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The Development of a Multimedia Application in Learning Japanese: A Step Forward in Malaysia's Look East Policy

Naginder Kaur, Nor Arzami Othman, Hana Wahida Adli

Universiti Teknologi MARA, Malaysia

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ABSTRACT

The Look East Policy Programme in Malaysia, that was rejuvenated recently by Tun Dr Mahathir Mohamad, the seventh Prime Minister of Malaysia, focuses on a few key areas, namely, education, training and investment, consequently, making the learning of Japanese as a third language fundamental for Malaysian undergraduates as a key point to set them apart from others, especially in multicultural or intercultural competency atmospheres. On the global sphere, the emergence of Japan as a rising force in industrialisation has also made the learning of Japanese essential for non-native speakers. Hence, it has become relevant and necessary to pay more attention to the learning of the Japanese language in all corners of the globe. However, for many, it is a daunting task, mainly because of unfamiliarity with the Japanese script and the vast number of characters in the language. This paper outlines an initiative taken by the researchers in developing and testing a multimedia application for Japanese language learning using sensory learning and Tangible User Interface, adopting the five-step ADDIE model. The paper maps out the detailed step-by-step process in developing this application, named ATAMJHS for the learning of the Hiragana syllabary, using Malay language mnemonics as the learning guide, thus, making it a truly novel application for use by any Malay-literate learner in South East Asia and anywhere beyond, ensuring a more rewarding and sustainable partnership with Japan in the future, through quality education (SDG 2030: Goal 4), specifically in upholding and realising the Look East Policy in the Malaysian context.

* Corresponding author. *E-mail address*: ninder@uitm.edu.my

1. Introduction

Since its first launch in July 1981 by Dr Mahathir Mohamad, the fourth Prime Minister of Malaysia then, the Look East Policy has made Japanese language one of the international languages of high demand in the Malaysian national education system (Shabudin, Aisyah, Darus, & Mimiko, 2014).

According to Datuk Seri Najib Razak, the sixth Prime Minister of Malaysia, since both Malaysia and Japan have had a strong mutual relationship for more than 60 years, this policy has benefited 16,600 Malaysians through the allocation of students and workers from Malaysia into universities and institutes of technology in Japan which aim to expand experience and training in many industries (Perimbanayagam, 2017). Datuk Seri Najib also said that these Japan-trained talents symbolise a part of the talent pool that fulfills or even surpasses the minimum requirements of the business community, especially of the Japanese companies operating in this country (Perimbanayagam, 2017). In addition, the Malaysian government is consistently encouraging the growth of talented Malaysians by facilitating them to acquire the appropriate knowledge and skill sets for today and the future (Perimbanayagam, 2017). As an emergent Islamic economy, Malaysia aspires and strives to emulate the Japanese by investing in its human capital, that is, its young generation. As Sarwar and ul Haq (2017) aptly contend that "economic growth takes place in economies due to improvement in the form of skills, training, knowledge, and research etc" (p. 82), it is therefore, imperative that Malaysia, as an emerging Islamic economy places adequate emphasis on education, and research for its human capital, and provides quality education (SDG 2030: Goal 4) for a sustainable future.

In early 2018, the seventh Prime Minister of Malaysia, Tun Dr. Mahathir Mohamad said Malaysia and Japan will rejuvenate and add more value to the 37-year-old policy to deepen collaboration and strengthen business affairs between the two countries (Malaysia and Japan to revive Look East policy, 2018). Mahathir also hoped that Japanese universities would set up their branches in Malaysia (Malaysia and Japan to revive Look East policy, 2018). In accordance with these future plans and opportunities, the importance of learning Japanese language will become more prominent in the future. At present, Japanese language courses are already offered at Malaysian national schools which include SBP *(Sekolah Berasrama Penuh)* and local universities as well, to cope with the modernisation stream. In addition to their fundamental role of providing knowledge and training, Malaysian universities bear the responsibility to ignite innovation, and introduce new technology through research (Bakar, Sakinah, M. Zaini, & Sarmin, 2019), hence, an innovative method of teaching and learning Japanese language at tertiary level is necessary to be explored.

