL program. What the developers thought was easy to

understand or user-friendly was not always the case from the students'

perspective. As mobile learning becomes increasingly more popular among

teachers, smartphone apps will become more common in classrooms. Almost

all university students own mobile phones and in a few years most students

will have a smartphone. This is why development of smartphone apps is

important for researchers. With more research on features of these apps and

how they can be effective for language learning, better apps will become

available for students to use.

CHAPTER 7

CONCLUSION

This study found that Japanese language learners are aware of the smartphone apps available and use them as a supplement to their classes. However, most of the students are in higher-level classes or have Japanese as a major or minor. Since not all students have a smartphone teachers are less likely to use these apps in the classroom so they do not exclude some students. Some teachers are allowing their use during class, but there are still some teachers who do not allow cell phones in class, even if the student may be using a dictionary app. Most of the teachers did not feel confident with this new technology and as a result did not share any apps with their students. Dictionary apps were by far the most popular app, but some students stated that they did not know of any good Japanese apps available. While there are many good educational apps none of them contain all the useful features students would like to see. Currently there are two apps that include most of the useful features the students liked, but there is no app that includes everything. Thus, students have to download multiple apps to get all the features they want to have.

While this study found many insights into Japanese apps there were a few limitations. In the survey study not a lot of teachers were surveyed since two of them taught two classes offered. In addition, one of the teachers did not fill out a survey. The four teachers in the study is not a big enough sample size to say that teacher do not tell their students about apps even if

they are aware of them. Another limitation in the survey study was that not all JAPAN 302 students chose to fill out a survey so we do not have a good sample from that level. This study could be improved if more than one institution were surveyed with a larger number of teachers and students so we could determine if there was a co-relation between the teachers' awareness of apps and the students'.

In the app features study there were only 13 participants, which is not significant enough to make definite claims to what features should be included in Japanese apps. Another limitation is that a majority of the students were fluent in Chinese, thus they already knew kanji. Since kanji is written the same in Chinese they only have to memorize the multiple readings for each character, while non-Chinese students have to also memorize how the characters are written as well. This study could be improved if there were more participants from each level and if they did not have any kanji knowledge prior to learning Japanese. This would give a better indication of which features students learning kanji would find useful.

This study is a preliminary attempt to see if students are using smartphone apps and how they are perceived. While students are more likely to use technology that they like, they may not always like features that are good for language learning pedagogically. The study shows that the proficiency of the student affects what students would like to see in an app. However, this study did not touch on how well the development of apps fit into pedagogical needs. Students have many different learning styles and

find different resources helpful in learning another language. Possible next steps for this research include studying if and how apps can adjust to different types of learning styles, and determining whether apps are effective for learning another language. More research and evaluation will need to be conducted to determine whether and how newer technologies, including smartphone apps, can become an effective resource for language learning.

Apps are becoming increasingly popular and educational institutions are beginning to do more research on this technology. It is important for developers to test out their apps with students and teachers to receive feedback on which features are useful or disliked by the students. Teachers have a lot of influence over what technologies their students use outside the classroom and would benefit their students by learning about apps and sharing the good apps with their students. This will become easier for teachers if there is more technical support and development offered in this area. Many teachers feel that their students know more about smartphones and do not feel confident in sharing apps with their students. Thus, students are left to browse the app store or find apps through word of mouth. Many students are beginning to see the use of apps for language learning as teachers are allowing these apps in class. Once smartphones and tablets become ubiquitous they will be an important tool for language learning as they can hold thousands of resources in the palm of the hand making it easy to pull out to look up a word or phrase in another language.

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Appendix A

Japanese Writing System

Hiragana and Katakana evolved through the simplification of Chinese characters during the Heian period (794-1185). Since Japanese did not have their own writing system, characters brought over from China were used to represent Japanese syllables with no regard to their meanings. Japanese could be written using kanji to represent either the meaning of a word or its pronunciation. For example, the word mountain could be written phonetically using the characters 夜 '*ya*' (evening) and 麻 '*ma*' (hemp) or use the kanji 山 (mountain) with it's Chinese pronunciation '*yama*'. Over time katakana became simplified and only used part of the kanji to represent a sound as seen in Figure 12. To make the writing system simpler for females the Chinese characters were gradually simplified to their present-day form. This alphabet, hiragana, is comprised of forty-six characters representing either a vowel or a combination of a consonant and a vowel as seen in Figure 13. (Makino, Hatasa & Hatasa, 1998 pg. 2)

ア 阿	イ 伊	ウ 宇	エ 江	オ 於
カ 加	キ 機	ク 久	ケ 介	コ 己
サ 散	シ 之	ス 須	セ 世	ソ 曽
タ 多	チ 千	ツ 川	テ 天	ト 止
ナ 奈	ニ 仁	ヌ 奴	ネ 祢	ノ 乃
ハ 八	ヒ 比	フ 不	ヘ 部	ホ 保
マ 末	ミ 三	ム 牟	メ 女	モ 毛
ヤ 也		ユ 由		ヨ 與
ラ 良	リ 利	ル 流	レ 礼	ロ 呂
ワ 和	ヰ 井		ヱ 恵	ヲ 乎
ン 尓				

Figure 9. Katakana chart including the kanji each character was associated with. The red strokes represent the part of the kanji that was used to make the new alphabet.

