

# Kana Warrior: Teaching Hiragana to Malaysian Youth Using 2D Platformer Video Game

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**Abstract**— The Japanese language is one of the most in-demand foreign languages in Malaysia. It is popular with the Malaysian youth because of the Japanese animation called Anime. It has influenced the youth to have an interest in the Japanese language. Since Japan's economy is currently one of the largest globally, having proficiency in the Japanese language can be a boon to the youth. However, they do not actively study it despite having an interest in the language. Using gamification can effectively teach them the Japanese language. Hence, this research aims to develop a 2D platformer video game that teaches the Malaysian youth one of the writing scripts of the Japanese language, Hiragana. This research also aims to evaluate the effectiveness of the game among selected respondents. Another aim is to educate and motivate the Malaysian youth about the basics of Hiragana. This research uses the ADDIE Model which is commonly used to produce an effective design in the field of instructional design. An evaluation has been carried out to multiple respondents and they have given out positive feedback on the video game.

**Keywords**— Japanese Language, Video Game, 2D Platformer, Malaysian Youth, Gamification, Hiragana

## I. INTRODUCTION

Playing video games is a favourite pastime of most people in the younger generations around the world. Even people who grew up playing video games will likely still be attached to it during adulthood. 100 million USD in revenue has been contributed by the gaming industry to Malaysia in the year 2018 [1]. So, it is not an exaggeration to say that video game is one of the biggest industries in the country right now. Video games are usually made with the intent of being played for leisure. However, it can also be a very effective platform to educate the youth in gaining new knowledge. This research is to develop a 2D platformer video game that educates the Malaysian youth in Hiragana.

The Japanese language is a relatively popular language around the world. This is due in part to the influence of Japanese media such as Anime and Japanese games. Malaysia is also not excluded from its influence. Many Japanese companies have taken their root in this country and bringing over their Japanese speaking employees as well. This has opened many job

opportunities for the locals that are able to speak the Japanese language. However, not many people are actively studying it even if they have a slight interest in it. Hence, the findings of this research will encourage people to study the Japanese language and potentially help boost their career opportunities in the future.

For the problem statement in this research, the Malaysian youth only has passing interest in learning Japanese language. Since they live in a non-Japanese language speaking country, they do not see the need to actively learn it. Hence, their interest in the language will disappear over time. Furthermore, there is a lack of effort to promote Japanese language to Malaysian youth using gamification. Malaysia has many formal institutes for people to learn the Japanese language. However, there are no teaching method that uses gamification to teach the language to the younger generation.

The objective of this research is to educate and motivate the Malaysian youth about the basics of Hiragana. Besides that, another objective is to develop a 2D platformer video game that teaches Malaysian youth the basics of Hiragana.

There are two research questions in this research namely, is video game an effective medium to teach Hiragana to the Malaysian youth? Besides that, does gamification help in keeping the Malaysian youth motivated to study Hiragana?

This research is focused on the Japanese language, specifically the Hiragana writing script. The data collection will be targeted on Malaysian youth around the age of 15 years old and 26 years old having little to no knowledge of Hiragana. The data collection will be done through survey after the users have played the game. Using this strategy, the effects of the game on their Hiragana skills will be made apparent.

## II. RELATED WORKS

### A. Video Game

The history of video game is not in the distant past as the earliest recorded video game was "Space War" in the year 1962 [2]. It was developed by Steve Russell who was a student at the Massachusetts Institute of Technology at the time. It has simple gameplay in which two spaceships fight each other in single combat. At the time, it was an advanced program that pushed the capabilities of the hardware to their limits. This was the beginning of the video games era.

### 1) Platformer Genre in Video Games

One of the most popular games in history that utilises the platformer genre is Super Mario Bros. (1985). It is a game where you control a plumber named Mario as he travels the world to save the princess. It is a side-scrolling platformer game where you can only move left and right in a 2D environment. The platformer genre has a simple game mechanic. This makes it easier for the player to understand how to play immediately. In figure 2-2, the player can see that Mario starts at the left of the screen. This indicates that you would need to go right to proceed. You also can only jump and walk left and right. Those are the only movements the player needs to know to play the game. However, the genre can also be played around with such complexity. In Super Mario Bros., the player has multiple ways to upgrade the main character. One example is Mario eating a mushroom to get bigger and essentially gaining an extra life.

