

**SERIOUS GAMES FOR LEARNING  
KOREAN LANGUAGE – HWAITING!!  
APPLICATION**

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SERIOUS GAMES FOR LEARNING KOREAN LANGUAGE- HWAITING!!  
APPLICATION

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## ABSTRAK

Aplikasi “Hwaiting!!” membantu pelajar memperoleh kemahiran berkomunikasi asas dalam Bahasa Korea dengan menggunakan gabungan pembelajaran interaktif dan permainan interaktif yang memberikan pengguna konteks konkrit untuk membangun dan menggunakan kemahiran mereka. Sejak pertumbuhan pesat perdagangan dua hala antara Malaysia dan Korea Selatan, dan jumlah pelaburan Korea yang memasuki Malaysia telah mempengaruhi permintaan bagi orang yang mempunyai kepakaran di Korea. Oleh itu, masalah yang timbul adalah mengenai sistem pendidikan di Malaysia, tidak termasuk kelas Bahasa Korea dalam silabus seperti bahasa Mandarin, yang menjadikan mereka sukar untuk belajar. Objektif projek ini adalah untuk merekabentuk dan membangunkan aplikasi permainan serius mudah alih yang menyediakan pendidikan bahasa Korea untuk pelajar. Pada akhir projek ini, aplikasi ini akan menyediakan perisian yang sangat baik, di mana pengguna boleh mempelajari konsonan asas dan berganda, vokal asas dan berganda dengan mendengar audio serta dengan bantuan perumian, dan juga latihan perbualan dari segi salam dan topik membeli-belah melalui aktiviti latihan padan suai, serta termasuklah soalan pelbagai pilihan dengan audio yang boleh didengar, grafik dan reka bentuk yang bagus, dan juga mesra pengguna. “User Accepting Testing” telah digunakan untuk mendapatkan maklum balas pengguna dan mengenalpasti kebaikan dan keburukan projek yang telah dibangunkan sepenuhnya. Artikel ini memberikan gambaran keseluruhan aplikasi, dan menerangkan pengalaman hingga kini dalam peralihan aplikasi dari prototaip ke dalam aplikasi latihan berlandaskan metodologi Model Addie.



## **ABSTRACT**

The “Hwaiting!!” application helps learners acquire basic communicative skills in Korean languages by going through the combination of interactive lesson and interactive games that give user a concrete contexts in which to develop and apply their skills. Since the rapid growth of bilateral trade between Malaysia and South Korea, and the growing amount of Korean investments entering Malaysia have influenced the demand for people with expertise on Korea. Hence, the problem is education system in Malaysia did not include the Korean Language classes in the syllabus like Mandarin does, which make it difficult for them to learn. The objectives of this project is to design and develop a mobile serious games application that provide Korean language education for student. At the end of this project, this application will provide the excellent courseware, where user can easily learnt the basic and double consonants, basic and double vowels by listening to the audio, with the help of romanization, and also the conversation practice in term of greetings and shopping topics through the drag and drop activities, nice graphics and design, include multiple choice questions (MCQs) and also user-friendly. The User Acceptance Testing (UAT) had been used in order to get a feedback and find the pros and cons of the fully developed project. This article gives an overview of the application, and describes the experience to date in transitioning the application from prototype into training application using Addie Model methodology.

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## LIST OF ABBREVIATIONS

HA	Hwaiting!! Application
UAT	User Acceptance Testing
MCQ	Multiple Choice Questions

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND**

Game has been an entertainment for both children and adolescents that fascinated enough for them to dedicate their leisure time to play it. Children mostly explore the world around them by playing games and interacting with others. Nowadays, students still learn by playing during the formal education process. In order to communicate with the people around the world, they need to develop speech and social skills. Hence, games should also be beneficial in second language acquisition among adults since playing games has a positive influence in first language acquisition process.

Serious games is a type of game that being designed purposely to educate, training and simulate the user on the topics being covered, for example foreign language like Hangul (Korean). Hangul is a symbol system that had been created for the official alphabet of the Korean language by the Great King Se Jong in Joseon Dynasty in purpose to awake the illiterate citizen (Haneul, n.d.). Hence, games can act as one of the important part of learning experiences in a Korean language as it is easy to learn. It will provide the chance for the language learners to apply what have been taught in the class in a fun and most relaxing ways.

“Hwaiting!!” application is designed to help learners quickly acquire basic communication skills in Korean languages by going through the combination of interactive lesson and interactive games that give user a concrete contexts in which to develop and apply their skills.

## 1.2 PROBLEM STATEMENT

Educational systems are responsible to train individuals to participate actively in political, economic and social relations. Hence, one of the needs of individuals is to develop skills in listening, speaking, reading and writing in foreign language so they can communicate, make projects, gather data, and make businesses in international platform. Since the rapid growth of bilateral trade between Malaysia and South Korea and the growing amount of Korean investments entering Malaysia have influenced the demand for people with expertise on Korea.

Based on table 1.1 below, we can see the problem that occur are due to education system, educational process, teachers and also learners.

Table 1.1 the problem statement description and effect.

Problem	Description	Effect
1. Education System	<ul style="list-style-type: none"> <li>- It is vital to have a national system of foreign language teaching (Oktay, 2015), which requires a scientific plan.</li> <li>- Another significant throwback to completing task is student achieving testing system.</li> </ul>	<ul style="list-style-type: none"> <li>- If there is enough scientific planning, starting Korean courses at earlier grades can produced the expected result.</li> </ul>
2. Educational Process	<ul style="list-style-type: none"> <li>- Teach to test with less time devoted to activities that are not part of the test.</li> <li>- Consider the atmosphere, appearance, size, and equipment of learning places.</li> </ul>	<ul style="list-style-type: none"> <li>- Has negative impacts on educational process.</li> <li>- Larger classes causing failure because it's impossible to closely monitor students' language</li> </ul>

		use. It also present problem of control and discipline.
3. Teachers	- Method of teaching.	- Student will feel bored if kept doing learning session only by books.
4. Learners	-Learner struggle to understand the relevant of learning Korean.	- Causes negative attitude towards foreign language learning.

### 1.3 OBJECTIVES

Based on the problem statements above, the objectives of the “Hwaiting!!” application project are:

- i. To study the available mobile serious game applications that provide Korean Language education for student.
- ii. To design and develop a mobile serious games application that provide Korean language education for student.
- iii. To evaluate the effectiveness of the developed mobile serious games application that provide Korean language education for student.

## 1.4 SCOPE

Based on table 1.2 below, it shows the scope of project which are user, system and development.

Table 1.2 the scope of project

User	The targeted user for this games are people that take Korean language as their second/third language.
System	<ul style="list-style-type: none"><li>i. Microsoft Words</li><li>ii. Unity</li></ul>
Development	<p>Module included:</p> <ul style="list-style-type: none"><li>i. Learn the basics of Hangul (included basic consonant, vowels, double consonants and vowels)</li><li>ii. Learn the communication using Hangul (in term of Greetings and Shopping)</li><li>iii. Will contain some audio , quizzes and games</li></ul>

## 1.5 THESIS ORGANIZATION

This thesis consists of five chapter.

**Chapter 1** consist of Introduction, Background, Problem Statement, Objectives and Scope of the project.

**Chapter 2** consist of Literature review. This chapter is about comparison between the existing systems that are related to “Hwaiting!!” application.

**Chapter 3** consist of Methodology. This chapter will explain about the methodology that will be used in developing “Hwaiting!!” game such as incremental or RAD.

**Chapter 4** consist of Implementation. This chapter explain about the design and implementation process of “Hwaiting!!”.

**Chapter 5** consist of Conclusion which concludes all the things we get from developing “Hwaiting!!”.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter will cover about review of available application of game in the field of Korean language. These three (3) existing game application in Korean language are explained in term of Graphical User Interface (GUI), Operating System (OS), language provided, target audience of application, size of application, version application, the advantages and disadvantages of the application. This comparison of this existing application recommend the strength and effectiveness of existing application, so that this project can produce a better version of application in learning Korean.

#### **2.2 GAMES**

Game is a fun activity involving a task that is accomplished by following certain rules, usually in competition with one or more individuals (Ketterlinus, 2017).

There are some basic characteristic of game. Those are:

- i. Rules – is the structure of the game. This rule solely bound on those who enter the game-play voluntarily and does not applied nor existed outside game environment.
- ii. Goals – each game started with some specific goals. It can be describe as the accomplishment or winning by playing the game.
- iii. Chance – Each time player play the game, the games offer difference type of courses which can intrigued user interest and also bring them uncertainty that will make the games more exciting and delightful.

- iv. Competition – Players can show their competitiveness openly in game play as the competitiveness is subtle. The rules determine the board of comparison among the players in games.

Other consideration of game key point is interaction between the player and games system. Many games greatly help to develop practical skills, serve as a form of exercise, or otherwise perform an educational role.

## **2.3 TYPE OF GAMES**

In this subtopic, we will discuss in details about the type of games, which are Mobile Games, Educational games/Learning games in subtopic 2.3.1 and 2.3.2 respectively.

### **2.3.1 MOBILE GAMES**

A mobile game is a game played on a smartphone/tablet, smartwatch or portable media player.

Today, mobile games are usually downloaded from app stores. Other than that, mobile games tend to be small in scope and many prioritise innovative design and ease of play over visual spectacle (Mobile Game, 2018 ).

In 2000s, the popularity of mobile games has been increasing. This can be proved by the result of about over \$3 billion USD worth of games were sold internationally in 2007 , thus projected annual growth of over 40%.

### **2.3.2 EDUCATIONAL GAMES/LEARNING GAMES**

Educational games or learning games are the games that used for learning or educational purpose. These type of games have the basic characteristic of games, but with some enhancement in order to manipulate the essence of learning behaviours. These games usually used to increase the player skills and knowledge, which sometimes they also need to have critical thinking in order to solve problem.

Academician use these type of games learning in order to engage the children, thus drill the student skills and at the same time improving their concentration level. Educational game is created based on combination of educational content, learning principles and games concept.

### **2.4 REVIEW OF EXISTING SYSTEMS**

In this subtopic, we will review the three (3) existing systems of game-based learning for Korean language.

## 2.4.1 EXISTING GAME 1: HANGUL PUNCH

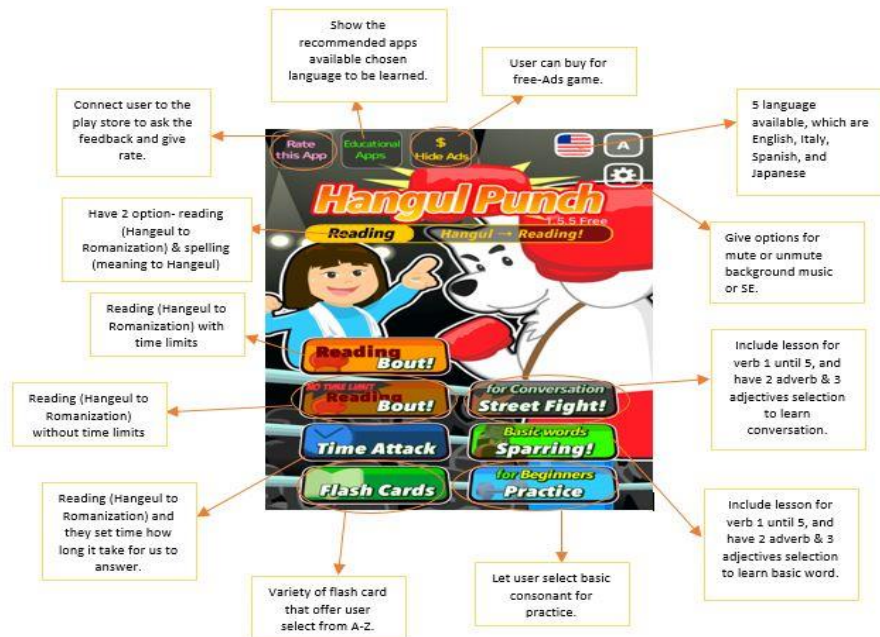


Figure 2.1: Hangul Punch Serious Game

Hangul Punch is an implemented serious games as it consist of some action that required to do by the user. This game developed by Hikari Nakashima. It's "Practice mode" is for player to practice the basic Hangeul characters one by one. The player will master the configuration of the Hangul characters by this mode.

When the player already master the structure of a character, the player will want to be able to read the word. At that time, player can challenge "bout mode" to play against the rival. In the "bout mode", the words of food relationship will appear. If the player did not master reading of a word, the player cannot win the bout.

This game based on master the Korean characters in boxing.

How to play this game:

1. Firstly, Hangul characters are displayed on the screen.
2. Select a Hangeul punch.
3. If it is correct, punch will hit the counter.

4. When wrong in the bout, counter will hit the player.

If player understand the structure of a character, then player can punch (Nakashima, 2018).

In table 2.1, it shows the strength and weakness of Hangul Punch games.

Table 2.1 Strength and weakness of Hangul Punch games

STRENGTH	WEAKNESS
The games include the basic consonants for beginner in Korean language to practice first before play the game.	Sometimes the words are repeated in the same game.
Using suitable audio.	In-app purchase in order to hide the ads.

## 2.4.2 EXISTING GAME 2: LEARN KOREAN LANGUAGE GAME (SMART HANGUL LEARNER)

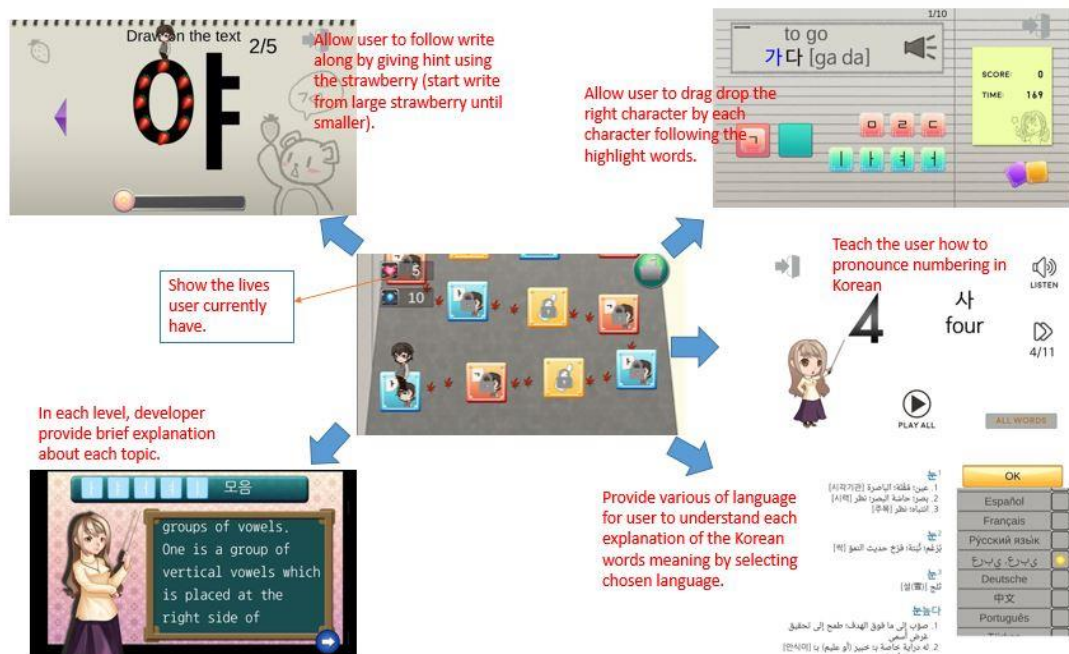


Figure 2.2: Learn Korean Language Game

Learn Korean Language Game is an entertainment game which developed by A.D.D Software using UNITY software. The main purpose for the developer to create this application is for the player/user can easily learn from Korean alphabets to the real life expressions through playing game with no more tedious memorizing (Software, 2017).

The information about this games:

1. This application is basically for beginner: Learn from Korean alphabet – Hangul
2. The user need to play a game to review what they learnt
3. Korean pronunciation are available along every words
4. Collected Korean real life expressions
5. Learn with pictures: no more vocabulary book memorizing

In table 2.2, shows strength and weakness of Learn Korean Language (Smart Hangul) games.

