“Mandarin For Newbies”
Development Of Mobile Game For Learning Mandarin Language

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Abstract— Creating an application named “Mandarin for Newbies” aims to bring in more exposure and accessibility towards the importance of learning Mandarin Language, through the use of technology (Android SDK, Unity, Adobe Photoshop). This is proven to be of importance through the interviewee’s responses regarding the importance and usage of Mandarin as a language. Mandarin for Newbies application aims to provide an alternate and easier way of learning Mandarin language through the use of smartphones, providing an accessible way to learn, in comparison, with the standards way of learning. The uniqueness of this application is taking the learning aspect through the usage of space repetition, which is, a learning method that takes advantage of increasing intervals of time in between subsequent review of previously learned material in order of taking advantage of a psychological spacing effect. All the while, combining it with entertainment, that is a game. This allows the user to learn as they play. Several tests, including compatibility and user acceptance tests were performed to evaluate the prototype. Although the prototype has not been able to cover the whole aspect of learning, the test results shows a satisfactory result in terms of accessibility and basic functionality.

Keywords— Language Learning, Mandarin, Game, Android SDK, Unity, Adobe Photoshop

I. INTRODUCTION

A. Background

Mobile phone has been a huge part of our lives. As time goes by, mobile phone has developed into a smartphone that are capable to contain numerous applications inside of it. People tend to use their smartphone as their medium to communicate, nevertheless not only to communicate, smartphone can be the source of entertainment and information as well.

Smartphones are built in with operating system. There are two main operating systems which are Android and iOS. Android seems to have the biggest market share among other operating systems. Therefore, Android is currently the most used operating system in the world.

Various applications can be downloaded on smartphone. Application itself has many categories such as games, tools, entertainment, and communication. Among all categories, games are the most popular one with 6.9 billion app downloads.

In order for one application is being used by the user, language is one of the most important component in an application. So far, the most common language that has been used is English followed by Chinese as the second most spoken language in worldwide. Right now, China is becoming one of the huge market in the world, therefore people such as business leaders are more interested in finding people who speak fluent in Mandarin.

With the existing data, the Author is trying to comply the consumer’s interest in learning mandarin, which will be shown in chapter five. However, according to business insider, Chinese is one of the most difficult language because it requires the memorization of over a thousand unique characters and on average it could take 1.69 years (88 weeks), or 2,200 class hours [1].

With the occurrence of this problem, the Author intended to create a mobile game application aimed to ease people in learning Mandarin. There once was an old Chinese proverb that said “Tell me and I will forget. Show me and I will remember. Involve me and I will understand” [2], therefore the Author will create a game application using English and Mandarin as the main language for people who are willing to learn by involving themselves more through playing the game.

It is proven that the game since mobile games attract numerous people. According to statista.com the user of mobile games throughout the year is continuously increasing [3]. Due to its phenomenon, the Author believes that by creating “Mandarin for Newbies” is a good opportunity for those who are interested in learning Mandarin.

B. Aims and Benefits

In this thesis project, the Author aims to educate people and ease the learning process regarding Mandarin language. The Author hopes that the game will engage more audiences of people who are interested in learning Mandarin to have a fun and interactive way in the form of android-based game application. The benefits that could be obtained by the user from this game application being created are:

1. The game will provide basic information of Mandarin that are programmed in a simple gameplay.
2. This game will have an easy learning process for the user to learn Mandarin language.
3. The user will be able to read and hear the pinyin (拼音) which is a romanization of Mandarin through the sound projection that the game provided.

4. The user can view their completed and incomplete achievements that are gained from completing several categories.

II. LITERATURE REVIEW

A. SpacedRepetition

The SRS (Spaced Repetition System) is a presentation method which makes sure that it stays constantly fresh in your mind and that gives you the information before you would forget it [4]. Using spaced repetition method as an approach, it will optimize the relation between time spent learning and learning success. Kornell said that flashcards are the beginning of the spaced repetition approach, that has a common technique for learning by repetition and feedback [5]. Flashcard is a card printed with words or numbers and briefly displayed as part of a learning drill. This is often used for tasks like learning vocabulary from foreign languages.

Bjork’s research shows that repeatedly testing yourself on what you’ve learned and learning in short bursts over time is much more effective for long-term recall than cramming [6]. Cramming is a memorization technique by absorbing copious amounts of information in a short period prior to an exam that only lasts for the short term [7]. It is recommended students practice active learning and critical thinking through discussions, individual thinking and studying in groups.