There are numerous types of platformer games that use various ways to reward and challenge the players. Super Mario World, another Mario game, is characterised by a reward format [3]. The game has a few hidden areas that are only accessible through few means. Players use their dexterity to complete the challenges and gain satisfaction from them. In another game called Sonic the Hedgehog, items called rings are scattered throughout the level. The player tries to collect it in a short amount of time. This game uses a time limit as the challenge. For the third game, they researched Donkey Kong 2. This game uses exploration as the key mechanic for its reward. Hidden areas in this game contain secret coins and the player needs to gather them as rewards.

### 2) Gamification in Education

Video game has become an increasingly important part of modern childhood. It brings joy to people's lives and improves their mood significantly. In contrast to that, most formal education is a tedious task to sit through. Even if the person has a slight interest in learning, they will eventually lose interest quickly. To raise their interest to study and maintain it, they would need a fun way to do it.

Gamification of education is simply defined as incorporating game design elements in an educational environment to heighten the learner's motivation and engagement [4]. The idea is like giving incentives to someone for doing something that is considered mundane. One such example is receiving a salary or bonus for performing a job.

Gamification of education ensures specific knowledge sticks in the learner's mind. It hooks the player to its story, gameplay, music, or any other elements present in the game. In addition, educational element. By applying gamification to an otherwise boring education, it could drastically increase the performance of a student in gaining knowledge.

## B. Japanese Language

The Japanese language is spoken by around 128 million people around the world [5]. Though it is primarily spoken by

the people of Japan. It is a member of the Japonic family, which has two branches: the Japanese language and the Ryukyuan languages. The Korean language is thought to be related to the Japonic family as well.

### 1) Japanese Writing System

The Japanese language was primarily a spoken language [6]. It did not have any writing system up until around the year 800. This is due to them adopting the Chinese writing system. It is theorised that the Japanese were illiterate for some hundred years until they took on the Chinese writing system. The modern Japanese writing system consists of three scripts: Hiragana, Katakana, and Kanji. These are the primary ways for the Japanese to write and type in their daily lives.

Hiragana is a Japanese syllabary and the first of the three Japanese writing scripts. It has 46 characters or sounds called *gojūon* that translates to a table of 50 sounds. Furthermore, there are modified forms of these sounds to describe additional sounds. These are *dakuon* (20 sounds), *handakuon* (5 sounds), *yōon* (36 sounds), *sokuon* (1 sound), and additional letters (6 sounds). Hiragana is often used to describe words that are originally Japanese.

A Japanese language learner needs to learn Hiragana. This is because Hiragana is the foundation of the Japanese writing system. It is laid out everywhere on the streets of Japan. Most words on the billboard and any other advertisements in Japan are written in Japanese. Thus, it would be an advantage to be able to read those words. Hiragana also helps people in reading Kanji in the form of Furigana. Furigana is Hiragana characters that are laid out beside the matching Kanji. This is to help them read it if they are unable to read the Kanji.

### 2) Importance of Japanese Language to Malaysian Youth

There is a high demand for the Japanese language as a foreign language in Malaysia, especially in Japanese companies. Since Japan and Malaysia have a long-established business relationship with each other. Recently, many Japanese companies required an individual to be able to speak in their mother tongue to better communicate with their Japanese employees [7].

To work in Japan, it is sometimes mandatory for a person to be fluent in the Japanese language. When working in an environment where you need to communicate with the locals daily, it is certainly a requirement. As a benchmark, a person needs at least a level 2 certification (N2) in the Japanese Language Proficiency Test (JLPT) for the general occupation in Japan [8]. In terms of Japanese culture, most Japanese people do not speak other languages than their own. Despite acknowledging that English language proficiency is important to compete in the global economy, Japan is still ranked in the bottom of the list in terms of English skills [9]. Thus, for a person to participate in the economy involving Japan, they would need to be proficient in the Japanese language.