Table 2.2 Strength and weakness of Learn Korean Language games

STRENGTH	WEAKNESS
<p>This game taught step by step, which first, they provide explanation in each stages, and enter the next phase which taught user how to pronounce and write the character.</p>	<p>The main character has short lives (5 lives for 5 stages). Need to wait about 6 min for it to be reload.</p>
<p>Easy to understand for the beginner that want to learn Korean.</p>	<p>Require user to install Google Play Games app which will take more spaces.</p>

### 2.4.3 EXISTING GAME 3: POPPOPPING KOREAN

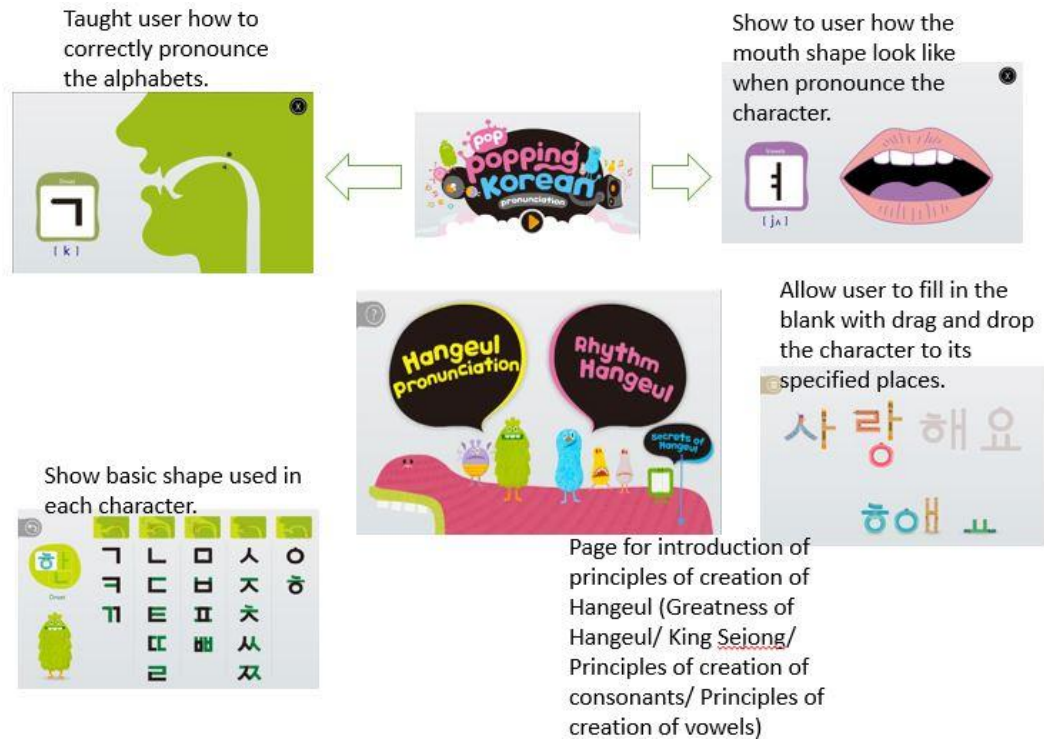


Figure 2.3: Hangeul Punch Serious Game

PopPopping Korean is an education application designed for foreigners to learn Korean in an easy and faster way with fun. It is developed by (주)한솔교육 (Hansol Education Co. Ltd.) , a prominent Hangeul education company in Korea (Ltd., 2015).

The characteristic of this applications are, easy, fun and fast way to learn Korean with mobile devices.

- i. Easy – Which user can easily induce and emulate the pronunciation of onset consonants, vowels, and coda consonants through pronunciation animation. These make user can become more familiar with the pronunciation of Hangeul.
- ii. Fun – User can combined and mix the pronunciation of Hangeul to make rhythm. When the word is complete, the animated cartoon will appear.



- iii. Fast – Enable user to be able to read Hangeul in short period of time, not just memorizing.

The components available in this applications are:

- i. Hangeul Pronunciation: User can view animations on the pronunciations of Hangeul.
  - Onset/Vowels/Coda
  - Syllables – Learning of syllables
- ii. Rhythm Hangeul: User can play the Rhythm Hangeul game.
  - Fifty words related to the Korean wave.
  - Comic animations with the meaning of the words.
- iii. Secrets of Hangeul – Mainly page for introduction to the creation of Hangeul by King Sejong.

In table 2.3, shows the strength and weakness of PopPopping Korean games.

Table 2.3 Strength and weakness of PopPopping

STRENGTH	WEAKNESS
This application excels at not only vocal, but also visual examples on how your mouth and it consents should be positioned to help make the unique sounds.	The background music is too loud and there are no any settings to turn down to understand better what is being taught.
The design is visually appealing, efficient and memorable.	Required user to install Adobe AIR in the phone before used.

## 2.5 EXISTING GAMES COMPARISON

In this subtopic, we will discuss about the existing game comparison which are, Hangul Punch, Smart Hangul, and PopPopping Korean with this project, “Hwaiting!!” application.

Table 2.4 shows the comparison of these three (3) existing game with “Hwaiting!!” application.

Table 2.4 Existing game comparison

FEATURES	HANGUL PUNCH	SMART HANGUL	POPPOPPING KOREAN	HWAITI NG!!
Graphical User Interface (GUI)	✓	✓	✓	✓
Target Audiences	Beginner (12+)	Beginner (3+)	Beginner (3+)	Beginner (10+)
Size-storage	Varies with devices	69MB	31MB	Varies with devices
Requires Android (OS)	Varies with devices	2.3 and above	2.2 and above	Varies with devices
Current version	Varies with devices	4.8.2	1.0.0	-
Advantages	Various learning such as conversation etc	Basic Korean language.	Basic Korean language.	Include basic and intermediate learning.

Drawbacks	Include In-app Product that cost RM 11.78 per item	User need to wait in order to renew lives.	No option for user to lower or mute the background music.	Beta-version
User friendly	✓	✓	✓	✓
How to play	✓	✓	✓	✓
Hint	✓	✓	✗	✓
Level information	✓	✗	✓	✓
Pop up message	✓	✓	✓	✗
Suitable & Adjustable Audio	✓	✓	✗	✓
Graphic quality	✓	✓	✓	✓
Information about game	✓	✓	✓	✓
Advertisement	✓	✓	✗	✗

Based on the comparison made in the table above, we got to review that each games have quite same features. Most of it focus on targeted user below 13. Since we are basically produced this game to make it easy for user especially foreigner who wish to learn Korean language, that is why the focus should be below 13 years old. It is due to each new learner should learn beginner part first instead of jump to the intermediate in order to enhance their basic before proceed.

Last but not least, we can conclude that the application will be better if the topic covered provide option, where user can play the beginner or intermediate (such as conversation) stage, user-friendly, and have a good graphic quality without an advertisement and controllable volume/sound. We can use these implications and insert/apply it in this “Hwaiting!!” application, so that we will get the great and attractive application.

## **2.6 METHODOLOGY**

In this subtopic, we will discuss in details about three (3) methodologies which are Waterfall model, ADDIE model, and agile model.

## 2.6.1 WATERFALL MODEL

The Waterfall Model were referred as linear-sequential life cycle model as it is illustrated in a linear sequence flow. The Waterfall Model are easy to understand. Each phase in the Waterfall Model must be completed one by one before it can moves to the other phase. The phases will not overlap (Sharma, 2016).

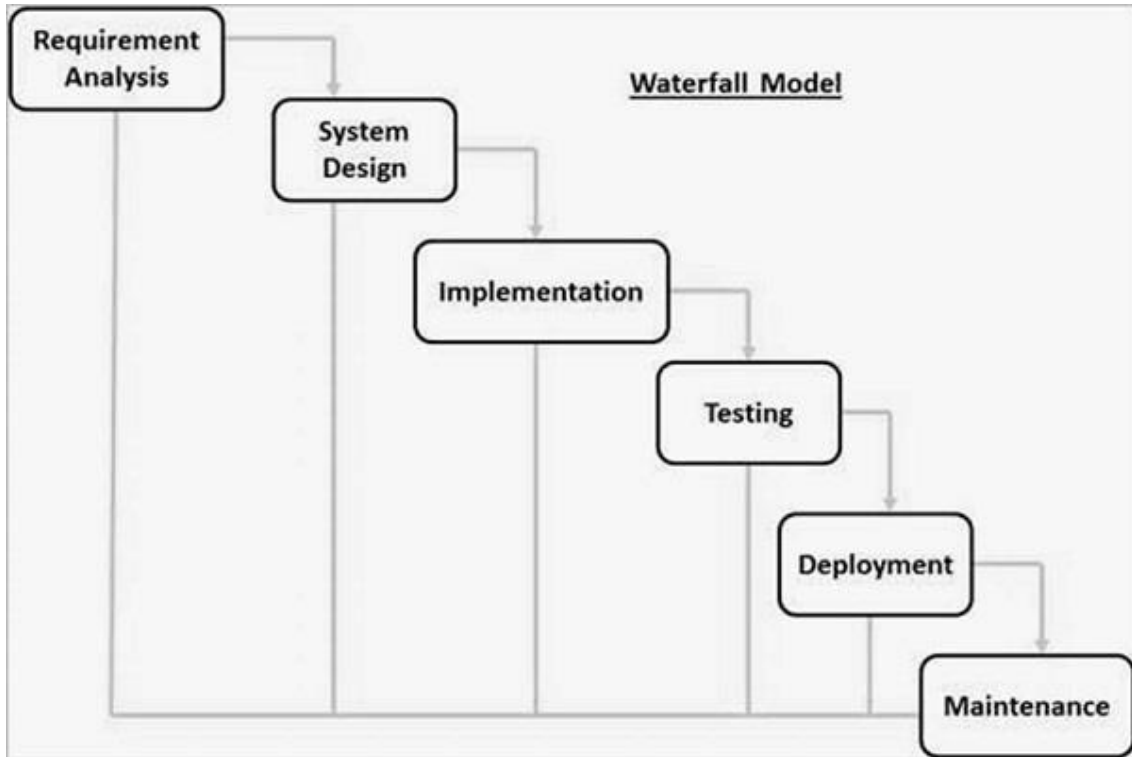


Figure 2.4: Waterfall Model

There are 6 phases in this methodology which will be explain briefly below:

1. Requirement Analysis  
-In this phase, all systems possible requirements to be developed are captured and documented in a requirement specification document.
2. System Design  
-The requirement specifications from first phase are studied. This phase help to specify hardware and system requirements, and helps to define overall system architecture.
3. Implementation

-With inputs from system design, the system will developed first in unit (small programs) and are integrated in next phase. Each unit is developed and tested for functionality (Unit Testing).

4. Testing

-After testing each units, it will integrated into system. The post integration of entire system is tested for any faults and failures.

5. Deployment

-Product will be deployed/released into market once settle the testing for functional and non-functional.

6. Maintenance

-Some issues will come up in client environment. In order to fix those issues, patches, and to enhance better version of product are released. Maintenance is done to deliver these changes in the customer environment.

Table 2.5 Advantages and Disadvantages of Waterfall Model

ADVANTAGE	DISADVANTAGE
Easy to understand and use	Not suitable for randomly changing requirement
Phases are processed and completed one at a time	Not suitable for complex and object oriented projects

## 2.6.2 ADDIE MODEL

The ADDIE model is the process traditionally used by instructional designers and training developers. The five phases (Analysis, Design, Development, Implementation, and Evaluation) is represent a dynamic, flexible guideline for building effective training and performance support tools (ADDIE Model, n.d.). In the ADDIE model, each step has an outcome that feeds into the subsequent step.

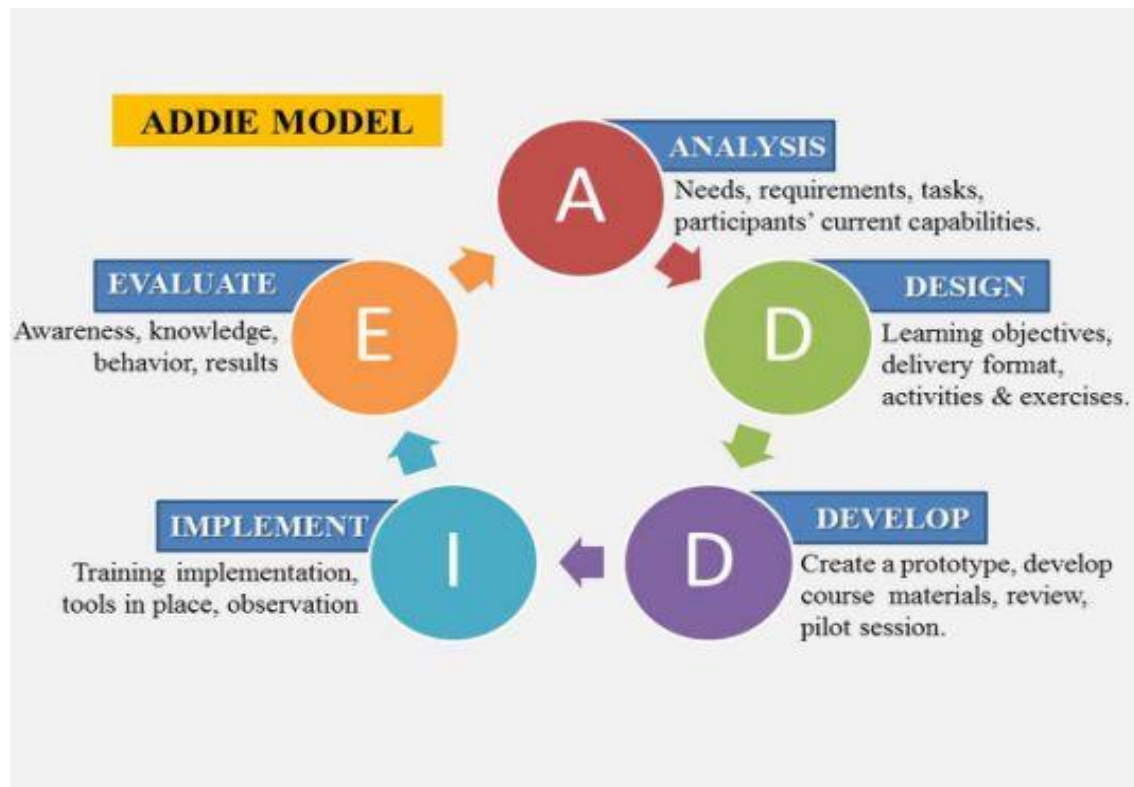


Figure 2.5: ADDIE Model Methodology

There are 5 phases in this methodology which will be explain briefly below:

### 1. Analysis

In this phase, instructional problem, the instructional goals and objectives, the learning environment, and learner's existing knowledge and skills are clarified established and identified respectively. Below are some of the questions that are addressed during the analysis phase:

- Who is the audience and their characteristics?
- Identify the new behavioural outcome?
- What types of learning constraints exist?

- What are the online pedagogical considerations?

## 2. Design

This phase deals with learning objectives, assessment instruments, exercises, content, subject matter analysis, lesson planning, and media selection. The design phase should be systematic which are logical and have orderly method of identifying, developing and evaluating a set of planned strategies that are targeted to attain the project's goals. Other than that, this phase also should be specific which means each element of the instructional design plan needs to be executed with attention to details.

These are steps used for the design phase:

- Documentation of the project's instructional, visual and technical design strategy.
- Apply instruction strategies according to the intended behavioral outcomes by domain (cognitive, affective, psychomotor).
- Create storyboards
- Design the user interface and user experience
- Prototype creation
- Apply visual design (graphic design)

## 3. Development

The development phase is where the developers create and assemble the content assets that were created in the content assets that were created in the design phase. Programmers work to develop and/or integrate technologies. Testers perform debugging procedures. The project is reviewed and revised according to any feedback given.

## 4. Implementation

During the implementation phase, a procedure for training the facilitators and the learners is developed. The facilitators' training should cover the course curriculum, learning outcomes, method of delivery, and testing procedures.



Preparation of the learners include training them on new tools (software or hardware), student registration.

5. Evaluate

The evaluation phase consists of formative and summative where it present in each stage of ADDIE process and tests designed for domain specific criterion-related referenced items respectively. They also provide opportunities for feedback from the users.

Table 2.6 Advantages and Disadvantages of ADDIE Model

<b>ADVANTAGE</b>	<b>DISADVANTAGE</b>
ADDIE model is flexible – it can be used for traditional instruction, individual instruction and across industries.	A common complaint is that ADDIE is a linear process.
ADDIE model can be used with different evaluation strategies.	It's time consuming and costly.

### 2.6.3 AGILE MODEL

Agile Model is a rapid delivery of working software product and it is a combination of both iterative and incremental process models which focus on client satisfaction. It is breaks into small incremental builds which provided in iterations that is typically lasts for about one to three weeks for each iteration. In every iteration, it involves planning, requirement analysis, design, coding, unit testing and also acceptance testing. At the end of the iteration, the working product will be shown to the client and important stakeholders (Powell-Morse, 2017).

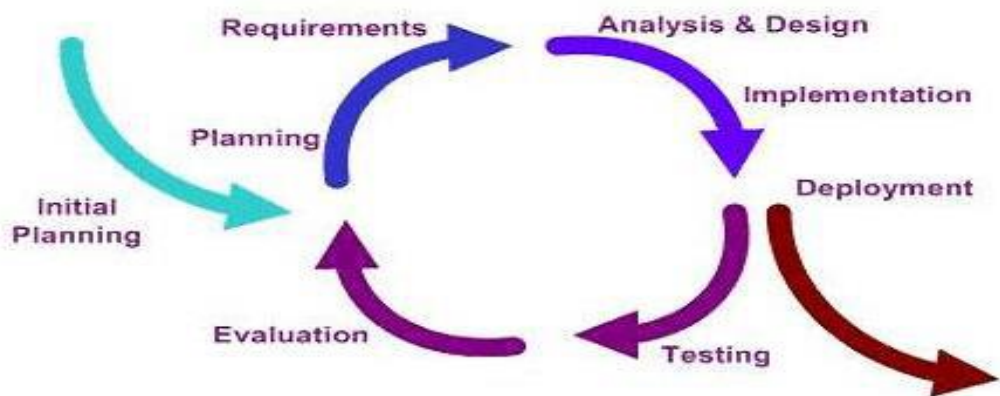


Figure 2.6: Agile Model

Table 2.7 Advantages and Disadvantages of Agile Model

ADVANTAGE	DISADVANTAGE
Adaptive to necessary changes	Highly depends on client requirements
Increase the reusability of the components	Time consuming (Powell-Morse, 2017)

## 2.7 TECHNIQUE

In this subtopic, we will discuss in details about the technique used to develop the project.