In learning Japanese, mnemonics is one of the effective ways to boost memory capacity. Mnemonics as identified by Wilson (2013) are "systems that enable us to remember things more easily and usually refer to internal strategies such as reciting a rhyme". If current teaching methods continue to use the textbook and chalkboard approach, a lot of effort and time will be consumed to engage students' interest and continuous self-learning ability (Zhang, 2016), which will jeopardise their overall learning efficiency. In addressing Altas' (2015) claim that words and images influence a person in the way they retain information, hence, an application that integrates text, art, sound, and animation may increase students' interest in the learning process. Additionally, mnemonics deployment may take a shorter time for students to memorise and allows them to hold on to information for a longer period in their memory (Glynn et al., 2003).

1.1 Japanese Writing System and Its Usage

As stated by Kim (2017a), the Japanese writing system consists of three main written scripts which are Hiragana, Katakana, and Kanji. Hiragana is the essential phonetic writing system used to symbolise every different sound in Japanese. Because of the phonetic features and easier structure, it is common to learn Hiragana first before proceeding with Katakana and Kanji (Hatasa, 1991; Kim, 2017b). Usually, Hiragana is used to represent Japanese grammatical elements and words which are of Japanese origin (Niko, 2018). While Katakana represents the same sounds as Hiragana, it is mainly used to represent words imported from other languages (Kim, 2017a; Niko, 2018). For instance, the word "sumimasen" which means "sorry" or "excuse me" and is of Japanese origin, would be written in Hiragana (すみません). Meanwhile, "nekutai" which means "necktie" is obviously a loan word, hence, is written in Katakana (ネクタイ).

Hatasa (1991) points out that both Hiragana and Katakana have 46 basic letters with two types of accent marks which are for voicing and converting /h/ to /p/ or vice versa which are commonly seen while

representing secondary letters. In addition, there are letters that can be written small as they follow another letter such as /kyu/ and /kya/ which are, /ya/, /yu/, and /yo/ (Hatasa, 1991). These letters are known as contracted sounds (Hatasa, 1991). Other than that, if the letter /tsu/ is written small, it indicates doubled consonants (Hatasa, 1991).

As mentioned before, loan words are mostly transcribed in Katakana (Hatasa, 1991). Therefore, vowel letters can be written small as these are used to approximate sounds that supposedly do not exist in Japanese (Hatasa, 1991). Furthermore, the 46 basic letters in Hiragana and Katakana do not show any obvious systematic variation. Kana silhouettes show no clue of how these should be pronounced. For instance, although the syllables /ka/, /ki/, /ku/, /ke/, /ko/ share the same initial constant, their Kana signs have nothing in common. Similarly, /hi/, /mi/, and /ki/, although pronounced with the same vowel, their shapes are varied without any rational patterns (Hatasa, 1991).

Japanese mainly use Kanji, the Chinese characters adapted into Japanese culture into writing (Kim, 2017b). This adaptation has occurred since the fifth or sixth centuries (Learn Japanese, 2018). Kim, (2017b) also claims that in Japanese writing system, there is no space which necessitates the need for Kanji to separate particular words in a sentence. In addition, Kanji also helps to differentiate homophones that often occur due to a limited number of distinct sounds in the Japanese writing system.

2. Literature review

2.1 Benefits of Using Mnemonics in the Learning Process

Hall, Kent, McCulley, Davis and Wanzek (2013) suggest that compared to other memorisation tutoring routines such as rehearsal, mnemonics instruction is proven to produce better recall of information such as historical information. One of the reasons why mnemonics has been proven to be practical is that it does not require writing nor reading, thus enabling students with learning and mental disabilities to learn better (Scruggs & Mastropieri, 1989). Scruggs and Mastropieri (1989) suggested that graphic representations of material can also diminish verbal limitations. This shows the significance of using visual and verbal mnemonics in contributing to the ability of enhancing information retain and recall.

Other than that, according to Higbee (1985), the usage of Yodai, a Japanese mnemonics method developed by Masachika Nakane, is certain to improve the time taken for students to be taught and they will still perform better compared to other students who learn using conventional teaching methods. According to Boggan, Harper and Whitemire (2010), Yodai is a technique whereby students are taught methods to do addition using variables, before getting to know the addition sign (+) itself (White, 2016). In addition, this finding suggests that mnemonics is applicable throughout a variety of cultures.