## C. Case Study

### 1) Gamification Assisted Language Learning for Japanese Language Using Expert Point Cloud Recognizer

In similar research done in reference [10], he created an RPG (Role-Playing Game) game that teaches the player to write Hiragana and Katakana characters. This game has a fun battle mechanic in which the player must write the characters accurately in the correct stroke order to defeat the enemies. For the findings, 150 players were tested to view the results of the research. Pre-test (Before the player plays the game) and post-test (After the players played the game) were done to measure the players' improvements. In the pre-test, 10 players answered the questions correctly, 36 players got 30% - 50% wrong answers and 104 players got wrong answers for all questions. For the post-test, 10 players answered the questions correctly, 134 people got an average correct answer of 20% - 100% while only 6 players got all wrong answers.

The only limitation this game shows is that the aesthetic is not pleasing to some people. This means it might not be able to maintain their interest to learn if they do not like what they are viewing. Overall, this research has yielded results in which many players have improved their basic Japanese language skills and has raised interest in the language itself.

### 2) Gamification of Mobile-based Japanese Language Shadowing



Figure 1: Shadowingu Gameplay

In another research done in reference [11], they created an application named Shadowingu. This application gamifies an existing technique to learn the Japanese language which is called Shadowing. Shadowing is an advanced learning technique in which a person listens to a text in their target language and speaks the text at the same time as the speaker. They gamified this technique because it is boring and less motivating when there is no feedback from a teacher. The game entails multiple game design elements such as time, progression, storytelling, rewards, and more. The player must speak the matching sound for the text displayed on the screen to progress the game. The research uses pre-test and post-test to evaluate 25 respondents that will play it. From the test, it finds that 60% of the word pronunciation was more accurate after the post-test and that 92% of them prefer their education to be gamified.

However, there were some elements in the game that some players felt like a hindrance. Those are rules, stories, and avatars. They felt that those elements make it harder to learn the

language. Although, if implemented properly, it could be used to enhance the learning experience.

In conclusion, the research conducted by other people to gamify the Japanese language was most promising and yielded good results. This proves that gamification of education is an effective way to educate someone on the Japanese language while keeping them motivated to learn.

### 3) Gamification of M-Learning Mandarin as Second Language



Figure 2: Screen Layout of the Application

Based on reference [12], they developed two similar applications that teach the Mandarin language. One is gamified and the other is not gamified. The application contains nine topics for the learning materials: greetings, family, general conversation, colour, numbers, days and months, general vocabulary, food, and animals. In each topic, it provides a text in Mandarin and audio on how to pronounce the word. The players are given 5 sets of questions in each topic to be answered correctly before heading to the next material. In the gamified version, the questions are treated as levels.

They recruited 20 students who like to play games to participate in the research testing. The results show that the gamification method surpasses non-gamification in some aspects. These are concentration, learner skills, feedback, and immersion. The participants are more focused and immersed when using the gamified version. Thus, giving more performance in learning. However, the game version loses in terms of a clear goal of overall learning and a clear goal of each level. This means that the participants have a clear vision of what they are learning in the non-gamified version. Overall, the gamification method has proven to be useful to teach people in learning a new language.

#### 4) Duolingo



Figure 3: Duolingo Homepage Screen

Duolingo is a language learning website and mobile application. It is a freemium-based application in which the users may use it for free with advertisements or subscribe to a premium plan which offers multiple advantages such as advertisements free, unlimited hearts, mistakes review, and more. It offers around 106 language courses and currently has over 500 million registered users. The game element that has been added to this application is that it scores the person on how much lesson they take and gives them points called “XP”. It is then used to increase their rank in certain topics. The users would compete with other users to move on to the next level called “League”, which ranges from Bronze League to Diamond League.

Although it is quite a useful tool, this application is not a game by itself, but it has been gamified to emulate how a game would look like. It does not have a story or narrative that could hook you into playing even further. It is purely an educational application that has been slightly gamified. Overall, it is good for casual learners and intensive learners, but it is not a full-fledged game.

#### 5) Learn Japanese to Survive! Hiragana Battle



Figure 4: Battle Gameplay of the Game

“Learn Japanese to Survive! Hiragana Battle” is an educational RPG (Role-Playing Game) game developed by Sleepy Duck. It can be played on Windows or MacOS computer. In this game, the player learns the first of the three Japanese

writing scripts, Hiragana. It was developed using the RPG Maker game engine.