### 2.7.1 PROGRAMMING LANGUAGE

In this subtopic, Table 2.8 shows the explanation Java of and C# programming language.

Table 2.8 List of Programming Language

<b>Programming Language</b>	<b>Explanation</b>
Java	Java language using its own structure, syntax rules and programming paradigm and it implements the concept of Object Oriented Programming. The java language starts with package and within the packages there are classes and within the classes there are methods, variables, constants and more. The instruction that is suitable for the CPU chipset is written out and the program will run on, in the Java compiler.
C#	Implemented the Object Oriented Programming (OOP) Language. Developers are able to build variety of secure and robust application. Provides a convenient user interface design and also simple and easy to learn. C++ complexity is simplified by C# syntax. Provided some powerful features such as null-able value types, enumerations, delegates, Lambda expression and direct memory access

## 2.7.2 APPLICATION

In this subtopic, Table 2.9 shows the explanation of Mobile Application and Web Application.

Table 2.9 List of Application

Application	Explanation
Mobile Application	Mobile application is a type of software that run services that is accessed by PC on a mobile devices. The application that is a mobile based usually has small capacity and limited functions than the PC version. The example of mobile application that have been using nowadays are Google, Email, Facebook, which is offers for a PC application at the first place.
Web Application	Web Application is a computer program that run services on a web server that need to be accessed by the use of Web Browser. A web application is compatible to any platform which we can see the example of Google search engine, it can be runs on both windows and OS X. When the application is updated on the server, all user will have the access to the updated version without developers need to distribute it.

## 2.8 CONCLUSION

Based on the methodology studied, ADDIE Model is chosen for the best methodology to use for the development of the Korean Learning Language Applications-Hwaiting!!. ADDIE Model is chosen because it is flexible and can be used with different evaluation strategies.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

The methodology used in developing this “Hwaiting!!”-Learning Korean application is ADDIE model. This chapter will explain about the methodology that is implemented during the implementation process in details.

#### **3.2 ADDIE MODEL**

In the previous chapter, which is in Literature Review, the review of available instruction model was made. Based on the comparison of those three (3) model, we have chosen ADDIE model as it seems more fit and suitable to complete these projects. Hence, in developing “Hwaiting!!” application, requirements are gathered from Google Form survey result as a client. The requirements gathered are used in developing ADDIE prototype of the “Hwaiting!!” application. ADDIE model are chosen due to some factors which it is a widely used method in product design and especially in instructional system development, such as teaching methods, books and educative games. The ADDIE method provides a good basic skeleton to create an educational method (ADDIE Model, n.d.). There are five (5) phases of ADDIE in their lifecycle which are, Analysis, Design, Development, Implementation and Evaluation. The diagram of the ADDIE phase lifecycle are shown in the figure below. The details of each phases will be explained further in the next subchapter.

### **3.2.1 ANALYSIS PHASE**

In this analysis phase, “Hwaiting!!” application will be analysed regarding the usability, and which topic that are suitable to be input based on the result obtained from the survey. A survey is needed to collect the user requirements to make sure the application which will be developed fulfils the user desire. Based on the survey, the number of people interested in learning Korean language are quite large. Most of them preferred learning based on the application as it is easy to be accessed by them. The target user of this survey are general as this application related to foreign language learning (Korean) which can be taken by whoever interested to learn. Other than collecting the user requirements, this phase also involves the gathering of all required information to create the games.

### **3.2.2 DESIGN PHASE**

This stage is a pre-development stage where in here, the application will be developed and design roughly here. In this stage, the several designs were created. Firstly, a storyboard was created to finalize the flow of the application and the use case and context diagram was designed. All of these will be discussed in details in subtopic 3.4, 3.5, 3.6, 3.7 for flowchart, context diagram and use-case diagram, and storyboard respectively.

### **3.2.3 DEVELOPMENT PHASE**

In this stage, the overall development of the application that follows the design will be executed. This application will be developed using Unity 2D Game Engine software.

### **3.2.4 IMPLEMENTATION PHASE**

This phase consists of implementation process that conduct the observation session using this application with a proposed method which allows user to control and interact with this application. The observation will be recorded when users test the application. In order to get feedback from the user once complete this phase, formative evaluation is conducted. Revising is required after getting feedback from the user. Finally, the feedback will be evaluated and reviewed in order to improve and fix errors encountered while using the application.

### **3.2.5 EVALUATION PHASE**

In this phase, two layers of evaluation will be performed. Firstly, the Formative Evaluation will be performed with, a small group of people selected and these application will be evaluated by them in term of goal reaching. Secondly, the Summative Evaluation will perform to prove the worth of an instruction after it has been executed.

### 3.3 WORK BREAKDOWN STRUCTURE

In this subtopic, the work breakdown structure shows the work flows in each phase based on the ADDIE model methodology. Based on the figure 3.3 below, it shows the work flow happened in each phase.

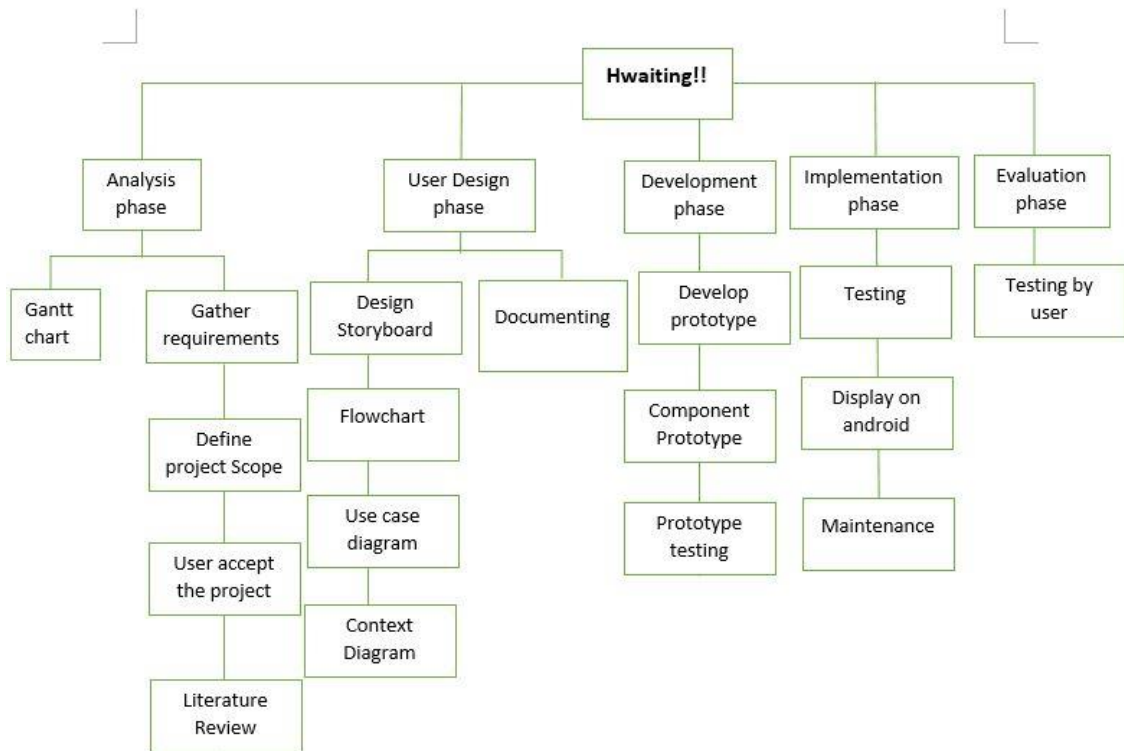


Figure 3.1: The work breakdown structure of implementing the ADDIE Model in the progress of the project.



### 3.4 FLOWCHART

In this subtopic, figure 3.4 shows the flowchart of user actions while using the application.

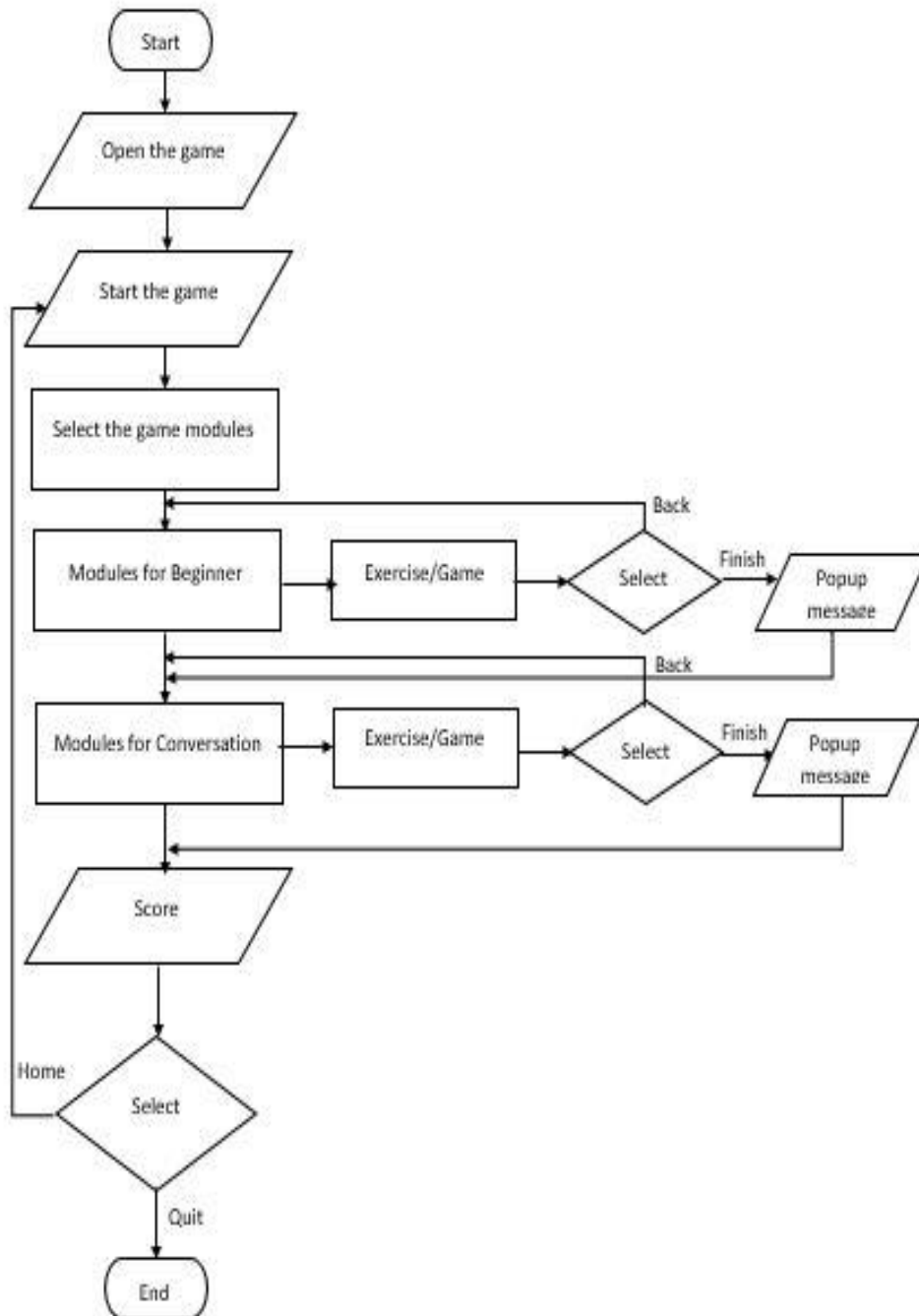


Figure 3.2: The flowchart for “Hwaiting!!” application

### 3.5 CONTEXT DIAGRAM

In this subtopic, figure 3.5 shows the context-diagram of “Hwaiting!!” applications.

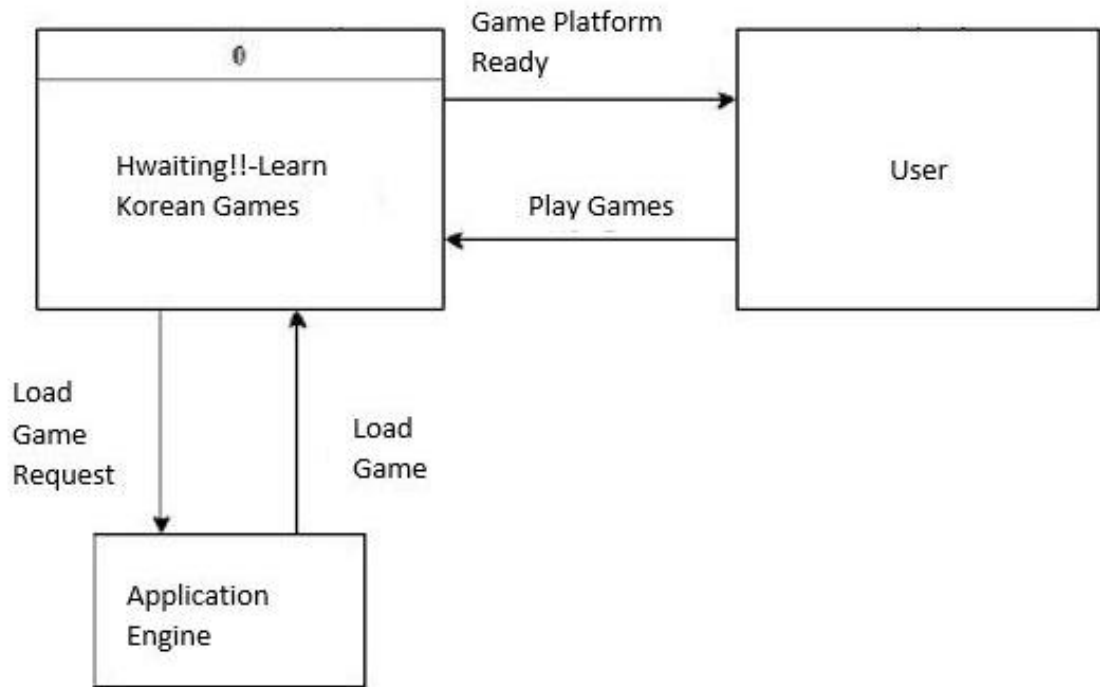


Figure 3.3: The context-diagram of “Hwaiting!!” applications.

### 3.6 USE-CASE DIAGRAM

In this subtopic, figure 3.6 shows the use-case diagram of “Hwaiting!!” applications.

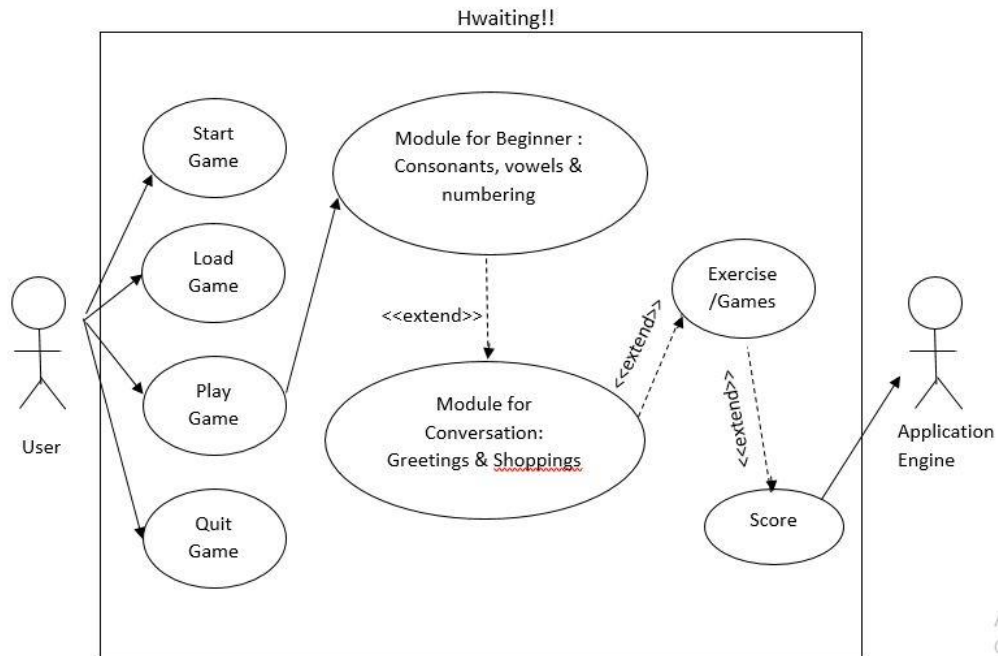


Figure 3.4: The use-case diagram of “Hwaiting!!” applications.

### 3.7 STORYBOARD

In this subtopic, we will discuss on the storyboard of the project and also explained a little bit about how it's working.

#### 3.7.1 HOMEPAGE



Figure 3.5: The homepage for “Hwaiting!!” application.