あ a	か ka	さ sa	た ta	な na	は ha	ま ma	や ya	ら ra	わ wa
い i	き ki	し shi	ち chi	に ni	ひ hi	み mi		り ri	
う u	く ku	す su	つ tsu	ぬ nu	ふ fu	む mu	ゆ yu	る ru	ん n
え e	け ke	せ se	て te	ね ne	へ he	め me		れ re	
お o	こ ko	そ so	と to	の no	ほ ho	も mo	よ yo	ろ ro	を o

Figure 10. Chart of hiragana and their pronunciations.

Appendix B

Student Survey

Please circle your answer.

    1. What level Japanese class are you in?

A... 102   B... 202   C... 302   D... 402

    2. My gender is:

A... Male   B... Female

    3. My age is:

A... Under 20   B... 21-29   C... 30-39   D... 40-49   E... 50 or over

    4. My current year of study is:

A... 1st Year   B... 2nd Year   C... 3rd Year   D... 4th Year   E... Other

    5. Which Japanese classes have you or are you taking? (Circle all that
       apply)

A... 101   H... 301   O... 402

B... 102   I... 302   P... 421

C... 150   J... 321   Q... 425

D... 201   K... 322   R... 427

E... 202   L... 325   S... 429

F... 240   M... 341   T... 439

G... 241   N... 401   U... 481

    6. Is Japanese your:

A... Major   B... Minor   C... Elective

    7. What languages do you know? (Please include your proficiency of
       Beginner, Intermediate, Advanced or Fluent)

<u>Language</u>   <u>Proficiency</u>

    8. How long have you visited or lived in Japan?

_____(years) _____(months) _____(weeks)   Never

9. Which of the following Japanese resources do you use? (Circle all that apply)

A... Watch Japanese anime or dramas (in Japanese)

B... Read manga or Japanese novels (in Japanese)

C... Browse Japanese websites

D... Email Japanese people

E... Go to the Japanese Conversation Club

F... Other(Please Specify) _____

10. Do you own a smartphone?

A... Yes   B... No

11. If yes, which operating system do you have?

A... Blackberry

B... Apple iOS

C... Android / Google

D... Windows 7

E... Do not know the operating system: Brand_____

F... No, why?

12. Do you know of any smartphone/ iPod apps for the Japanese language?

A... Yes (go to question 14)   B... No (go to question 13)

13. If you answered no for question 12, what is the reason? (Circle all that apply)

A... Do not have a smartphone/ iPod

B... Do not download language apps

C... Do not see a point to language apps

D... Other (please specify)

_____

14. If you answered yes for question 12, how many Japanese apps did you hear about from the following people? (Circle all that apply)

Classmate/ Friends in class	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+
Friend outside of class	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+
Teacher	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+
Exploring an App store	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+
Browsing the Internet	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+
Other _____	A... 1	B... 2-3	C... 4-5	D... 6-9	E... 10+

15. If you have a smartphone what kinds of apps, in general, do you
     download? (Circle all that apply)
A... Games
B... News
C... Sports
D... Reference
E... Books
F... Social Networking
G... Travel
H... Other (Please Specify)

_____

16. If you have a smartphone what kinds of Japanese apps have you
    downloaded? (Circle all that apply)
A... Kanji practice
B... Hiragana/Katakana practice
C... Dictionary
D... Vocab
E... Grammar
F... Reading / Manga
G... Japanese culture or games
H... Other (please specify)

_____

17. If you have a Japanese app, which one(s) do you have? For each app
    please rate the frequency you use it (Continue on last page if you need
    more room)
_____   A... Daily   B... Weekly   C... Monthly   D... Only Once
_____   A... Daily   B... Weekly   C... Monthly   D... Only Once
_____   A... Daily   B... Weekly   C... Monthly   D... Only Once
_____   A... Daily   B... Weekly   C... Monthly   D... Only Once
_____   A... Daily   B... Weekly   C... Monthly   D... Only Once

18. Do you use Japanese language apps in class?
A... Yes   B... No

19. If yes, which one(s) do you use?

20. If you do not use Japanese apps in class what is the reason? (Circle all that apply)

A... Do not have any Japanese apps

B... Not allowed to

C... Do not find them useful

D... They are only good for self-study

E... Other (please specify) _____

21. Are these apps helpful to supplement Japanese class?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

23. Please leave any additional comments about apps.

Appendix C

Instructor Survey

Please answer the following questions for the current class you are teaching.