This is a complete game that focuses on an educational aspect, namely teaching Hiragana characters to the player. It helps the player memorise the characters using repetition. The player will encounter many Hiragana characters as enemies and eventually face the same one all over again, making it great for memorisation. Later in the game, the player should have at least memorised most of the characters, if not all. Some of the items that can be bought by the player in the game will also be spelled in Hiragana only, forcing you to use your newly acquired knowledge to the test.

It is, however, not without any flaws. The font used for the enemies’ sprites is different and more stylised than the one in the dialogue box. It might be good practice for the player to be able to read the same characters in a different font. However, it can be confusing for beginners, and it might take a while before they would be accustomed to it. Another thing of note is that apart from it being a Japanese educational language game, it uses the standard RPG mechanics. Nothing new will be added later in the game, so there is nothing that motivates the player any further once they are used to the mechanics except for encountering new Hiragana characters.

Table 1: Table of Comparison for Related Works

Feature	Gamification Assisted Language Learning for Japanese Language Using Expert Point Cloud Recognizer	Gamification of Mobile-based Japanese Language Shadowing	Gamification of M-Learning Mandarin as Second Language	Duolingo	Learn Japanese to Survive! Hiragana Battle
Navigation	Decent navigation	Decent navigation	Decent navigation	Smooth navigation	Decent navigation
Colour	Decent colour combination	Decent colour combination	Very little variations of colour	The colours are striking	Various use of colours
Text	Legible and readable	Legible and readable	Legible and readable	Legible and readable	Legible and readable.
Gamification Elements	Health, score, timer	Health, score	Score, timer	Health, experience points, leader board	Health, experience points, score
Strength	Fun battle mechanic	Good game design and good adaptation of an existing technique	Contains many contents of various topics	Free application with premium plan	Complete game with storyline and other game elements
Weakness	Certain aesthetic of the game does not attract people.	Some of the game elements make it difficult to learn the language.	The user interface is plain. Lacking in colour combination.	Not a complete game. It is only an application that has been gamified. It has no main storyline.	Some font for Japanese text is different, making it difficult for beginner.

### III. METHODOLOGY

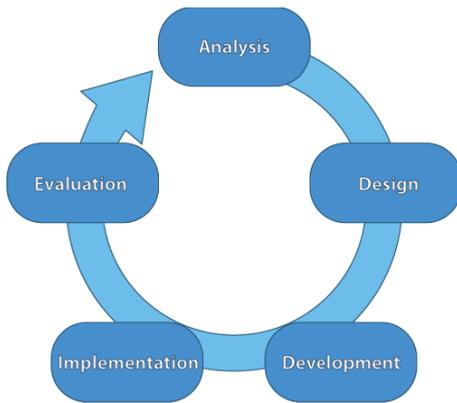


Figure 5: ADDIE Model Diagram

#### A. Analysis Phase

In this phase, several things are researched and analysed. The first thing is the game engine that is used to develop the game application. Multiple game engines are readily available for the public to use to create their games. For this game, Unity game engine is used to develop it. Regarding this research paper, the title, problem statement, aim, and objectives are also researched. The next thing to analyse was the information regarding the Japanese language and its writing script. Information about video games is also researched. Both areas are included in the literature review.

#### B. Design Phase

To start the design phase, a wireflow of the game layout was created. Wireflow is a term used to describe a combination of flowchart and wireframe. Adobe XD is used to create it as it is a powerful tool to create UI and UX design of any application. Then, the character design, the game's storyline, level design, and other art assets are created. For these assets, Clip Studio Paint is used to sketch those out and Adobe Illustrator to draw the final products.

#### C. Development Phase



Figure 6: Main Menu of the Game

In this phase, the characters and other art assets were created based on the earlier designs. To create it, the application called Adobe Illustrator is used to draw it. After that, the characters were animated by using Adobe Animate. The application that

was used to create the meat of the product is a popular game engine known as Unity. The programming side for this game uses C# programming language. The game was developed for Windows users on the computer platform.