Figure 3.5 shows the homepage of the “Hwaiting!!” application. In this page, we insert 2 options, where user can select either one topic they want to discover. The options are practice for the beginner, quiz, and also for conversation.

### 3.7.2 BEGINNER-PRACTICE (Consonant)



Figure 3.6: The first page of practice for beginner.

Next, in figure 3.6 is the page for the practice for beginner, where on this page, user can click on each button to know how it pronounce and learn basic consonant of Korean character. User can click on About Hangul button for some information on how the characters work, home icon button, if they want to back to the homepage, or click on “Next” button to proceed to next page.

### 3.7.3 BEGINNER-PRACTICE (Vowels)



Figure 3.7: The second page of practice for beginner.

Figure 3.7 is the continuation of the previous page, where user is taught about vowels of Hangul. User can click on “Back”, “Next” or “Home” button to proceed to previous, next and homepage respectively.

### 3.7.4 BEGINNER-PRACTICE (Double Consonant)

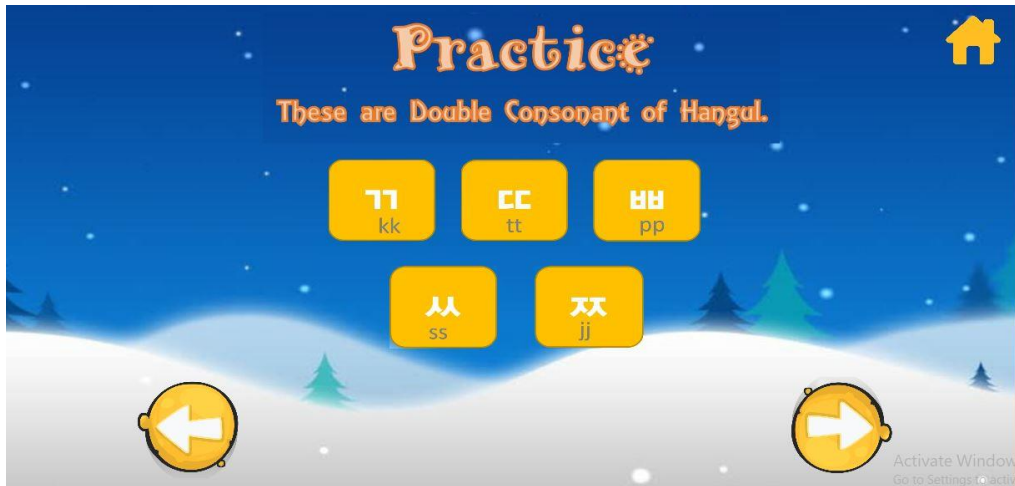


Figure 3.8: The third page of practice for beginner.

Still in the topic of Practice, based on figure 3.8, this time user being taught about double consonants of Hangul. The function of button are same. Click on each vowels to enable audio on how it pronounce correctly.

### 3.7.5 BEGINNER-PRACTICE (Double Vowels)

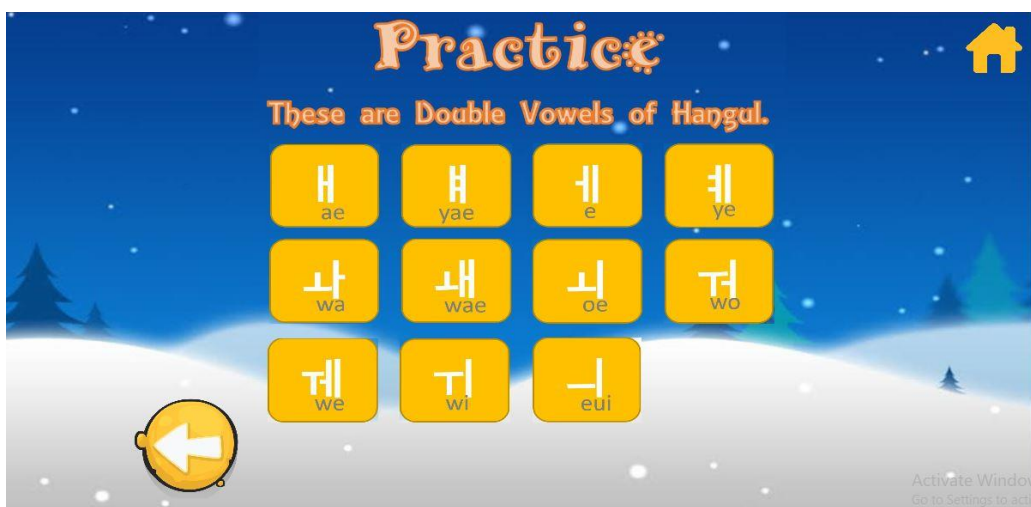


Figure 3.9: The fourth page of practice for beginner.

Last, but not least, in figure 3.9 shows for the page of practice, are the lesson on learnt double vowels of Hangul and how to pronounce. User can click on Home icon button to go straight to homepage, or “Back” button to see previous page.

### 3.7.6 CONVERSATION MODULE PAGE



Figure 3.10: The page for user to learn conversation.

In this figure 3.10 page, we allowed user to click on back button in order to be direct to homepage if they want to exit this topic. In this topic, we provide 2 options, which are greetings and shopping. Both topic can be useful if we ever went travel to South Korea or even meet up Korean colleagues/sellers.

### 3.7.7 QUIZ MODULE PAGE



Figure 3.11: Quiz module page

In figure 3.11, shown the menu page for Quiz module where user can interact with the button applied, which are Home icon, reset, play and trophy room button. The home button will navigate user to the homepage, while, reset button will reset the trophies achieved by player in the trophy room, play button to start answering question and last but not least, trophy room where the racks of trophies are placed.



### 3.7.8 QUIZ QUESTION



Figure 3.12: Quiz question

In figure 3.12, shown the first page, and question 1 in the quiz module. We provide 4 button with multiple choice answer, where user need to choose the correct answer. For example, the answer for this questions is “go-yang-i”, hence the trophy will be given to player, and it automatically save in the trophy room as the token of achievement. Menu button here will navigate user back to the Quiz Module Page.

### 3.7.9 TROPHY ROOM



Figure 3.13 Trophy Room

In figure 3.13, shown the trophy room. Player can collect 10 different trophies if only they can answer all 10 questions correctly.

### 3.8 SOFTWARE AND HARDWARE SPECIFICATIONS

In this subtopic, we will discuss in details regarding the software and hardware requirements.

#### 3.8.1 SOFTWARE AND HARDWARE SPECIFICATIONS

In this subtopic, based on table 3.1, shows the software used in development of this applications and specifications.

Table 3.1 the software used in development of this applications and specifications.

SOFTWARE	SPECIFICATION
Google Drive	<ul style="list-style-type: none"><li>● To archive the progress of the project</li><li>● To save a backup for the project</li><li>● To write documentation as backup</li></ul>
Draw.io	<ul style="list-style-type: none"><li>● To draw all related diagrams for the application planning and design</li></ul>
GanttProject	<ul style="list-style-type: none"><li>● To develop the Gantt chart for the project planning</li></ul>
UNITY	<ul style="list-style-type: none"><li>● To build and develop the application</li><li>● To create the application platform</li></ul>

### 3.8.2 HARDWARE REQUIREMENTS

In this subtopic, based on table 3.2, shows the hardware used in development of this applications and specifications.

Table 3.2 the hardware used in development of this applications and specifications.

HARDWARE	DESCRIPTION
Personal Laptop	<ul style="list-style-type: none"><li>● Writing documentation planning of the application</li><li>● Writing the Software Requirement Specification</li><li>● Writing the Software Design Description</li><li>● Platform for software system used in building the application</li></ul>
Printer	<ul style="list-style-type: none"><li>● To print any source as reference for documentation</li><li>● To print the final documentation</li></ul>
Android Mobile Phone	<ul style="list-style-type: none"><li>● To implement system testing on real device</li><li>● Platform to run the final application</li></ul>

### 3.9 GANTT CHART

In this subtopic, we presented the Gantt chart in figure 3.9 below to show time range that we take to do the development based on ADDIE model methodology.

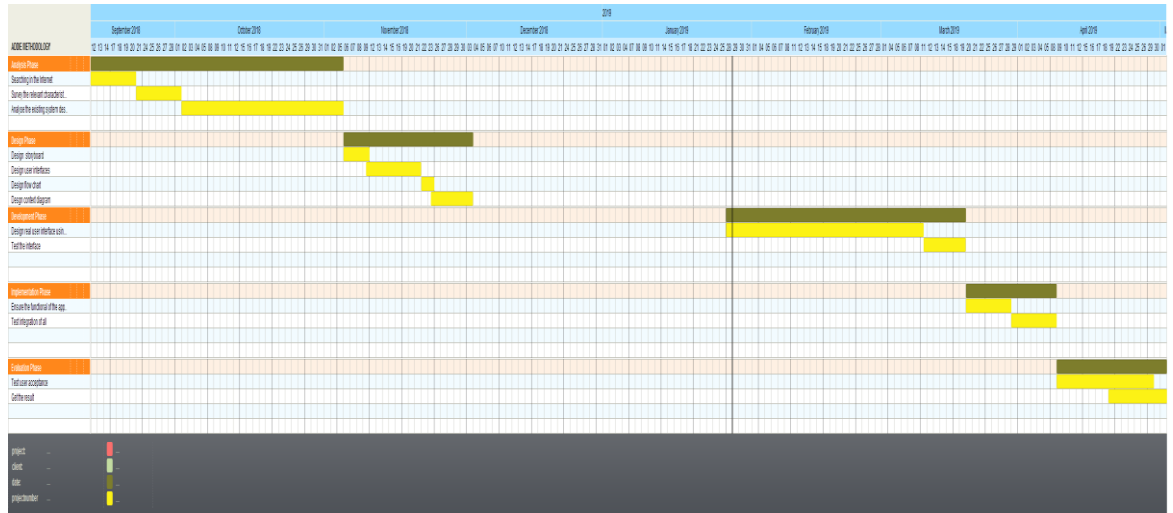


Figure 3.19 the time range in Gantt chart

### 3.10 IMPLEMENTATION

In developing the Hwaiting!! Application (HA) by using the ADDIE methodology, all the planning done by gathering the requirements will be implemented. The base for the game made in Unity software will be the prototype of the application. The real application will be deployed in android mobile phone at the end.

### 3.11 TESTING

The purpose of this section is to outline the User Acceptance Testing (UAT) process for the system. Approval of this testing implies that reviewers are confident that following the execution of the test plan, the resulting will be considered fully-tested and eligible for implementation.

The chosen user will go through each of the instructions in the user manual. Any errors or problems found by the user must be noted on this form. The form also needs to be signed by the user after the test is finished.

#### 3.11.1 USE CASE NUMBER ONE

Table 3.3 Use Case Number One

Module	Test Data	Expected Result	Actual Result	Pass/Fail	Comment
For Beginner-practice					
For Conversation					

#### 3.11.2 USE CASE NUMBER TWO

Table 3.4 Use Case Number Two

Module	Test Data	Expected Result	Actual Result	Pass/Fail	Comment
For Beginner-practice					

For Conversation					
---------------------	--	--	--	--	--

### 3.12 SYSTEM TESTING APPROVAL

Table 3.5 System Testing Approval

	Name	Date
Verified by:  _____  Developer		
Approved by:  _____  Client		

## **CHAPTER 4**

### **IMPLEMENTATION, TESTING AND RESULTS DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter will discuss about the implementation, testing and the result testing of Serious Game for Learning Korean Language-Hwaiting!! application (HA) that have been created using Unity software. In implementation, the discussion will be elaborated based on the steps and the processes involved during the development of the game. The interfaces and coding of each function also will be inserted in this chapter to give understanding on how the game works and build using the Unity software. Besides, the evaluation phase will discuss on how the evaluation and testing were conducted to detect and discover the errors that occur in the game application. The “Hwaiting!!” application game will be tested several times by several respondent to observe their responses while playing the game. All the feedback and responses received from them will be discussed in the result of the system testing.

#### **4.2 IMPLEMENTATION**

The implementation of the “Hwaiting!!” application (HA) game application is based on the requirement that have been collected during the requirement analysis phase. The development of the application need to meet all the requirements in order for the functionality of the application to be successful to be used by general user. All the game elements such as graphics, animations, audio, and images will be implement in this application to make the application more interactive and fun. The next section will discussed on the use of Unity software in implementing the application.

## 4.2.1 STAGE OF IMPLEMENTATION

Unity is the most common software for game development as it provides all tools that allowed developer to create game without build in programming in the Unity so that the application will works well. Unity is the best platform in creating game application as its provided medium for all elements works such as animation, video, audio and graphic as well. Unity version 5.6.6f2 is used in the project. Figure 4.1 and onward shows the step on how “Hwaiting!!” game application have been developed using Unity.

Figure 4.1 shows the Unity software main page. First, open the Unity software and click on new to open new project. Create the project name “Hwaiting!!” and select 2D as the game will be created in 2-Dimensional platform. Then, click create project.

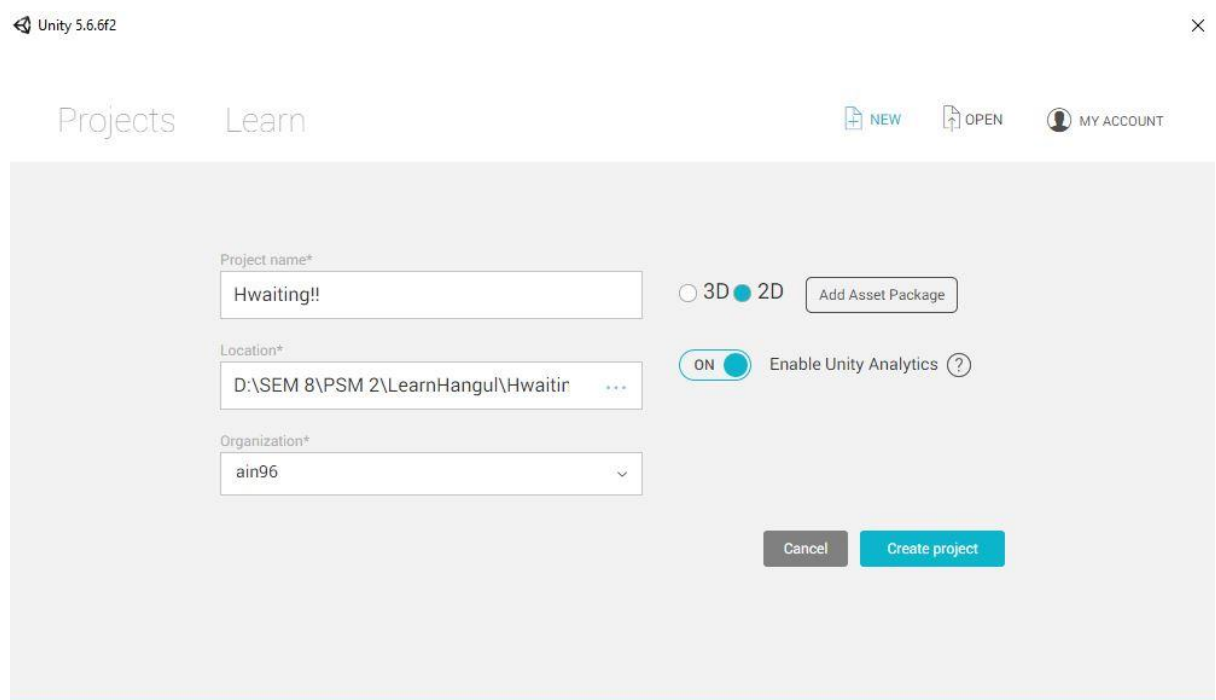


Figure 4.1 The Unity Software main page

Figure 4.2 shows the Unity created scene. Go to the file and click on the new scene. Save the scene as “MenuScreen”. Create the other scene such as “Beginner”, “Conversation” “Quiz”, “Greetings”, “Shopping”, “DoubleVowels” and “DoubleConsonant” and others using the same method.



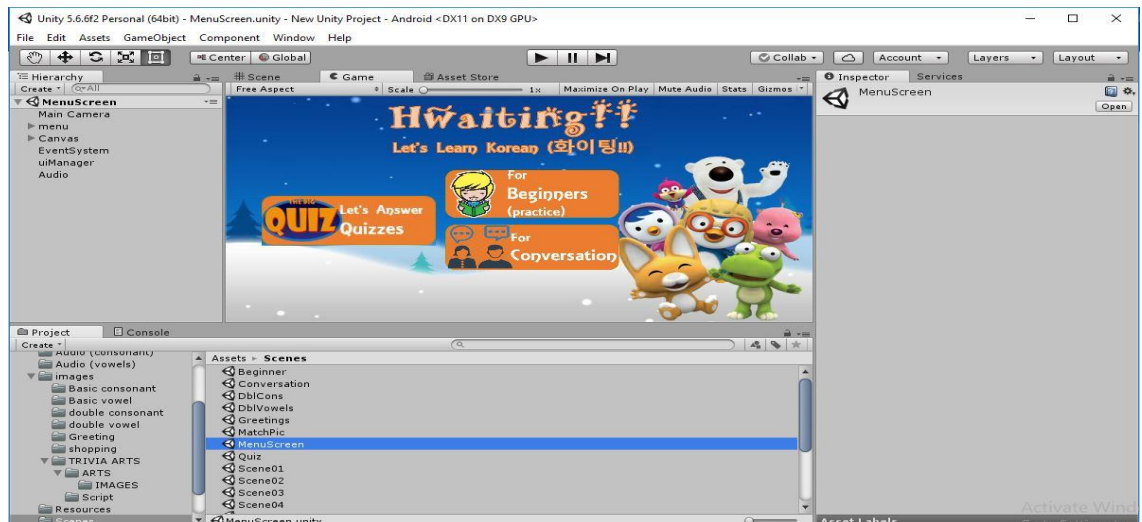


Figure 4.2 Unity Create Scene

## 4.2.2 INTERFACES AND CODING

### Quiz Menu Page

In this scene, we create the menu page by designing it with the selected background and function button that allows user to interact with the scene.