2.2 Related Works of Mnemonic Method

Several studies have been carried out on the use of mnemonics in learning. Mnemonics integrated gamification, based on studies conducted by Rawendy, Ying, Arifin and Rosalin in 2017, aimed to provide an attractive, creative and motivating learning method especially for children, using keyword method, loci, peg word method and picture method. This system provides a gamification module and focuses on users with prior knowledge in the field concerned, which is Chinese. Additionally, the system is used to strengthen the prior knowledge of users. The studies claim that this method is proven to render better results compared to traditional learning.

Tsong, Chong and Samsudin (2012) conducted a study on implementing tangible multimedia in learning for children. The study was conducted by placing a laptop equipped with a camera, a set of tangible objects attached with QR code markers that showed a direct representation of objects on the display screen, and a

normal display table that suited the physical capabilities of a child. This system used a Quick Response (QR) code marker and Flash library, whereby users were required to scan objects placed on the table using the QR reader by aligning the objects with the camera situated on the top of the laptop. The computer system would then display appropriate animations and videos corresponding with the objects scanned to the QR scanner. Tsong, Chong and Samsudin claimed that the systems used in their study showed positive results in terms of enjoyment, feasibility and usability.

In summary, in learning a third language, especially one that is categorised as difficult to learn, a new way of learning is needed in order to decrease the time taken, and ease the overall process of memorising and recalling information. In this case, Japanese syllabary has unfamiliar shapes and the number of syllables is also big, with 46 syllables each for Hiragana and Katakana, in comparison to Romanised script which contains only 26 syllables.

3. Mnemonics and Tangible User Interface in this study

To overcome these concerns, mnemonics and Tangible User Interfaces (TUIs) will be used. Mnemonics is proven to help learners memorise and recall information meanwhile TUIs encourage multiple sensory learning. Since mnemonics have a variety of types, in this project, visual and verbal mnemonics are chosen. In the visual mnemonics, acoustic elaboration is chosen because it is commonly used to present unfamiliar occurrences which in turn represent Japanese syllables that are unfamiliar to non-native speakers. Other than that, acrostics from verbal mnemonics are seen to be suitable for this project. In acrostics, another object is used to represent the first or second letters of information to be memorised. This feature is suitable for Hiragana as Hiragana contains syllables that combine consonants and vowels.

In addition, TUIs as proposed in Tsong et al., (2012) are considered suitable for the development of an assistive tool for assimilating mnemonics in Japanese Hiragana Syllabary. Tsong et al., (2012) described the benefits of QR code technology in connecting the physical and digital world. The researchers, however decided to use a QR code-like technology which plays a video via smartphone after detecting the object that had been tagged and enables customisable Augmented Reality (AR) such as videos on smartphone.

It is believed that a method which combines physical objects and a computer display might help Japanese course learners retrieve information easily and thus, be able to retain the information gathered from the process as multiple processing channels help circumvent the limited processing capabilities of each individual channel, therefore, increased amount of information can be processed when spread between multiple senses (Clark & Paivio, 1991).

A flash desktop application was developed using Adobe Flash with scripting of ActionScript 2.0. The outputs were audio, graphics, buttons used for navigation or scoring and tagged images. Certain buttons were set for scoring purposes especially in quizzes. Therefore, the buttons chosen were determined and the score allocated for each button were tracked. Retrievable data from the desktop application were the user's name and the total score in each quiz. This data was able to be tracked using XAMPP, which initiated data storage in the form of txt files after commands were received from php files.