#### D. Implementation Phase

For this research, the targeted audience are Malaysian youth around the age of 15 years old to 26 years old. They were given the game application to play around with and experience all the levels that have been developed.

#### E. Evaluation Phase

For this research, qualitative method was used to collect data from the respondents. In this method, they answered the survey created by the developer to achieve the research aims and objectives and answer the research questions.

### IV. PROTOTYPE

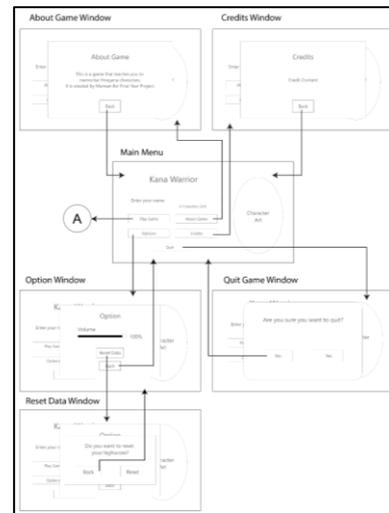


Figure 7: Wireflow 1

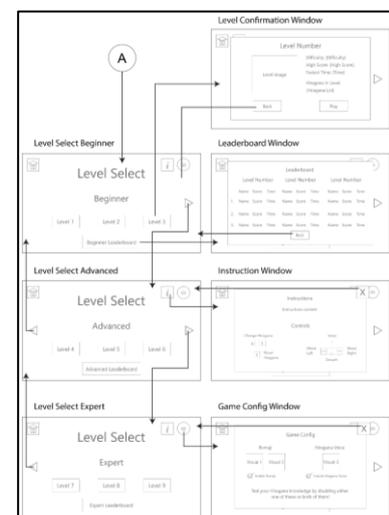


Figure 8: Wireflow 2

For the prototype, the researcher created a wireflow of the video game. It is a combination of wireframe and flowchart in one diagram. The game starts in the Main Menu scene containing five buttons. The buttons lead to the level select scene, credits window, about game window, options window, and the quit game window. In the level select scene, it shows buttons to display instruction window, game config window, leaderboard windows, and level windows that lead to their respective game level. This video game helps the player to learn Hiragana by defeating the enemies using Hiragana characters.

#### A. Font Selection



Figure 9: Night Warrior Font

In this video game, most of the font used is a font called Night Warrior. It has been chosen as the primary font because it is stylish yet still readable by the players. It fits the theme of the game which is about a warrior.

#### B. Button Design

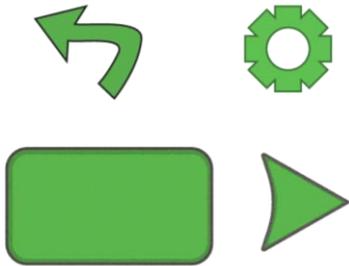


Figure 10: Button Designs

The button design for this video game is themed around the colour green which is the colour of nature. The button will transition to a darker colour scheme when the player hovers the mouse onto it. That will provide visual feedback to indicate that it is a clickable button.

#### C. Art Assets using Adobe Illustrator

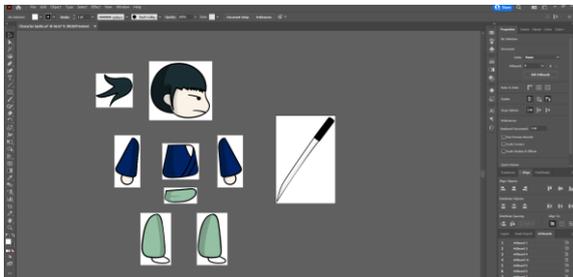


Figure 11: Adobe Illustrator Software

All the button and art assets in this video game were created using this software. The characters' sprites were also created using this software. It would later be exported as a PNG file to be animated.

#### D. Animation using Adobe Animate



Figure 12: Adobe Animate Software

The individual body parts of the characters created in Adobe Illustrator earlier were imported in this software. It was then gathered to form a character sprite to be animated. The main character has animations such as idle, attack, jump, crouch, and run. The enemy only has two animations which are idle and walk animation.