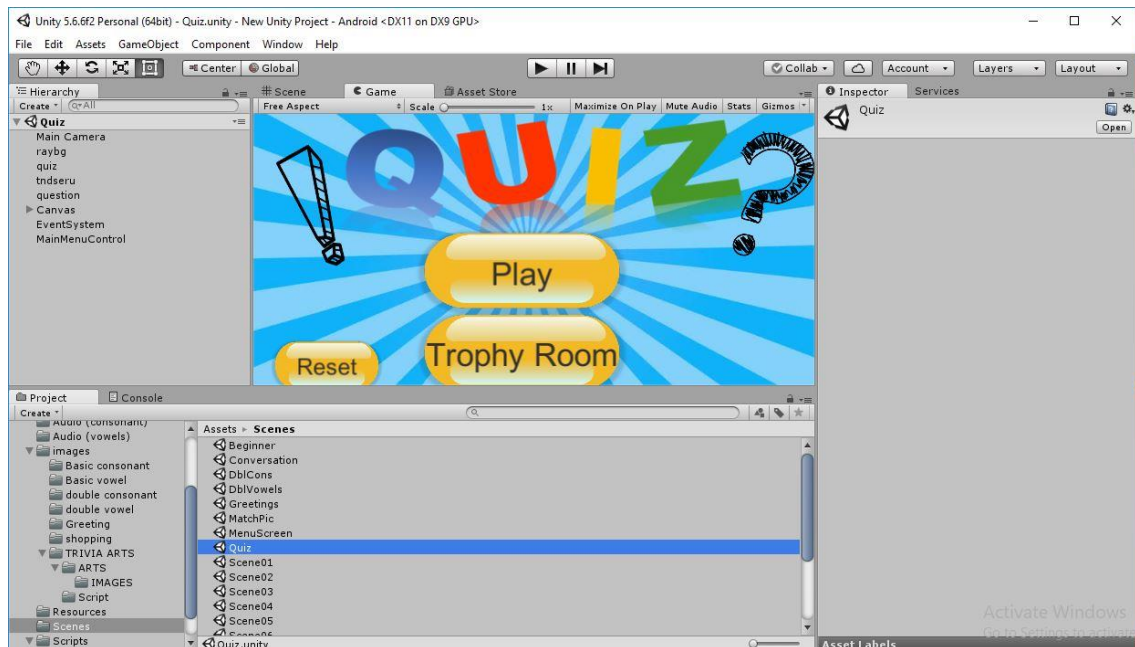
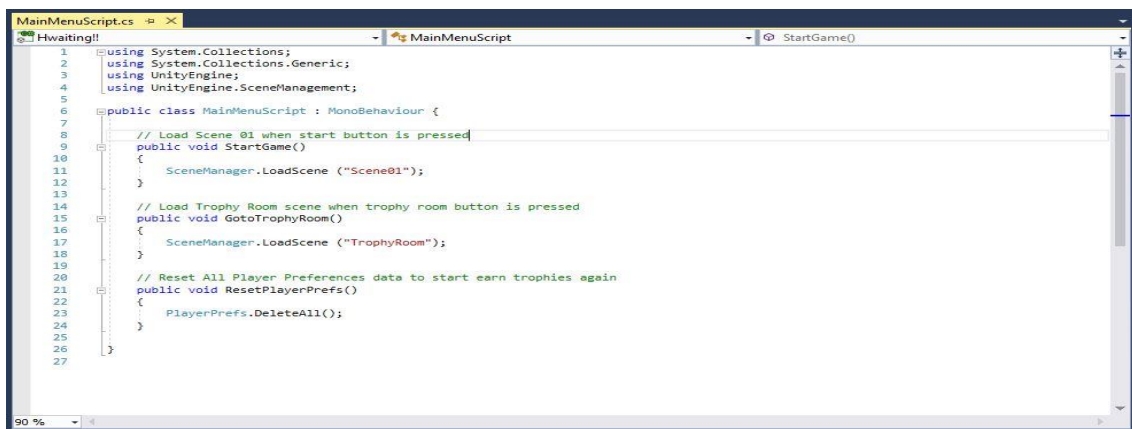


Figure 4.3 Quiz Scene

## Main Menu Script

In this script, we include the loadscene function in order to allow user navigate to the first page of the questions after user clicking on Play button. Next, if the user click on Trophy Room button, they will be navigate to the Trophy Room scene, where there are a racks of trophies being placed there. Last, the Reset button, the script provided allows user to reset the achievement that they got upon answering the questions correctly in the quiz back to zero (0).



```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5
6 public class MainMenuScript : MonoBehaviour {
7
8     // Load Scene 01 when start button is pressed
9     public void StartGame()
10    {
11        SceneManager.LoadScene ("Scene01");
12    }
13
14    // Load Trophy Room scene when trophy room button is pressed
15    public void GotoTrophyRoom()
16    {
17        SceneManager.LoadScene ("TrophyRoom");
18    }
19
20    // Reset All Player Preferences data to start earn trophies again
21    public void ResetPlayerPrefs()
22    {
23        PlayerPrefs.DeleteAll();
24    }
25
26
27 }
```

Figure 4.4 Main Menu Script

## Quiz-Scene01

In scene 1, we provide simple questions to be answered by the user. We put the image, layer by layer and tagged it as toDisable and toEnable, hence it will show the image by turn. For example, the question image will be shown first. Once user select either 4 multiple choice answer button, the correct or incorrect sign will be popup upon selected. If the answer is correct, the trophy image which is as achievement score for user will be given, but if it is incorrect, the incorrect sign will be enable and user need to answer it from the start as they will be kick to the quiz main menu again. These cycle are the same for the next scene until scene 10.