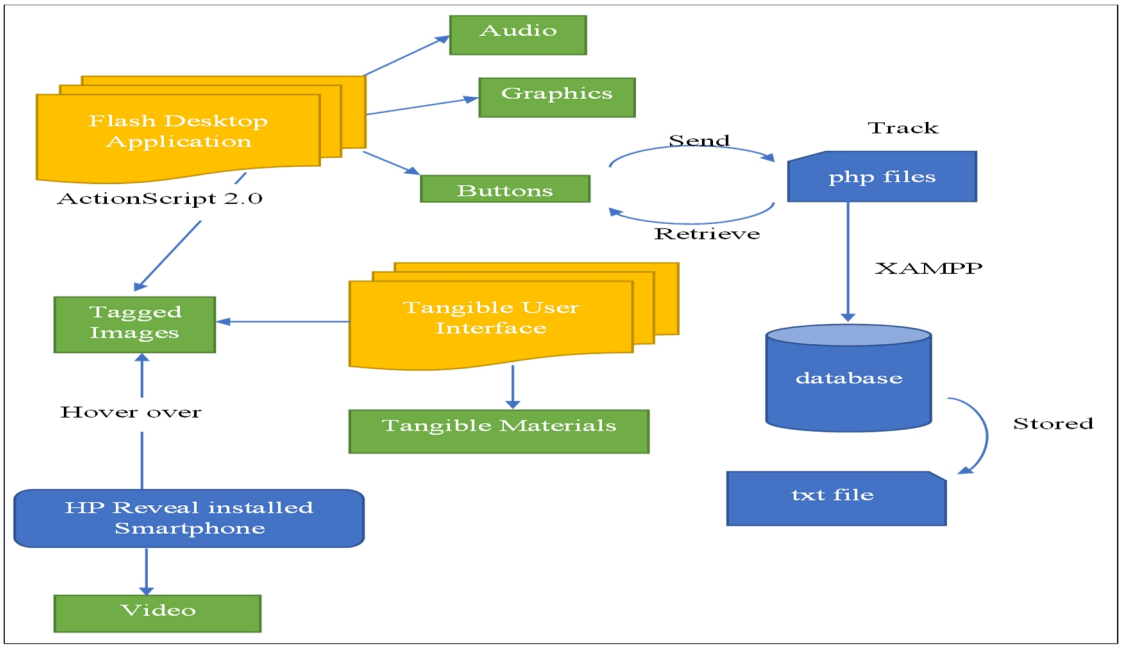

Fig. 1. Conceptual Framework for the Design

The TUIs component produced two products, which were tangible materials and tagged images. Both flash desktop application and TUIs components contained tagged images with the only difference being that the tagged images in flash desktop application was in electronic form while in TUIs component, it was in paper form. A smartphone installed with HP Reveal needed to be hovered over these tagged images and subsequently, videos that correspond to these tagged images were then displayed on a smartphone screen.

The figure below shows that both desktop application and tangible materials were equipped with tagged images. These tagged images were set up online using the HP Reveal application. The images that the researchers had chosen were overlaid with a video that acted as a simple Augmented Reality (AR) tool. Once a user launched the HP Reveal application on their smartphone and hovered it over the tagged images, the user's smartphone will play a tutorial video on how to write Japanese Hiragana syllables. The videos were only obtainable when the smartphone is connected to the Internet.

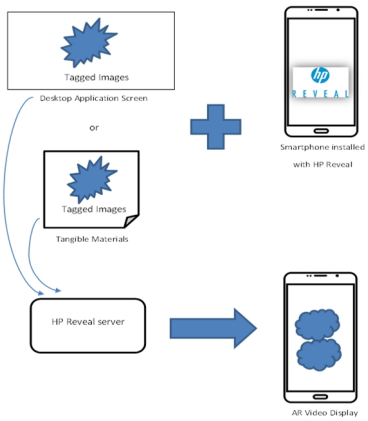

Fig. 2. Tagged Images for Desktop and Tangible Materials

3.1 Sitemap

In order to get the precise view of the application flow, the researcher needed to design a site map. The site map exhibits all the contents and provides a chart of the logical flow of the interactive interface. The map below shows all the contents of the courseware, in which the three main modules of this courseware are Quiz, Learn and Gallery. In this site map, each module has a HOME button which brings it to the Main Menu. The EXIT button was designed to proceed to the usage summary page and leave the application.