1. In this survey which class are you teaching? JAPAN_____

2. My age is:
A... 20-29   B... 30-39   C... 40-49   D... 50 or over

3. What technologies do you use in class?
A... Textbook CD
B... Japanese movies
C... Japanese music
D... Wikis or blogs
E... Moodle / WebCT / Vista
F... email with Japanese students
G... Skype language exchange
H... Other (Please Specify) _____

4. Do you own a smartphone?
A... Yes   B... No

5. If yes, which operating system do you have?
A... Blackberry
B... Apple iOS
C... Android / Google
D... Windows 7
E... Do not know the operating system: Brand _____

6. If you have a smartphone what kinds of applications (apps), in general, do you download? (Circle all that apply)

A... Games
B... News
C... Sports
D... Reference
E... Books
F... Social Networking
G... Travel
H... Other (Please Specify) _____

7. Do you know of any smartphone apps for the Japanese language?

A... Yes   B... No

8. How did you find out about these apps? (Circle all that apply)

A... Friends
B... Colleague / teacher
C... App store
D... Internet
E... Students
F... Other (please specify) _____

9. Do you have a Japanese app? If yes, which one(s)?

10. Do you tell your students about these smartphone apps?

A...Yes   B... No

11. If you do not tell your students about the apps, why?

12. Do you allow smartphone apps in class? Why or why not? If yes, how useful are they?

13. Please leave any additional comments about apps.

Appendix D

App Features Survey

1. What level Japanese class are you in?

A... 102   B... 202   C... 302   D... 402

1. What languages do you know? (Please include your proficiency of Beginner, Intermediate, Advanced or Fluent)

<u>Language</u>   <u>Proficiency</u>

2. How long have you visited or lived in Japan?

_____(years) _____(months) _____(weeks)   Never

3. Do you have a smartphone?

A... Yes   B... No

4. If you have a smartphone what kinds of applications (apps), in general, do you download? (Circle all that apply)

A... Games

B... News

C... Sports

D... Reference

E... Books

F... Social Networking

G... Travel

H... Other (Please Specify)

_____

5. Do you have any Japanese language apps?

A... Yes   B...No

6. If yes, which ones?

7. How do you like them? What features do you like about them?

8. Comparing Kotoba! and Kanjibox, which style of app do you like better? Why?

Kanjibox

Please answer the following questions about the "Kanji" category

    1. Was the "Drill: Kanji Def" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    2. Was the "Drill: Missing Kanji" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    3. Was the "Quiz" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    4. Was the "Study" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    5. Any additional comments about the "Kanji" category?

Please answer the following questions about the "Vocab" category

    6. Was the "Drill" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    7. Was the "Quiz" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

    8. Was the "Study" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

9. Any additional comments about the "Vocab" category?

Please answer the following questions about the "Reading" category
　　10. Was the "Drill" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

　　11. Was the "Quiz" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

　　12. Was the "Study" useful?

1	2	3	4	5
Not at all		Somewhat		Very
Useful		Useful		Useful

　　13. Any additional comments about the "Reading" category?

Please answer the following questions about KanjiBox in general
　　14. Was the app easy to use?

1	2	3	4	5
Very		Somewhat		Very
Difficult		Easy		Easy

　　15. Was there enough information?

1	2	3	4	5
No		Somewhat		Yes

　　16. Was the information presented well?

1	2	3	4	5
No		Somewhat		Yes

17. Was the level of kanji at a good level for you?

1	2	3	4	5
No		Somewhat		Yes

18. Was the amount of English good?

1	2	3	4	5
Not Enough English		Good amount of English		Too Much English

19. Was the amount of hiragana good?

1	2	3	4	5
Not Enough hiragana		Good amount of hiragana		Too Much hiragana

20. Which feature(s) did you like the best?

21. Which feature(s) did you dislike?

22. How do you like the overall design of the app?

1	2	3	4	5	6	7	8	9	10
Horrible									Awesome

23. Overall, do you find this application useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

24. Do you know of other similar apps to this? If yes, please specify which one(s).

25. How likely is it that you would you download this app?

1	2	3	4	5
Definitely Will Not		Maybe		Definitely Will

Kotoba!

Please answer the following questions about Kotoba!

1. Was the app easy to use?

1	2	3	4	5
Very Difficult		Somewhat Easy		Very Easy

2. Was there enough information?

1	2	3	4	5
No		Somewhat		Yes

3. Was the information presented well?

1	2	3	4	5
No		Somewhat		Yes

4. Was the level of kanji at a good level for you?

1	2	3	4	5
No		Somewhat		Yes

5. Was the amount of English good?

1	2	3	4	5
Not Enough English		Good amount of English		Too Much English

6. Was the amount of hiragana good?

1	2	3	4	5
Not Enough hiragana		Good amount of hiragana		Too Much hiragana

7. Was the stroke order animation for each kanji useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

8. Was the stroke count for each kanji useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

9. Was the radical list for each kanji useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

10. Was the kanji "Compounds" under "miscellaneous" useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

11. Which feature(s) did you like the best?

12. Which feature(s) did you dislike?

13. How do you like the overall design of the app?

1	2	3	4	5	6	7	8	9	10
Horrible									Awesome

14. Overall, do you find this application useful?

1	2	3	4	5
Not at all Useful		Somewhat Useful		Very Useful

15. Do you know of other similar apps to this? If yes, please specify which one(s).

16. How likely is it that you would you download this app?

1	2	3	4	5
Definitely Will Not		Maybe		Definitely Will