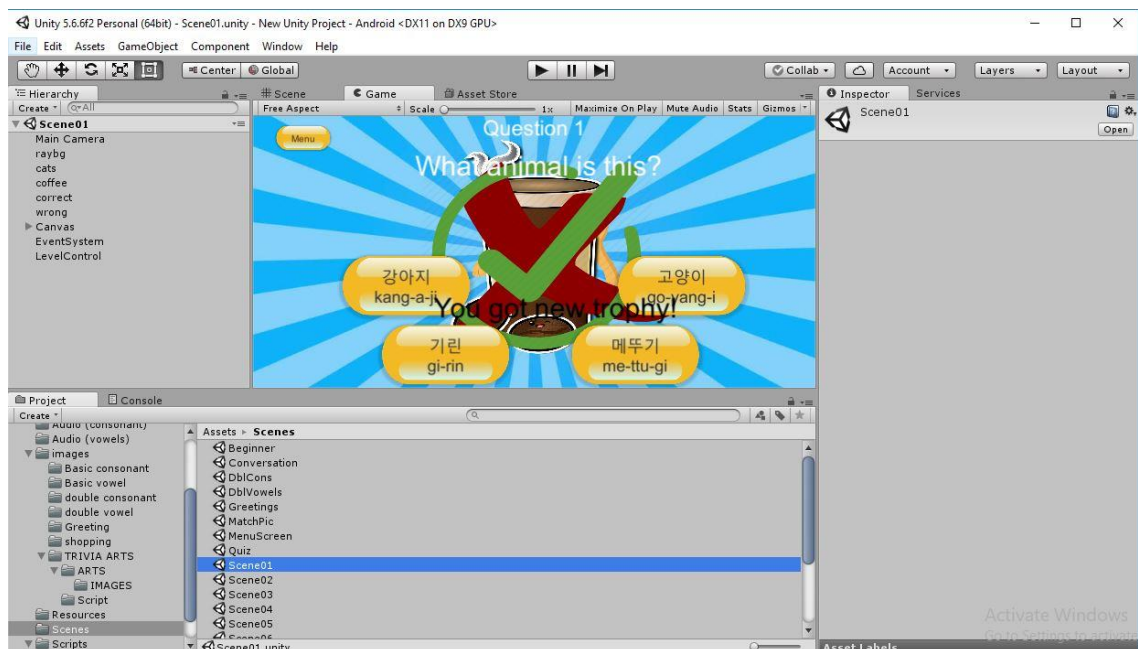


Figure 4.5 Scene01 in Quiz scene

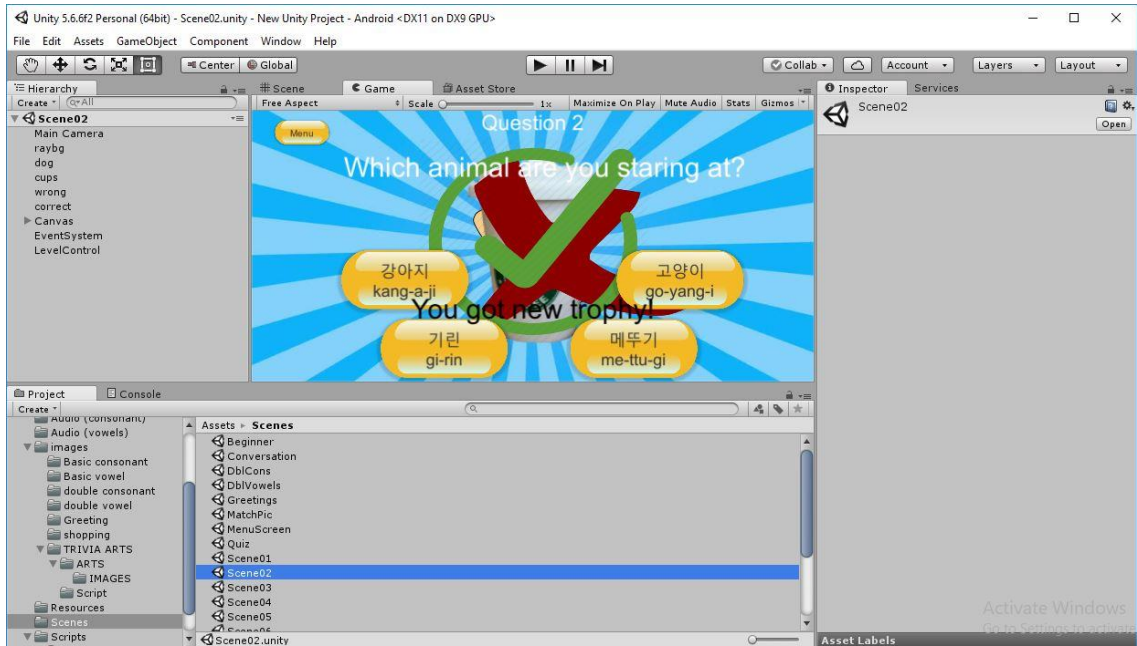


Figure 4.6 Scene02 in Quiz scene

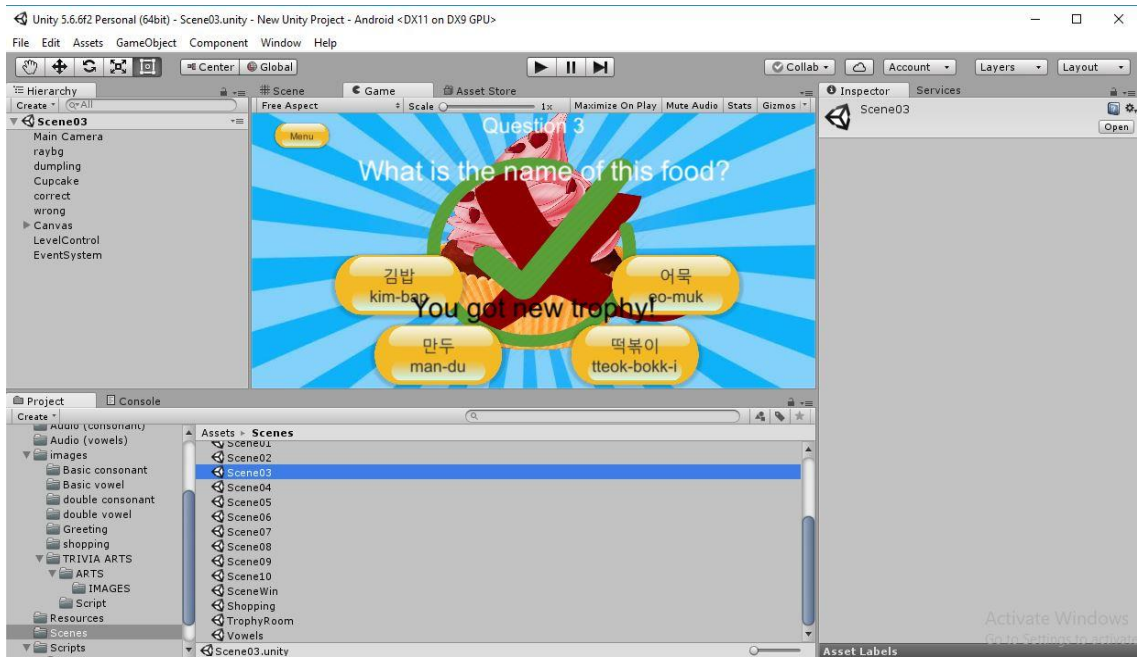


Figure 4.7 Scene03 in Quiz scene

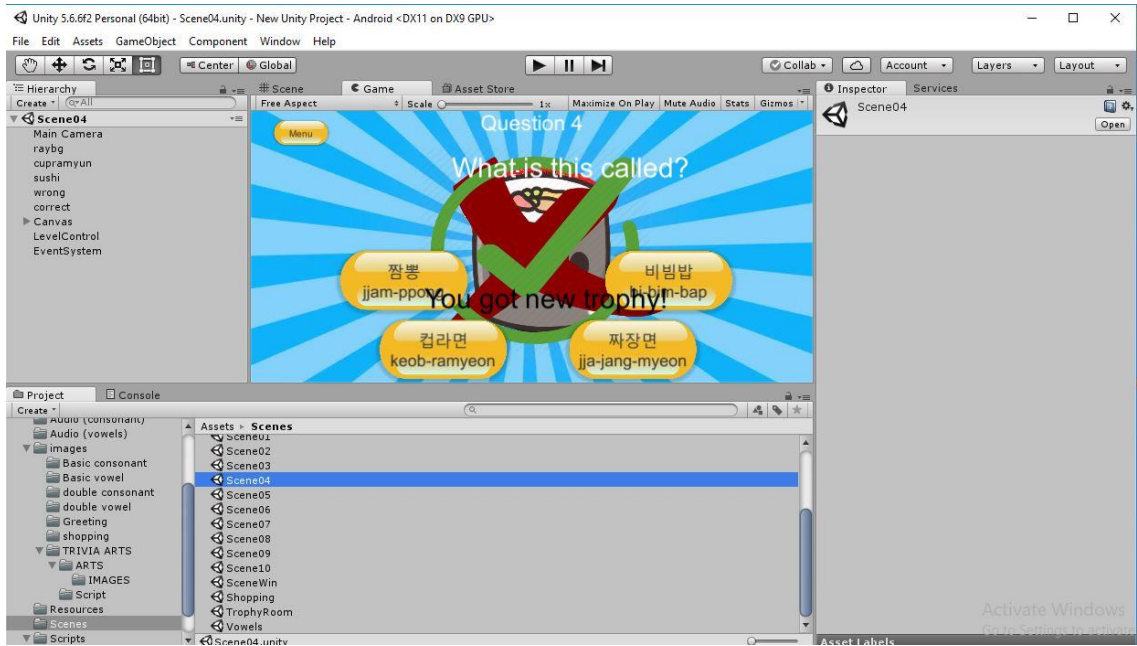


Figure 4.8 Scene04 in Quiz scene

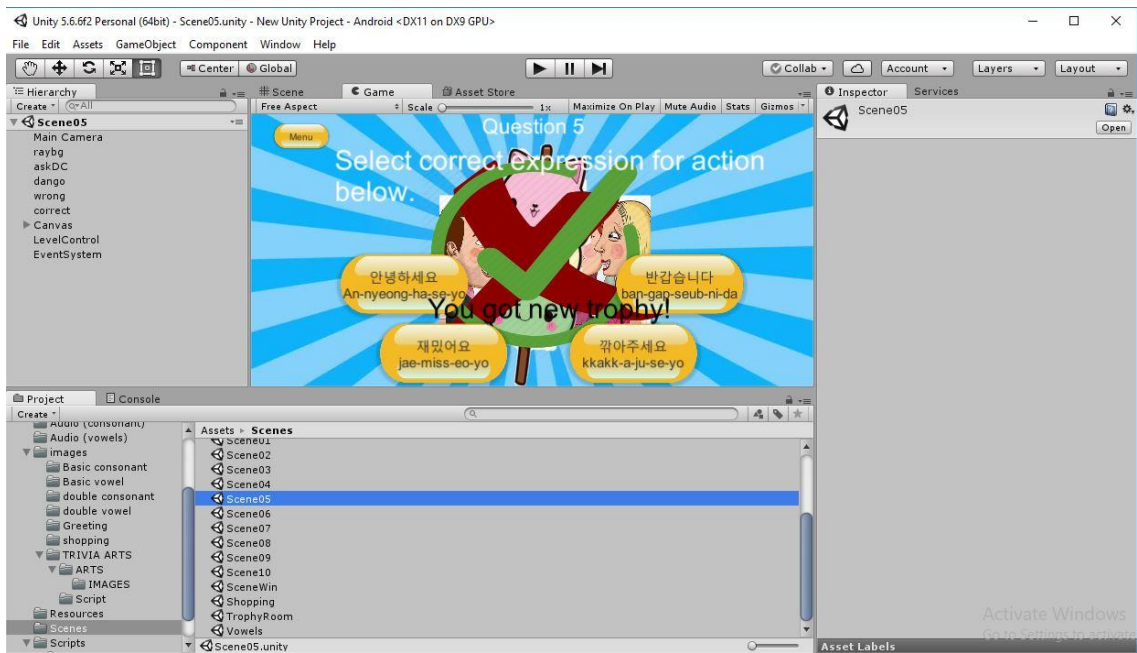


Figure 4.9 Scene05 in Quiz scene

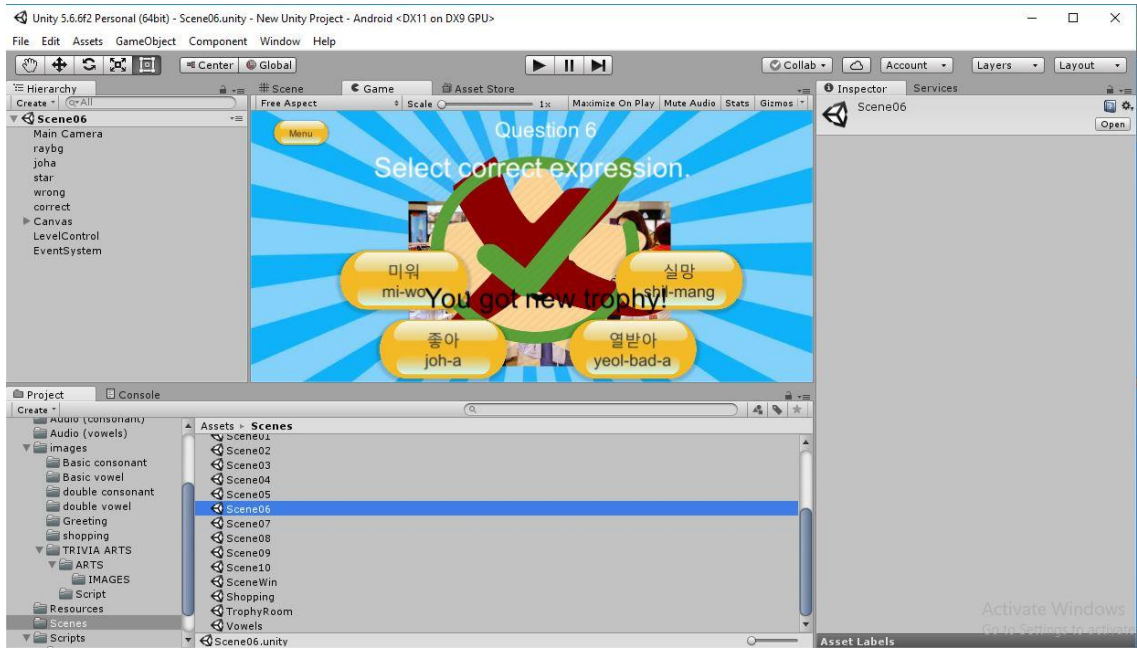


Figure 4.10 Scene06 in Quiz scene

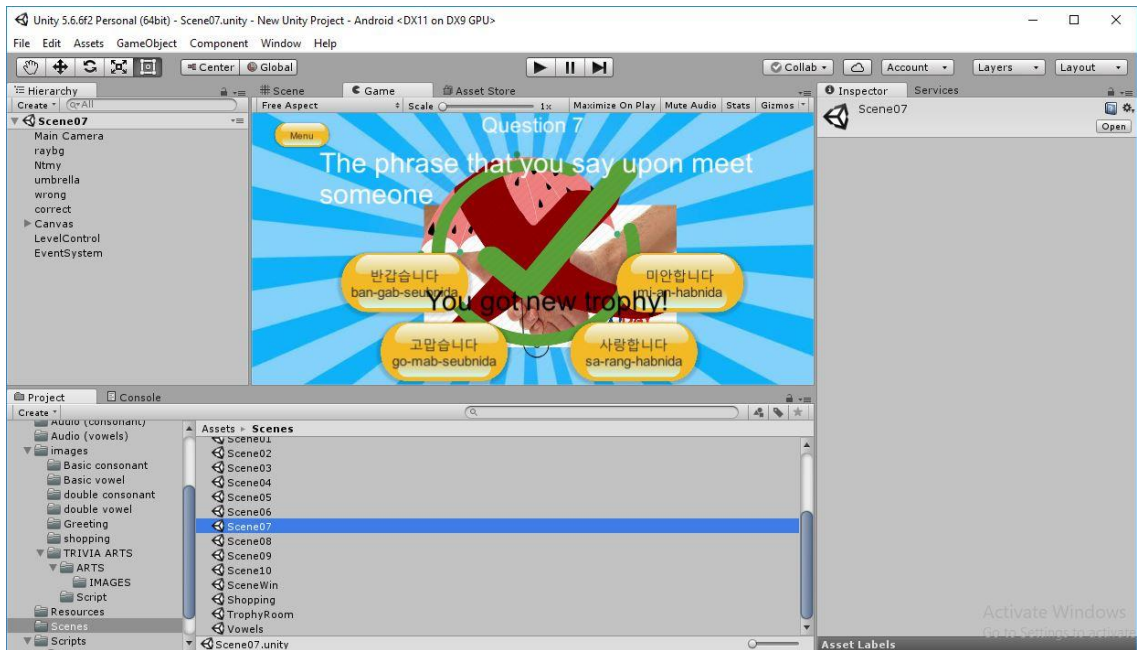


Figure 4.11 Scene07 in Quiz scene

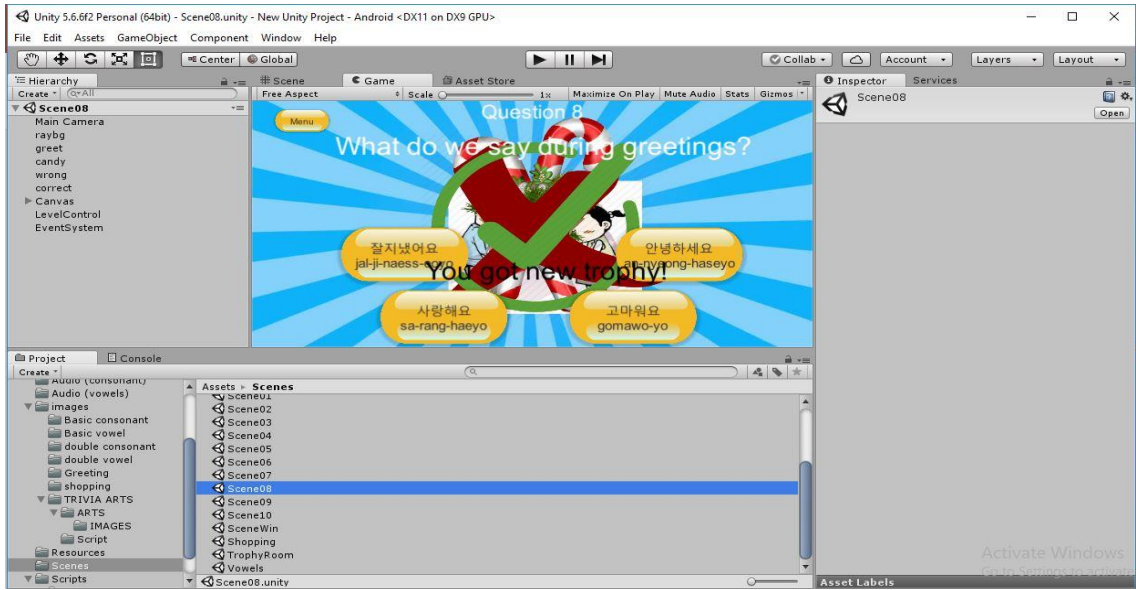


Figure 4.12 Scene08 in Quiz scene

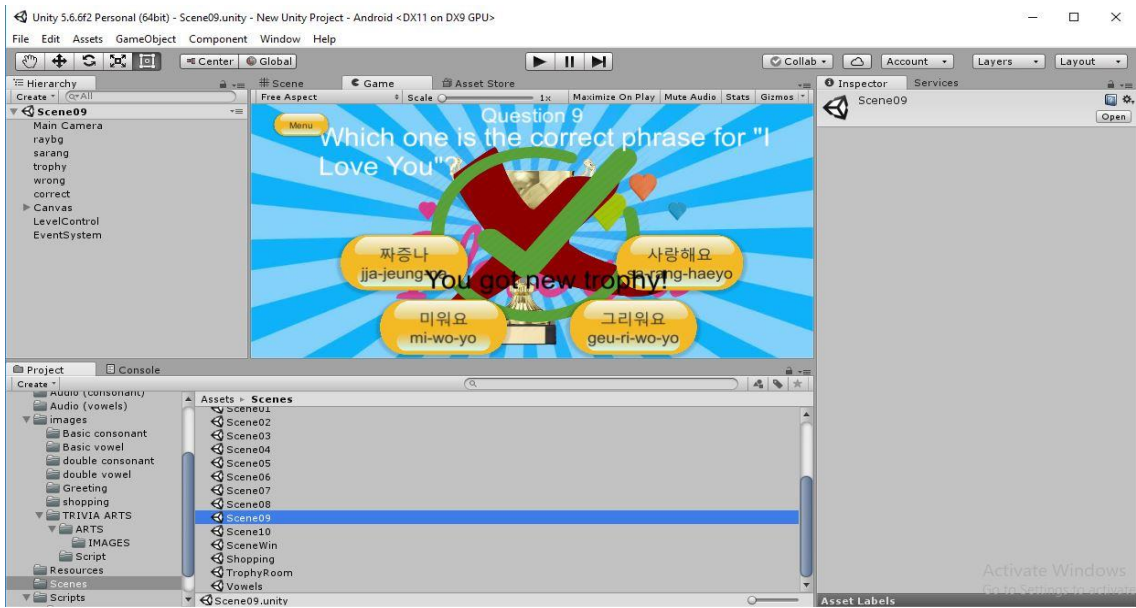


Figure 4.13 Scene09 in Quiz scene

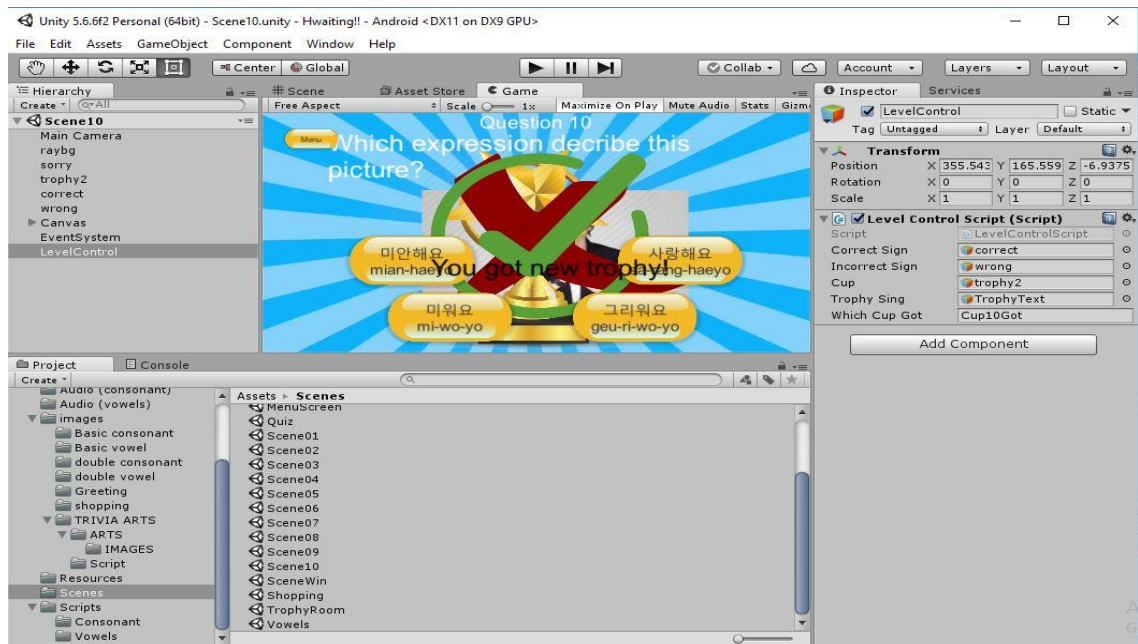


Figure 4.14 Scene10 in Quiz scene

## Level Control Script

In this script, it include the 2 game object, where we named it as toDisable and toEnable. The function of these game object are mainly to enable and disable the images based on which they being tagged in the inspector in the unity. In the hierarchy of each questions scene, we create an empty GameObject named as LevelControl. Then, we create a new script called Level Control Script and attached it to LevelControl GameObject. Once applied, in the inspector off LevelControl in unity, you can see the function appear which provide us, to drag the items based on its requirement. For example, the trophy image, goes to the cup place, and correct image to the correct sign place and so on, hence in each questions, the player will get designated trophy for each questions and not just repeated same trophy images.



```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5
6 public class LevelControlScript : MonoBehaviour {
7
8     // Get references to game objects that should be disabled and enabled
9     // at the start
10    GameObject[] toEnable, toDisable;
11
12    // References to game objects that should be enabled
13    // when correct or incorrect answer is given
14    public GameObject correctSign, incorrectSign, cup, trophySing;
15
16    // Variable to contain current scene build index
17    int currentSceneIndex;
18
19    // Variable name to pass to Player Prefs meaning which variable to set as got
20    // Adjustable in inspector depending on current scene and trophy
21    // you earn (if you do)
22    public string whichCupGot = "Cup1Got";
23
24    // Use this for initialization
25    void Start () {
26
27        // Getting current scene build index
28        currentSceneIndex = SceneManager.GetActiveScene ().buildIndex;
29
30        // Finding game objects with tags "ToEnable" and "ToDisable"
31        toEnable = GameObject.FindGameObjectsWithTag ("ToEnable");
32        toDisable = GameObject.FindGameObjectsWithTag ("ToDisable");
33
34        // Disabling game objects with tag "ToEnable"
```

Figure 4.15 Level Control Script (1)

```
34        // Disabling game objects with tag "ToEnable"
35        foreach (GameObject element in toEnable)
36        {
37            element.gameObject.SetActive (false);
38        }
39
40    }
41
42    // Method is invoked when correct answer is given
43    public void RightAnswer()
44    {
45        // Disabling game objects that are no longer needed
46        foreach (GameObject element in toDisable)
47        {
48            element.gameObject.SetActive (false);
49        }
50
51        // Turn on "correct" sign
52        correctSign.gameObject.SetActive (true);
53
54        // Getting a value if you already got current trophy
55        int Cupgot = PlayerPrefs.GetInt (whichCupGot);
56
57        // If you already got current trophy
58        if (Cupgot == 1)
59
60            // then you proceed to next level
61            Invoke ("LoadNextLevel", 1f);
62
63        // if you don't have current trophy yet
64        else
65            // then GetTrophy method is invoked in 1 second
66            Invoke ("GetTrophy", 1f);
67    }
```

Figure 4.16 Level Control Script (2)

```
LevelControlScript.cs - MainMenuScript.cs
LevelControlScript
toEnable

69 // Method is invoked if incorrect answer is given
70 public void WrongAnswer()
71 {
72     // Disabling game objects that are no longer needed
73     foreach (GameObject element in toDisable)
74     {
75         element.gameObject.SetActive (false);
76     }
77
78     // Turn on "incorrect" sign
79     incorrectSign.SetActive (true);
80
81     // Invoke GotoMainMenu method in 1 second
82     Invoke ("GotoMainMenu", 1f);
83 }
84
85 // Method is invoked if you don't have current trophy yet
86 void GetTrophy()
87 {
88     // "Correct" sing is turned on
89     correctSign.SetActive (false);
90
91     // Trophy game object is shown
92     cup.SetActive (true);
93
94     // "You got new trophy" sign is shown
95     trophySing.SetActive (true);
96
97     // Set Player Prefs whichCupGot variable so you got this trophy
98     // to store this value between the scenes
99     PlayerPrefs.SetInt (whichCupGot, 1);
100
101     // Invoke LoadNextLevel method in 1 second
102     Invoke ("LoadNextLevel", 1f);
```

4.17 Level Control Script (3)

```
LevelControlScript.cs - MainMenuScript.cs
LevelControlScript
toEnable

103 }
104
105 // Method loads next level depending on current scenes build index
106 void LoadNextLevel()
107 {
108     SceneManager.LoadScene (currentSceneIndex + 1);
109 }
110
111 // Method loads MainMenu scene
112 void GotoMainMenu()
113 {
114     SceneManager.LoadScene ("Quiz");
115 }
116
117 }
118
```

Figure 4.18 Level Control Script (4)

## Trophy Room

In the trophy room, in figure 4.19 shows the full rack of trophies. The player will get each trophies respectively upon answering correct answer in the quiz. They required to answer all questions correctly in order to get all trophies without problem.