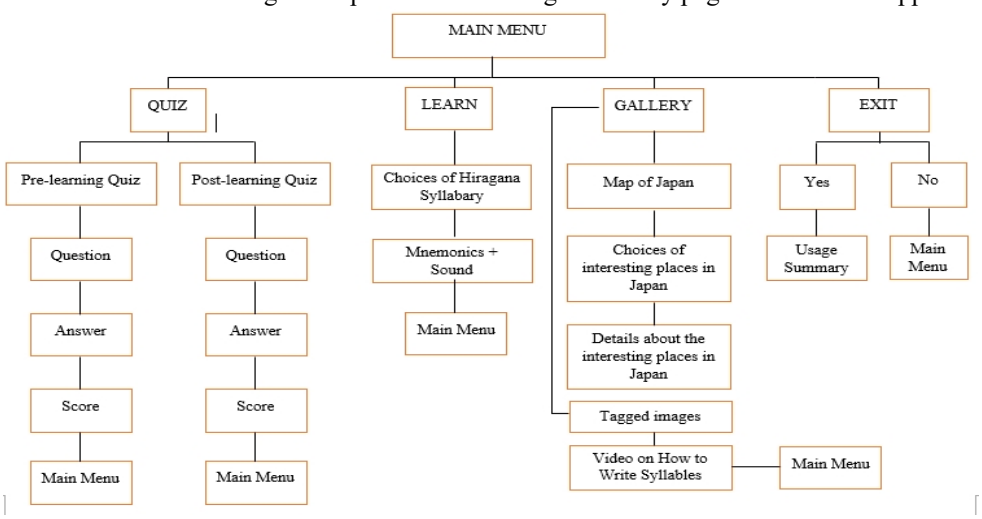

Fig. 3. Site Map of the Content of the Courseware

3.2 Storyboard

Before developing an application, it is very important to have a clear overall view of the interface intended to be developed. This can be done through sketching using a pencil and paper or by using a sketching software such as Balsamiq Mockups. The researcher chose to sketch on Balsamiq Mockups first before proceeding with the ATAMJHS application development.

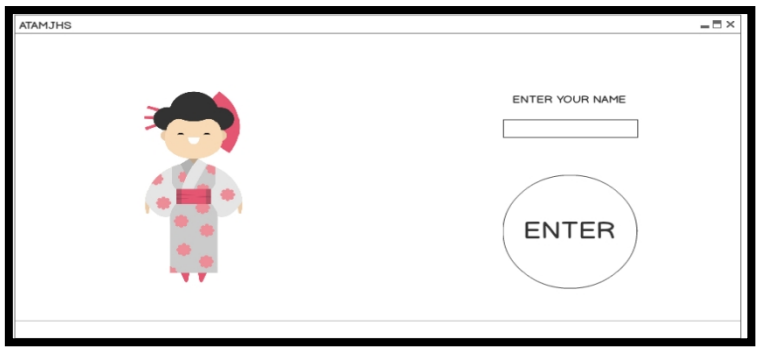

Fig. 4. Welcome Interface

Figure 4 shows the Welcome page which is the first interface sketch for ATAMJHS application. The interface shows label "Enter Your Name" and a textbox that received user's name. The interface also included an "Enter" button that proceeds to the next interface. In this interface, there is a woman wearing kimono that researcher has chosen to represent Japan.

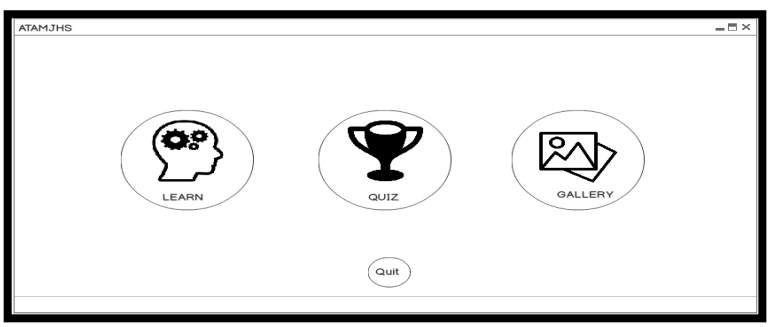

Fig. 5. Main Menu Interface

Figure 5 shows the Main Menu which is the second interface. There are three buttons that proceed to three different modules which are "Learn", "Quiz" and "Gallery". Each icon chosen is unique to the three modules. In addition, a "Quit" button is located at the bottom of the interface.