#### E. Audio

There are four background music in total that is played in this video game. These are the main menu and level select scene, level 1 until 3, level 4 until 6, and level 7 until 9. Every Hiragana bullet in the game also has a voice line that states the pronunciation for that Hiragana character. Other audio files are for sound effects such as when the player is damaged or when the bullet hits an obstacle.

#### F. Game Development using Unity Engine

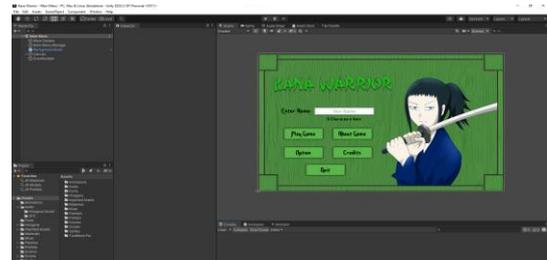


Figure 13: Unity Game Engine

Unity game engine is the main software that was used to create this video game. It imports all the needed assets into the software, uses coding to navigate between scenes and many more.

### V. RESULTS AND FINDINGS

A survey was created using Google Form and distributed to 33 random respondents within the age range of the target audience, namely 15 years old to 26 years old. After the testing, over 80% of the respondents strongly agree or agree that the game has improved their Hiragana skills. The following results answer the research questions of the researcher stated in Chapter 1 of this research.

A. *Is video game an effective medium to teach Hiragana to the Malaysian youth?*

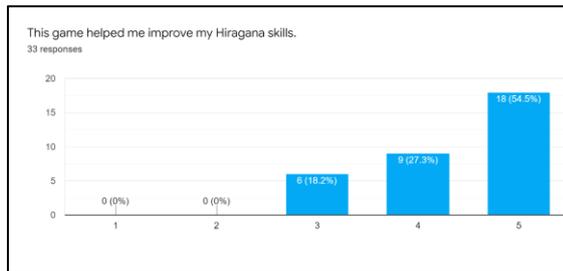


Figure 14: Use of game to teach Hiragana

In the figure above, it shows a bar chart of respondents about how the game helped improve their Hiragana skills. 18 people (54.5%) strongly agree, 9 people (27.3%) agree, and 6 people (18.2%) have neutral opinion. In conclusion to this, many people gave a positive response to this.

B. *Does gamification help in keeping the Malaysian youth motivated to study Hiragana?*

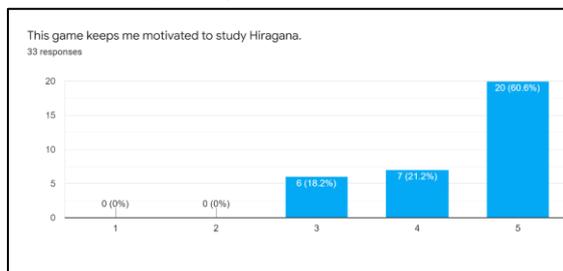


Figure 15: Gamification helps Malaysian youth in studying Hiragana

In the figure above, it shows a bar chart of respondents about how the game keeps them motivated to study Hiragana. 20 people (60.6%) strongly agree, 7 people (21.2%) agree, and 6 people (18.2%) have neutral opinion. In conclusion to this, many of the respondents also gave positive feedback to this.

## VI. CONCLUSION

This Kana Warrior game has been developed to teach the players in the basics of Hiragana. It contains multimedia elements that would increase player's engagement to it while also allowing them to memorise all of the Hiragana characters in it. Many feature can be added in this game.

For the future recommendations, the developer believes that the game can be further improved. This means that it can provide even more engaging gameplay and more effective means to teach Hiragana to the players. One of the possible improvements

is to improve the user interface to better please the eyes of the players. Besides that, the game can also be ported to mobile platform such as Android. This will allow even more people to play the game and learn Hiragana wherever they are. Furthermore, the audio in this game can be clearer and improved significantly. Audio is an important aspect in a game because it immerses the player in the game world.

In conclusion, the researcher wishes that more people would start learning the Japanese language by playing this video game. The players could gain the benefit of learning the language just from playing it. The researcher has also learned from this experience and strives to create even better teaching materials from this point on for the sake of the users.

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