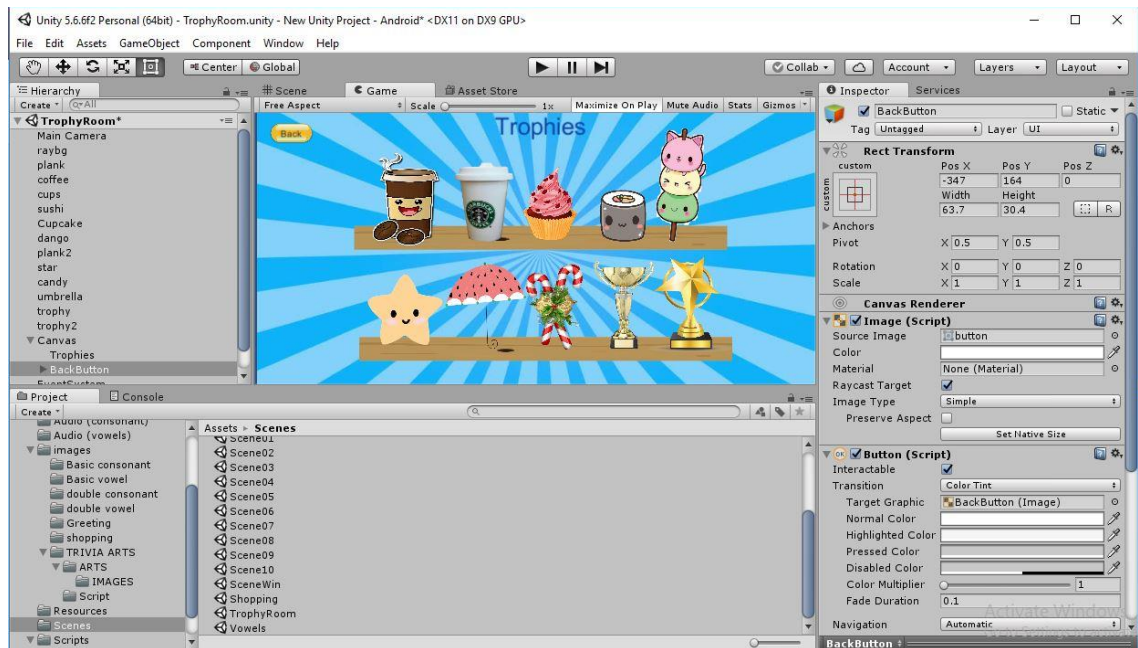


Figure 4.19 Trophy Room scene

## Trophy Room Script

In the trophy room script, we declare the game object cup1 until cup10, which defines the trophy images used. In the start function, we are getting the player preference value to assign which cup/trophy they got for each question.

```
TrophyRoomControlScript.cs | LevelControlScript.cs | MainMenuScript.cs
Hwaiting!! | TrophyRoomControlScript | cup1
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4
5 public class TrophyRoomControlScript : MonoBehaviour {
6
7     // References to trophies game objects to control
8     public GameObject cup1, cup2, cup3, cup4, cup5, cup6, cup7, cup8, cup9, cup10;
9
10    // Variables to contain Player Prefs values
11    int cup1Got, cup2Got, cup3Got, cup4Got, cup5Got, cup6Got, cup7Got, cup8Got, cup9Got, cup10Got;
12
13    // Use this for initialization
14    void Start () {
15
16        // Getting Player Prefs values to make sure you got
17        // particular trophy
18        cup1Got = PlayerPrefs.GetInt ("Cup1Got");
19        cup2Got = PlayerPrefs.GetInt ("Cup2Got");
20        cup3Got = PlayerPrefs.GetInt ("Cup3Got");
21        cup4Got = PlayerPrefs.GetInt("Cup4Got");
22        cup5Got = PlayerPrefs.GetInt("Cup5Got");
23        cup6Got = PlayerPrefs.GetInt("Cup6Got");
24        cup7Got = PlayerPrefs.GetInt("Cup7Got");
25        cup8Got = PlayerPrefs.GetInt("Cup8Got");
26        cup9Got = PlayerPrefs.GetInt("Cup9Got");
27        cup10Got = PlayerPrefs.GetInt("Cup10Got");
28
29        // If you got trophy 1
30        if (cup1Got == 1)
31            // then it is shown on the shelf
32            cup1.SetActive (true);
33        // if you don't get it
34        else
```

Figure 4.20 Trophy Room Control Script (1)

```
TrophyRoomControlScript.cs | LevelControlScript.cs | MainMenuScript.cs
Hwaiting!! | TrophyRoomControlScript | cup1
35        // then it is not shown
36        cup1.SetActive (false);
37
38        // Same for trophy 2 and 3
39        if (cup2Got == 1)
40            cup2.SetActive (true);
41        else
42            cup2.SetActive (false);
43
44        if (cup3Got == 1)
45            cup3.SetActive (true);
46        else
47            cup3.SetActive (false);
48
49        if (cup4Got == 1)
50            cup4.SetActive(true);
51        else
52            cup4.SetActive(false);
53
54        if (cup5Got == 1)
55            cup5.SetActive(true);
56        else
57            cup5.SetActive(false);
58
59        if (cup6Got == 1)
60            cup6.SetActive(true);
61        else
62            cup6.SetActive(false);
63
64        if (cup7Got == 1)
65            cup7.SetActive(true);
66        else
67            cup7.SetActive(false);
68
```

Figure 4.21 Trophy Room Control Script (2)

```
TrophyRoomControlScript.cs | LevelControlScript.cs | MainMenuScript.cs
Hwaiting!! | TrophyRoomControlScript | cup1
63
64     if (cup7Got == 1)
65         cup7.SetActive(true);
66     else
67         cup7.SetActive(false);
68
69     if (cup8Got == 1)
70         cup8.SetActive(true);
71     else
72         cup8.SetActive(false);
73
74     if (cup9Got == 1)
75         cup9.SetActive(true);
76     else
77         cup9.SetActive(false);
78
79     if (cup10Got == 1)
80         cup10.SetActive(true);
81     else
82         cup10.SetActive(false);
83
84 }
85
86
87
90 %
```

Figure 4.22 Trophy Room Control Script (3)

### 4.2.3 APPLICATION INTERFACE

In this subtopic, we will include the test version of mobile courseware – Hwaiting!! Application (HA) when being run through android.

#### 1. Homepage



Figure 4.23 Homepage scene

#### 2. Beginner Practice (Consonant)



Figure 4.24 Consonant scene

### 3. Beginner Practice (Vowels)

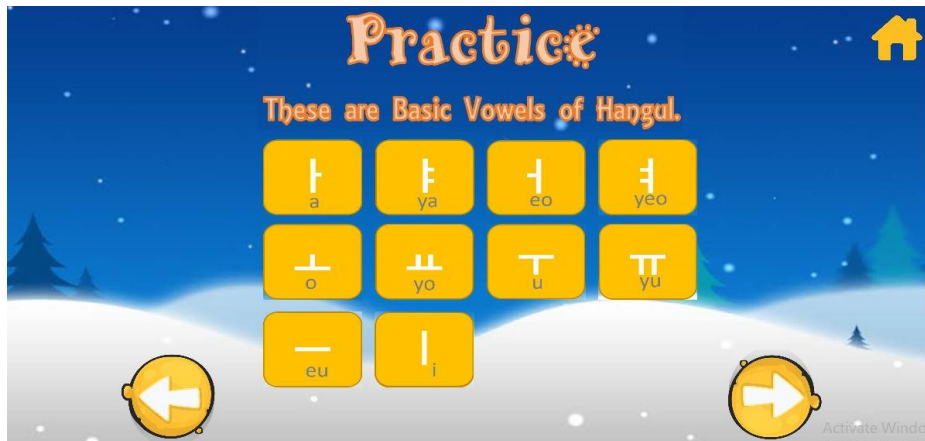


Figure 4.25 Vowels scene

### 4. Beginner Practice ( Double Consonant)



Figure 4.26 Double consonant scene

6. Beginner Practice (Double Vowels)

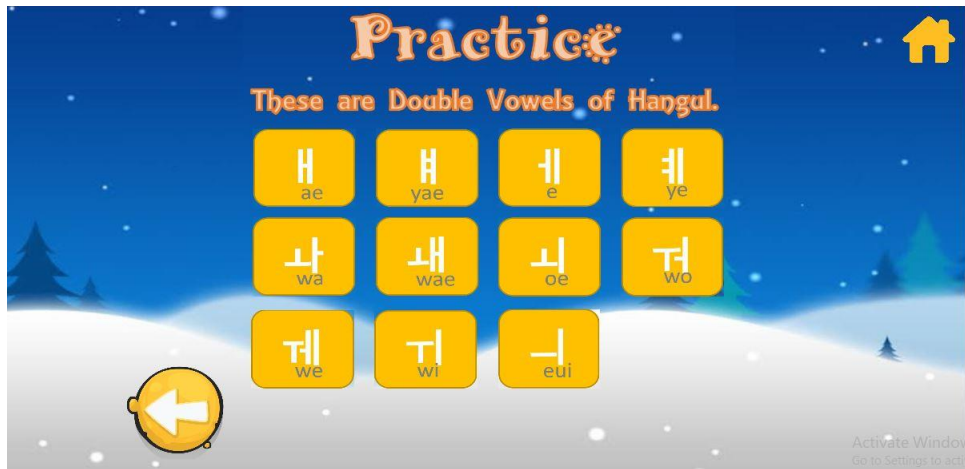


Figure 4.27 Double vowels scene

7. Conversation Module



Figure 4.28 Conversation scene



8. DragDrop Picture (Shopping and Greetings)

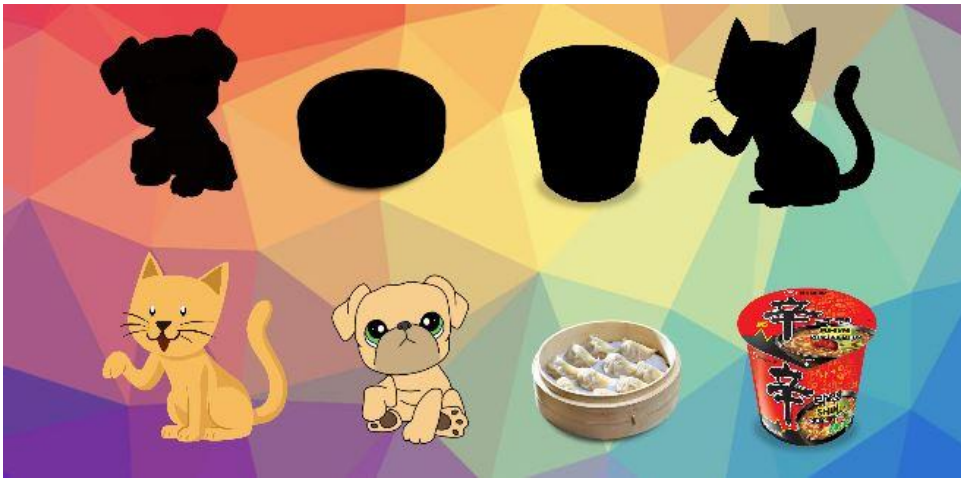


Figure 4.29 Dragdrop scene

9. Quiz Module



Figure 4.30 Quiz scene

10. Question 1 with assigned trophy



Figure 4.31 Scene01 scene



Figure 4.32 Trophy assigned for Scene01

11. Question 2 with assigned trophy



Figure 4.33 Scene02 scene



Figure 4.34 Trophy assigned for Scene02

12. Question 3 with assigned trophy



Figure 4.35 Scene03 scene



Figure 4.36 Trophy assigned for Scene03

13. Question 4 with assigned trophy



Figure 4.37 Scene04 scene



Figure 4.38 Trophy assigned for Scene04

14. Question 5 with assigned trophy



Figure 4.39 Scene05 scene



Figure 4.40 Trophy assigned for Scene05

15. Question 6 with assigned trophy



Figure 4.41 Scene06 scene



Figure 4.42 Trophy assigned for Scene06

16. Question 7 with assigned trophy



Figure 4.43 Scene07 scene



Figure 4.44 Trophy assigned for Scene07



17. Question 8 with assigned trophy



Figure 4.45 Scene08 scene



Figur 4.46 Trophy assigned for Scene08

18. Question 9 with assigned trophy

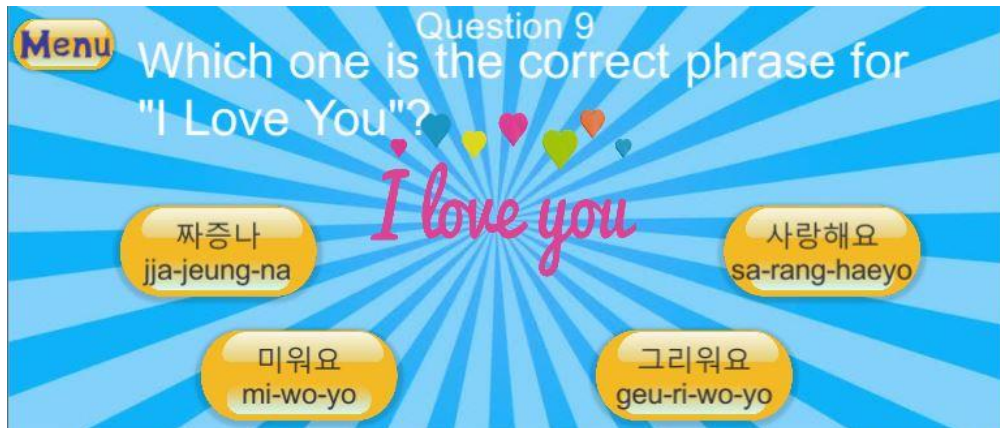


Figure 4.47 Scene09 scene



Figure 4.48 Trophy assigned for Scene09

19. Question 10 with assigned trophy



Figure 4.49 Scene10 scene



Figure 4.50 Trophy assigned for Scene10

20. WinScene



Figure 4.51 WinScene scene

21. Trophy Room



Figure 4.52 TrophyRoom scene

### 4.3 TESTING AND RESULT DISCUSSION

In this phase, several tests are done to discover any possibility error that occur in the application. The main purpose of the test is to find out the functionality of the game application to the user. This is also to ensure that the applications work as it should be without any fatal error. If there are problem occurred during the test, the developer need to revise the application and do corrections, which mean go back to the development phase. These process is allowed in ADDIE methods. After no error detected, the test is being done by several general respondent to get feedback from them. The further improvement from any non-satisfaction about the system is implement based on the testing. The type of testing used is User Acceptance Testing (UAT). This test considered successful when all the features and functionality are working as expected.

Table 4.1 below shows the test case of Hwaiting!! application that tested by several general respondent. This test case aims to test the game application functionality and to detect any of game errors.

Table 4.1 The Test Case of Serious Games for Learning Korean Language-  
Hwaiting!! Application

<b>TEST CASE</b>	<b>INPUT</b>	<b>EXPECTED RESULT</b>	<b>ACTUAL RESULT</b>	<b>PAS S/F AIL</b>
“Beginner” button in the main page will bring user to “Consonant” module page	Click the “Beginner” button	Move to “Consonant” module Page	Move to “Consonant” module Page	

“Conversation” button will bring user to “Conversation” module page	Click the “Conversation” button	Move to “Conversation” module page	Move to “Conversation” module page	
“Quiz” button will bring user to “Quiz” module page	Click the “Quiz” button	Move to “Quiz” module page	Move to “Quiz” module page	
Home icon button will bring user to “MenuScreen” page	Click the Home icon button	Move to “MenuScreen” page	Move to “MenuScreen” page	
“Back” and Back icon button will bring user to previous page	Click the “Back” and Back icon button	Move to previous page	Move to previous page	
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	
“Reset” button will reset the trophy rewards in the	Click the “Reset” button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	

trophy room scene				
“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆂ, ㆃ, ㆄ, ㆅ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆂ, ㆃ, ㆄ, ㆅ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆂ, ㆃ, ㆄ, ㆅ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆂ, ㆃ, ㆄ, ㆅ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆂ, ㆃ, ㆄ, ㆅ” audio sound will be played respectively	
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be	





Hangul characters work				
“X” icon button in “About Hangul” will bring user to “Consonant” page again	Click the “X” icon button	Navigate user to the “Consonant” page	Navigate user to the “Consonant” page	
“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively	Click the “Play” button	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	
“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.	Click “Menu” button	Navigate user to “Quiz” main menu	Navigate user to “Quiz” main menu	

<p>“Shopping” button in “Conversation” module page navigate user to “DragDropPic” activity scene related to the subject “Shopping”</p>	<p>Click “Shopping” button</p>	<p>Navigate user to “DragDropPic” scene</p>	<p>Navigate user to “DragDropPic” scene</p>	
<p>“Greetings” button in “Conversation” module page navigate user to “DragDropPic2” activity scene related to the subject “Greetings”</p>	<p>Click “Greetings” button</p>	<p>Navigate user to “DragDropPic2” scene</p>	<p>Navigate user to “DragDropPic2” scene</p>	

This test has been performed by:

Name : \_\_\_\_\_

Signature : \_\_\_\_\_

date : \_\_\_\_\_

Based on the test performed to 10 respondent, mostly give satisfaction, which is “Pass” result towards the project as all the buttons function based on the stated test case.