B. Research Method

The Author will conduct a research choosing qualitative and quantitative approach. After gathering both data, The Author is hoping to solve the existing problem in learning Mandarin.

1. Quantitative Research

This research is done to gather the data in a numerical form which can be measured by categories and can be used to construct graphs. Gathering the data from 25 people through spreading questionnaire forms. This research intends to discover how many of those who are interested in learning Mandarin. Also, to make a concrete conclusion based on the data related the amount of people who have the willingness to use this game application as one of the alternatives to learn Mandarin.

2. Qualitative Research

This research is an empirical research which involves a natural approach to understand more towards the individuals. The Author will be interviewing three sources who often play mobile games. This approach intends to gather more information about their interest in learning Mandarin and what are their obstacles in learning Mandarin so far. Interview session will contain some questions starting from the number of hours consuming game applications, then it goes deeper to their background, experience, interest and obstacles in learning Mandarin. As for the final question, the audience will be questioned by the Author, regarding the intention to learn Mandarin through application.

C. Software development methodology

Agile Method

As for this project, Agile Scrum Method will be used by The Author to help him addresses the complexity of this project during the development level. According to scrumalliance.org in 2017, Agile Scrum Development Methods are a group of software development methodologies based on the same principles or short-term system development that require rapid adaptation of developers to changes in any form [9]. Scrum’s development process involves several phases, such as:

1. Detailed Requirements

At the beginning of this stage, gathering all the qualified information and identifying all the key information in order for The Author to develop this program is necessary. The further step after gathering all the data is analyzed and summarized all the information which will be needed in the future.

2. Design & Analysis

At this stage, The Author begins to develop a design of the system flow and also another attribute that this game application needed. There will be sound projection of how to pronounce some of the Mandarin words.

3. Implementation & Developer Testing

At this stage, The Author will continue implementing a system that will be used in the application. In order for The Author to get a better result, conducting test to several people regarding the effectiveness of the application will be needed for further improvement of this project.

4. Quality Assurance / Acceptance Testing

At this stage, The Author will check the built-in prototypes and make sure that the prototypes are built in a way that allows the functionality to work in its full capability and ready to be shown at the public.
5. Evaluation / Prioritization

After getting feedbacks from the respondents, The Author will create the software according to existing prototype and continue to add its functionality simultaneously in order for the application to be dynamic and achieving the company’s goal.

III. SOLUTION DESIGN

A. System Architecture

![System Architecture Diagram]

Fig. 7 System Architecture

The system architecture shows the system of the “Mandarin for Newbies” game application. It shows all the system start from the user until the end of the game and back to the user.

The system starts by the user do some input and interact with the game by launching the game then click play, then the user will be able to choose the categories available. After the user chose a category, they will play the game until all the answers have been put into the correct order. The game ends with results of the game that have been played by the user which shows them how many stars they get and how long it takes for them to finish the chosen category.

B. Use Case Diagram

![Use Case Diagram]

Fig. 8 Use Case

- Achievements - User will be directed to Achievements page where list of all achievements and the Level of user will be displayed.
- View Level - User can view their current level based on the “stars” they earned.
- View Completed Achievements - User can view the list of all completed achievements in the Achievements page.
- View Incomplete Achievement - User can view the list of all incomplete achievements in the Achievements page.
- Categories - User will be directed to Categories page where list of categories will be displayed.
- Numbers - User will be directed to play Numbers category
- Fruits - User will be directed to play Fruits category
- Colors - User will be directed to play Colors category
- Clothes - User will be directed to play Clothes category
- Animals - User will be directed to play Animals category
- Play Game - User will be able to play the selected category
- Drag - User will be able to drag the answer
• Dror - User will be able to drop the answer in right question
• Tap to hear the Sound - User needs to tap the question to hear the correct answer.
• Tutorial - User will be directed to Tutorial page where instructions are shown.
• View Tutorial - User can view the instructions of how to play the game.
• Toggle Sound (on/off) - User will be able to turn the sound on or off.

IV. IMPLEMENTATION AND TESTING

A. System Requirement

The specifications of hardware and software that is used by the Author to develop the game application will be described, also the requirements of specification will be discussed in these sections:

1. Platform Used for Development

TABLE III. PLATFORM USED FOR DEVELOPMENT

<table>
<thead>
<tr>
<th>HARDWARE</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
</table>
| Android Device | Xiaomi Mi 6  
Operating system: Android 7.1.1 (Nougat)  
Processor: Octa-core (4x2.45 GHz Kryo & 4x1.9 GHz Kryo)  
Graphic: Adreno 540  
Memory: 128 GB, 6 GB RAM |
| Laptop | ASUS N550JK  
Operating system: Windows 10  
Processor: Intel Core i7-4710HQ CPU @2.50GHz  
Graphic: NVIDIA GeForce GTX 850M  
Memory: 1 TB, 8 GB RAM |

List of software and supporting applications used to develop the game:

- Unity
- Android SDK
- Adobe Photoshop

2. Requirements for User

To be able to run the “Mandarin for Newbies”, the user needs to have a hardware which is Android phone with a certain specification.