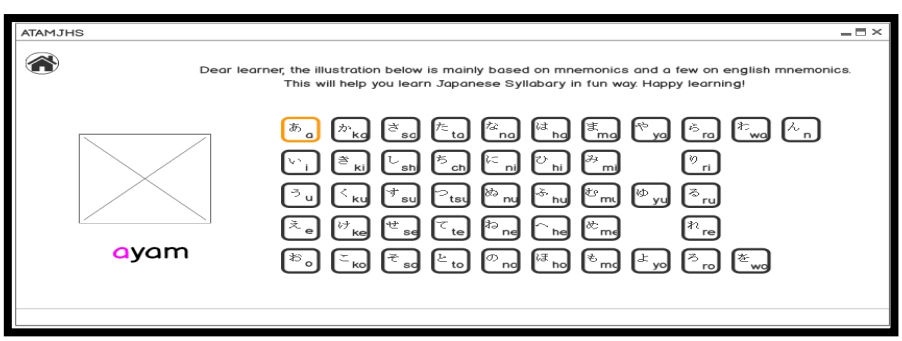

Fig. 6. Choices of Hiragana Syllabary Interface

Figure 6 shows the interface that displays a set of basic Hiragana syllables along with their Romanised pronunciation. Mnemonics that match the syllable is located to the left of the table. A “HOME” button is located on the left corner of the screen.

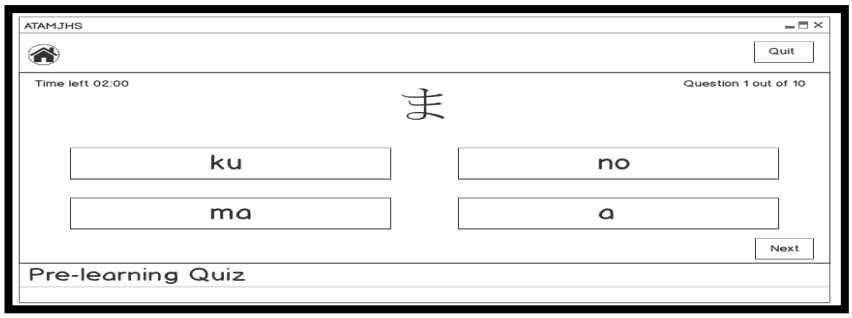

Fig. 7. Quiz Question Interface

Next, Figure 7 shows the “Quiz” question interface which consists of the syllables and answer options. The top left of the screen sees the “HOME” and “Time Left” button while the top right has a “Quit” button and displays the question number. On the bottom left, there is a description showing the type of quiz being attempted by the user, either a “Pre-learning Quiz” or “Post-learning Quiz”. On the bottom right, the “Next” button is located and this allows users to proceed to the next question.

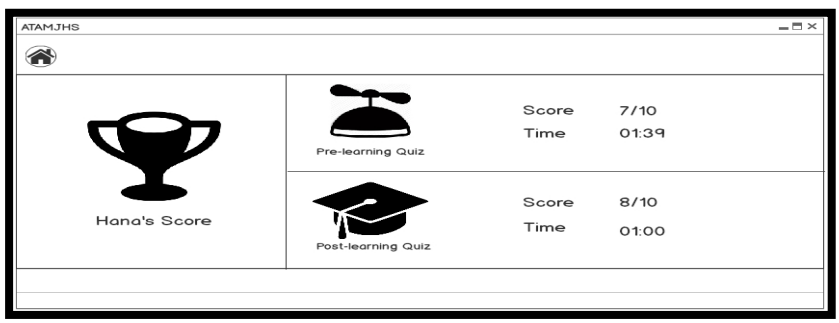

Fig. 8. Quizzes Score Interface

Figure 8 displays the scores obtained and time taken by the user in completing both quizzes, along with the name of the user. Different icons are used to indicate the “Pre-learning Quiz” and “Post-learning Quiz”. There is also a “HOME” button that brings the user back to the Main Menu.