Please refer to APPENDIX A for all the UAT form that have been distributed to 10 general respondent .

#### **4.4 CONCLUSION**

This chapter covers about the implementation, testing and the result discussion. The development of Serious Games for Learning Korean Language-Hwaiting!! Application involving a software application which is Unity. Unity is the best application of game development which provides tools and easiest ways to create all elements needed in the game such as graphics, audio and animation. Besides, the game development has fulfil all the requirements needed based on the analysis that has been done. The testing phase shows that the game application is function well and need to be improved based on the interactive part so the game will be more fun and interesting.

## **CHAPTER 5**

### **DISCUSSION AND CONCLUSION**

#### **5.1 INTRODUCTION**

This chapter will be discussing about the conclusion based from the development of Serious Games for Learning Korean Language-Hwaiting!! Application. Within the last few chapters, we had discussed the methods, techniques as well as the implementation and results. Specifically within this chapter, we will be discussing on the discussion that had been aroused and the conclusion regarding the developed application. Other discussion also would be present on showing the end product of the application that had been made based on the objectives as well as the scopes that had been stated.

#### **5.2 DISCUSSION AND CONCLUSION**

The main purpose of this section is to discuss and to conclude on the results of the implementation that had been made within the development of game interfaces of the Hwaiting!! Application (HA). The discussion that aroused during the development of the application is that the capabilities of the mobile application to ensure user fully understand the subject taught in it, the implementation of the application interface as well as its programming commands.

In conclusion, the mobile application is capable in deliver the important information through its application, but regardless, there are many constraints that could be discussed further based on the development of the application itself.

### 5.3 APPLICATIONS CONSTRAINT

The Hwaiting!! Application (HA) have many scenes created in the unity, and it makes it took longer time to do each module based on the proposed proposal.

Hence, here are the constraints that had aroused during development of the application:

i. Time to complete full application

Since all the modules need to be done, somehow, it took longer time to finish making interfaces design and also to thoroughly planning on how this application should be in order to give it a good outcomes.

ii. Lack of knowledge

One of the biggest constraint is when we had lack of knowledge in the variety of fields. For example, in this project, it required to use Unity platform, hence, we as developer at least need to know exactly, what it is about or how to use it correctly so that it will not be a hassled.

iii. Coding

Since Unity used C# language and also java, hence, we as developer need to understand how to implement and used it correctly. As some of the coding and commands are mostly taken from various sources, hence it make it much more difficult to combines the bit pieces , where there are sometimes they are not compatible with each other.

## **5.4 FUTURE WORKS**

This application can be accessed in various other platforms and not only focused on android mobile application, so that the range of user that can used it become larger.

Based on the completed Hwaiting!! Application (HA), there are several enhancement that could be carried out for future improvements of the HA which are:

- i. Add more modules, so that user can fully grasp the learning and can dependently depends on the applications.
- ii. Build it in iOS platform, so that both android and iOS user can used this HA on their respective mobiles.
- iii. Adding up more functions and features within the application.

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<https://play.google.com/store/apps/details?id=com.pk.utmulti&hl=en>

**APPENDIX A**  
**USER ACCEPTANCE TEST (UAT)**

About 10 UAT form have been distributed among general respondent for them to evaluate Hwaiting!! Application (HA) based on the test case stated.

Below are attachment of the answered UAT form by each respondent:

**Respondent 1**



TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS

“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	PASS
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound will be played respectively	PASS
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅟ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅟ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅟ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅟ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅟ” audio sound will be played respectively	PASS
“ㅃ, ㅍ, ㅌ, ㅍ, ㅍ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅍ, ㅌ, ㅍ, ㅍ” button respectively	“ㅃ, ㅍ, ㅌ, ㅍ, ㅍ” audio sound will be played respectively	“ㅃ, ㅍ, ㅌ, ㅍ, ㅍ” audio sound will be played respectively	PASS
“ ㅍ, ㅍ, ㅍ, ㅍ, ㅍ” button in the	Click the “ ㅍ, ㅍ, ㅍ, ㅍ, ㅍ” button	“ ㅍ, ㅍ, ㅍ, ㅍ, ㅍ” audio sound will	“ ㅍ, ㅍ, ㅍ, ㅍ, ㅍ” audio sound will	PASS

“Double Vowels” scene will play the “   ,   ,   ,   ,   ,   ,   ,   ,   ,   ” audio sound respectively	respectively	be played respectively	be played respectively	PASS
“About Hangul” button will bring user to the information page on how Hangul characters work	Click the “About Hangul” button	“About Hangul” information will be shown	“About Hangul” information will be shown	PASS
“X” icon button in “About Hangul” will bring user to “Consonant” page again	Click the “X” icon button	Navigate user to the “Consonant” page	Navigate user to the “Consonant” page	PASS
“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively	Click the “Play” button	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively page	PASS
“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.	Click “Menu” button	Navigate user to “Quiz” main menu	Navigate user to “Quiz” main menu	PASS
“Shopping” button	Click “Shopping”	Navigate user to	Navigate user to	

in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : Nor Fatin Ayuni binti Mohd Zaini

Signature : *Nor Fatin*

Date : 2/5/2019

## Respondent 2

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS



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in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : NUKUL SUHRAH ISHAK

Signature : 

Date : 2/5/2019



### Respondent 3

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PASS/FAIL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS



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
“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	PASS
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ” audio sound will be played respectively	PASS
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	PASS
“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	PASS
“ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the	Click the “ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button	“ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	“ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	

<p>“Double Vowels” scene will play the “     ,     ,     ,     ,     ,     ,     ,     ,     ,     ” audio sound respectively</p>	<p>respectively</p>	<p>be played respectively</p>	<p>be played respectively</p>	<p>PASS</p>
<p>“About Hangul” button will bring user to the information page on how Hangul characters work</p>	<p>Click the “About Hangul” button</p>	<p>“About Hangul” information will be shown</p>	<p>“About Hangul” information will be shown</p>	<p>PASS</p>
<p>“X” icon button in “About Hangul” will bring user to “Consonant” page again</p>	<p>Click the “X” icon button</p>	<p>Navigate user to the “Consonant” page</p>	<p>Navigate user to the “Consonant” page</p>	<p>PASS</p>
<p>“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively</p>	<p>Click the “Play” button</p>	<p>Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively</p>	<p>Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively page</p>	<p>PASS</p>
<p>“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.</p>	<p>Click “Menu” button</p>	<p>Navigate user to “Quiz” main menu</p>	<p>Navigate user to “Quiz” main menu</p>	<p>PASS</p>
<p>“Shopping” button</p>	<p>Click “Shopping”</p>	<p>Navigate user to</p>	<p>Navigate user to</p>	

in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : NUR SYAZARINA BINTI AHMAD

Signature : 

Date : 2/05/19

## Respondent 4

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS



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“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	PASS
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	PASS
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	PASS
“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	PASS
“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button in the	Click the “ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button	“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will	“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will	PASS

"Double Vowels" scene will play the "ll, ll, ll, ll, ll, ll, ll, ll, ll, ll" audio sound respectively	respectively	be played respectively	be played respectively	
"About Hangul" button will bring user to the information page on how Hangul characters work	Click the "About Hangul" button	"About Hangul" information will be shown	"About Hangul" information will be shown	PASS
"X" icon button in "About Hangul" will bring user to "Consonant" page again	Click the "X" icon button	Navigate user to the "Consonant" page	Navigate user to the "Consonant" page	PASS
"Play" button in "Quiz" page will navigate user to the "Scene01" and then once answer correctly, will navigate user to "Scene02" until "Scene10" page respectively	Click the "Play" button	Navigate user to the "Scene01", "Scene02", until "Scene10" page respectively	Navigate user to the "Scene01", "Scene02", until "Scene10" page respectively page	PASS
"Menu" button in "Quiz" scene will navigate user to the main menu of the quiz.	Click "Menu" button	Navigate user to "Quiz" main menu	Navigate user to "Quiz" main menu	PASS
"Shopping" button	Click "Shopping"	Navigate user to	Navigate user to	



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in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : SITI NORHANI BINTI ZAIDI

Signature : *Hamza*

Date : 2/5/2019



**Respondent 5**

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS



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“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	PASS
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” audio sound will be played respectively	PASS
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	PASS
“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” button respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅌ” audio sound will be played respectively	PASS
“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” button in the	Click the “ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” button	“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” audio sound will	“ ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅌ, ㄴ” audio sound will	PASS




“Double Vowels” scene will play the “  , ॐ, ॠ, ॡ, ॢ, ॣ, ।, ॥, ७, ८, ९, -1, ०” audio sound respectively	respectively	be played respectively	be played respectively	PASS
“About Hangul” button will bring user to the information page on how Hangul characters work	Click the “About Hangul” button	“About Hangul” information will be shown	“About Hangul” information will be shown	PASS
“X” icon button in “About Hangul” will bring user to “Consonant” page again	Click the “X” icon button	Navigate user to the “Consonant” page	Navigate user to the “Consonant” page	PASS
“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively	Click the “Play” button	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively page	PASS
“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.	Click “Menu” button	Navigate user to “Quiz” main menu	Navigate user to “Quiz” main menu	PASS
“Shopping” button	Click “Shopping”	Navigate user to	Navigate user to	PASS

in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : NOR ABUL FIZI BINTI MOHAMMAD

Signature : 

Date : 2.5.2019

## Respondent 6

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	Pass
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	Pass
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	Pass
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	Pass
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	Pass
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	Pass
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	Pass



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in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	pass
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	pass

This test has been performed by:

Name : AINUL STAFIQAH AZAHAR I

Signature : 

Date : 02-05-2019



## Respondent 7

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	Pass
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	Pass
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	Pass
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	Pass
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	Pass
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	Pass
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	Pass



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“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	Pass
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	Pass
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	Pass
“ㅃ, ㅆ, ㄸ, ㅊ, ㅍ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅆ, ㄸ, ㅊ, ㅍ” button respectively	“ㅃ, ㅆ, ㄸ, ㅊ, ㅍ” audio sound will be played respectively	“ㅃ, ㅆ, ㄸ, ㅊ, ㅍ” audio sound will be played respectively	Pass
“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the	Click the “ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button	“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	Pass



in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	Pass
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	Pass

This test has been performed by:

Name : NUR ALNISA' ANIS ALANNA BINTI RIZELAN

Signature : 

Date : 2/5/19

## Respondent 8

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS



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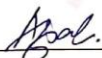
“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㄷ, ㅎ, ㅌ” audio sound will be played respectively	pass
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	pass
“ㅃ, ㅆ, ㅉ, ㅊ, ㅋ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅃ, ㅆ, ㅉ, ㅊ, ㅋ” button respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅋ” audio sound will be played respectively	“ㅃ, ㅆ, ㅉ, ㅊ, ㅋ” audio sound will be played respectively	pass
“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the	Click the “ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button	“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	“ ㅌ, ㅍ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will	pass

“Double Vowels” scene will play the “ ീ, ു, ൂ, ൃ, ൄ, ൅, െ, േ, ൈ, ൉, ൊ, ോ, ൌ, ്, ൎ, ൏, ൐, ൑, ൒, ൓, ൔ, ൕ, ൖ, ൗ, ൘, ൙, ൚, ൛, ൜, ൝, ൞, ൟ, ൠ, ൡ, ൢ, ൣ, ൤, ൥, ൦, ൧, ൨, ൩, ൪, ൫, ൬, ൭, ൮, ൯, ൰, ൱, ൲, ൳, ൴, ൵, ൶, ൷, ൸, ൹, ൺ, ൻ, ർ, ൽ, ൾ, ൿ, ൽ, ൿ ” audio sound respectively	respectively	be played respectively	be played respectively	pass
“About Hangul” button will bring user to the information page on how Hangul characters work	Click the “About Hangul” button	“About Hangul” information will be shown	“About Hangul” information will be shown	pass
“X” icon button in “About Hangul” will bring user to “Consonant” page again	Click the “X” icon button	Navigate user to the “Consonant” page	Navigate user to the “Consonant” page	pass
“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively	Click the “Play” button	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively page	pass
“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.	Click “Menu” button	Navigate user to “Quiz” main menu	Navigate user to “Quiz” main menu	pass
“Shopping” button	Click “Shopping”	Navigate user to	Navigate user to	pass

in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : AZIAN BINTI ~~MD~~ MD. ARIFFIN

Signature : 

Date : 2.5.2019



**Respondent 9**

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	PASS
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	PASS
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	PASS
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	PASS
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	PASS
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	PASS
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	PASS

“Trophy Room” button will bring user to “Trophy Room” game page	Click the “Trophy Room” button	Move to “Trophy Room” game page	Move to “Trophy Room” game page	PASS
“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” button in the “Consonant” scene will play the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” audio sound respectively	Click the “ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” button respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” audio sound will be played respectively	“ㄱ, ㄴ, ㄷ, ㄹ, ㅁ, ㅂ, ㅅ, ㅇ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” audio sound will be played respectively	PASS
“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button in the “Vowels” scene will play the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound respectively	Click the “ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” button respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	“ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, ㅛ, ㅜ, ㅠ, ㅡ” audio sound will be played respectively	PASS
“ㅞ, ㅟ, ㅠ, ㅡ, ㅢ” button in the “Double Consonant” scene will play the “ ” audio sound respectively	Click the “ㅞ, ㅟ, ㅠ, ㅡ, ㅢ” button respectively	“ㅞ, ㅟ, ㅠ, ㅡ, ㅢ” audio sound will be played respectively	“ㅞ, ㅟ, ㅠ, ㅡ, ㅢ” audio sound will be played respectively	PASS
“ ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” button in the	Click the “ ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” button	“ ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” audio sound will	“ ㅆ, ㅈ, ㅊ, ㅋ, ㆁ, ㆁ” audio sound will	



“Double Vowels” scene will play the “     ,     ,     ,     ,     ,     ,     ,     ” audio sound respectively	respectively	be played respectively	be played respectively	PASS
“About Hangul” button will bring user to the information page on how Hangul characters work	Click the “About Hangul” button	“About Hangul” information will be shown	“About Hangul” information will be shown	PASS
“X” icon button in “About Hangul” will bring user to “Consonant” page again	Click the “X” icon button	Navigate user to the “Consonant” page	Navigate user to the “Consonant” page	PASS
“Play” button in “Quiz” page will navigate user to the “Scene01” and then once answer correctly, will navigate user to “Scene02” until “Scene10” page respectively	Click the “Play” button	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	Navigate user to the “Scene01”, “Scene02”, until “Scene10” page respectively	PASS
“Menu” button in “Quiz” scene will navigate user to the main menu of the quiz.	Click “Menu” button	Navigate user to “Quiz” main menu	Navigate user to “Quiz” main menu	PASS
“Shopping” button	Click “Shopping”	Navigate user to	Navigate user to	

in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	PASS
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	PASS

This test has been performed by:

Name : NOOR AQILAH BINTI ABUUL HALIM

Signature : 

Date : 2/5/2019

## Respondent 10

TEST CASE	INPUT	EXPECTED RESULT	ACTUAL RESULT	PAS S/FA IL
"Beginner" button in the main page will bring user to "Consonant" module page	Click the "Beginner" button	Move to "Consonant" module Page	Move to "Consonant" module Page	Pass
"Conversation" button will bring user to "Conversation" module page	Click the "Conversation" button	Move to "Conversation" module page	Move to "Conversation" module page	Pass
"Quiz" button will bring user to "Quiz" module page	Click the "Quiz" button	Move to "Quiz" module page	Move to "Quiz" module page	Pass
Home icon button will bring user to "MenuScreen" page	Click the Home icon button	Move to "MenuScreen" page	Move to "MenuScreen" page	Pass
"Back" and Back icon button will bring user to previous page	Click the "Back" and Back icon button	Move to previous page	Move to previous page	Pass
Next icon button in button will bring user to next page	Click the Next icon button	Move to next game page	Move to next game page	Pass
"Reset" button will reset the trophy rewards in the trophy room scene	Click the "Reset" button	Clear trophy in trophy room game page	Clear trophy in trophy room game page	Pass





in "Conversation" module page navigate user to "DragDropPic" activity scene related to the subject "Shopping"	button	"DragDropPic" scene	"DragDropPic" scene	pass
"Greetings" button in "Conversation" module page navigate user to "DragDropPic2" activity scene related to the subject "Greetings"	Click "Greetings" button	Navigate user to "DragDropPic2" scene	Navigate user to "DragDropPic2" scene	pass

This test has been performed by:

Name : Nur Faraleya Azira Bt. Saman

Signature : 

Date : 2/5/2019