TABLE IV. REQUIREMENTS FOR USER

<table>
<thead>
<tr>
<th>HARDWARE</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Android Device</td>
<td>Operating system: Android 6.0 or above and Supported with all Google services</td>
</tr>
</tbody>
</table>

B. Testing Result

1. Alpha Testing

The Author will test the system first to see if there were any major bugs before presenting it to the users to be tested. In order to ensure that the application with all of its features are running properly, it would need to have the errors and bugs fixed and solved first.

2. Beta Testing

In this part, the application was tested by the users. There were 2 users requested to conduct the testing. According to the Author’s development method which is scrum methodology, there were 2 iterations in the developments. The Author was present the user about how the application will works in order to understand the application. After the application was tested, the users were interviewed by the author. This was done to know the user’s experience, opinions and suggestions. The results were used by the Author to further develop, fix, and enhance the application. The interviews were recorded by the Author and translated to a script, which will be attached to the appendix session.

V. DISCUSSION

A. Limitation

The research has given many lessons and experience to the Author. This being the first time that the Author creates an android based mobile application that implemented Unity, Android SDK and Adobe Photoshop.

1. The application is strictly made for Android Operating System.
2. The vocabulary of the program only consists of 45 basic words.
3. The application is only made in an English version, where the mandarin words are translated into English.
4. The only writing form provided is pinyin while there are other forms of writing such as simplified and traditional mandarin.
B. Research Analysis

“Mandarin for Newbies” is a research project that aims to educate people regarding Mandarin language. The objective of the research itself is to make an application to help ease the process of learning Mandarin language, in a way through providing entertainment and challenges along the course of learning.

Throughout the first phase of development, “Mandarin for Newbies” has been constantly tested and modified accordingly in order to achieve the objective. In the first iteration of the project, the application was developed after the Author received the required information through research, interviews and providing questionnaires. From all the compiled information, the Author gained a better understanding about what is needed by the users and data that supports the Author’s proposed solution. Furthermore, based on the results collected, a 100% of the respondents agreed that the application can help ease the learning experience.

Along the way, the Author has also collected the data on the information that is required when building an application regarding the course of a learning experience and chose based on the importance such as: Listening and Reading. This led the Author to build an application that provides challenges to the users and provide a basic learning experience through the stated methods. Afterwards, the application was then tested with the goal of gaining opinions from the users in order to further research of what should be improved and what needed to be fixed. In the first testing, the Author wanted to make sure that the basic features such as User Interface, achievement and level features are presented and functioned properly.

In the second iteration, both the positive and the negative feedback received were processed. In this phase, the Author get the required information to know what needs to be fixed and the features that needs to be added. The features that needs to be added, based on the feedback includes: Tutorials and Sound effect. Several functionality and bug also needed to be fixed before proceeding to the development phase. Afterwards, the testing, and interview are then handed out again towards the same testers in the first iteration’s testing. The feedback gained in this phase is then later be used as the Author’s references for future development.

Furthermore, through the presence of possible improvement, the successful result of the application and the tests leads to an evidence. “Mandarin for Newbies” as an educational application is able to reach the aim of the study.

VI. CONCLUSION

After an in-depth development and evaluation of the prototype application, it is concluded that the application’s prototype has managed to produce positive results. In term of functionality, it has implemented the concept of gamification quite well and is accepted positively by the user-testing group in this project. The program’s components considered in the previous sections of this report have been implemented and is considered adequate for continuous development and usage.

In terms of feedback from the users, testers of the prototype application have mostly responded well and have presented several improvements towards the prototype that will be discussed in the next section of the report. Therefore, the game will provide basic information of Mandarin, an easy learning process, make the user able to read and hear the pinyin and view their achievements.

In conclusion, based on the scrum methodology conducted, the application’s prototype has shown its worth as a proper tool to assist users in learning the Mandarin language in an easier and rewarding way. The application is hoped to remain viable options for potential users that are looking for a way to learn the Mandarin Language.

REFERENCES