Fig. 9. Choices of Interesting Places on the Map of Japan Marked with Map Locator Interface

Figure 9 shows the choices of interesting places on the Map. It is tagged with a clickable map locator feature showing the name of the place and when clicked, it will lead the user to the screen in Figure 10.

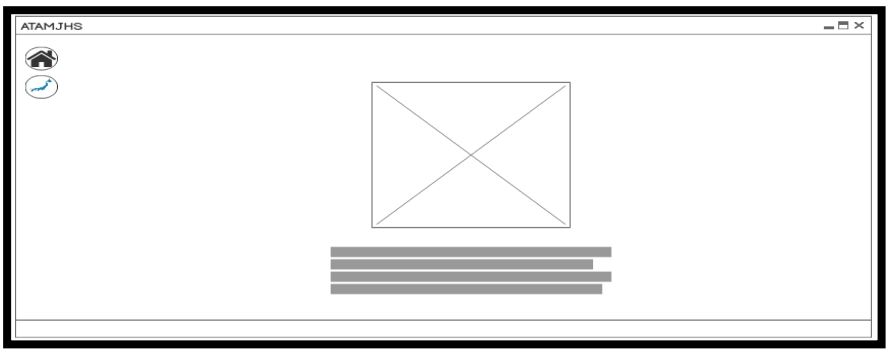

Fig. 10. Details of the Location Chosen Interface

Figure 10 contains details of an example of the chosen location. The interface includes an image and a brief description of the place. The top left has the “HOME” button as well as the “MAP” button that will bring the user to the screen in Figure 9.

4. User Interface Design

4.1 Properties and Timeline

Firstly, in order to use Adobe Flash Professional CS6 which requires a specific type of script, the researchers decided to use ActionScript 2.0. The size of the screen in pixels was set to a width of 1366 pixels and a height of 768 pixels.

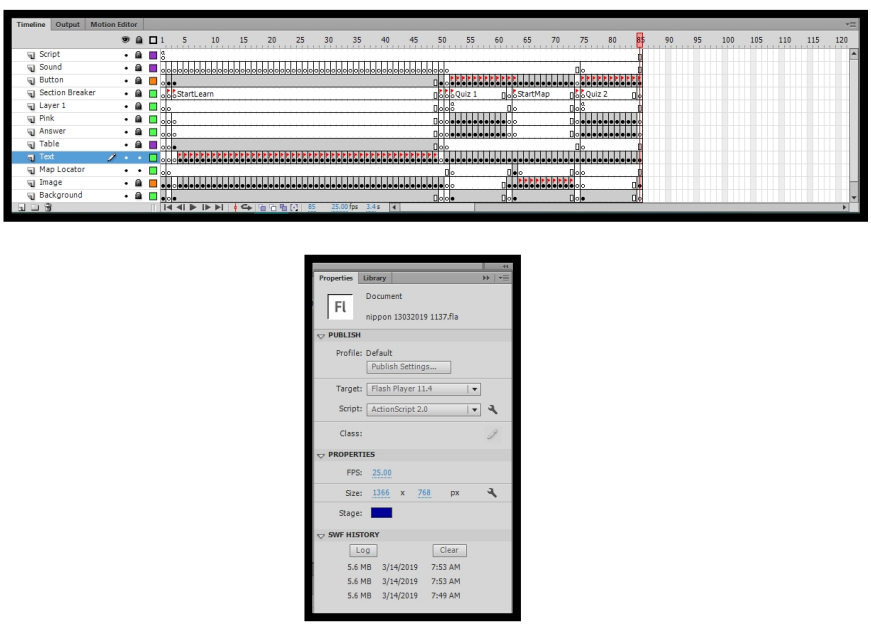

Fig. 11. Properties and Timeline in Adobe Flash CS6

The stage is an area where all the activities are performed and can be shown to the viewers when the movie or application is being played. A timeline panel is a place where the animations and drawings in the stage

are shown automatically in the timeline. The timeline panel consists of layer, frames and other few components. ATAMJHS is made up of eight layers within 50 frames. The researcher chose royal blue as the main background theme colour for ATAMJHS. Figure 11 shows the properties and timeline used in developing ATAMJHS.

4.2 Graphics

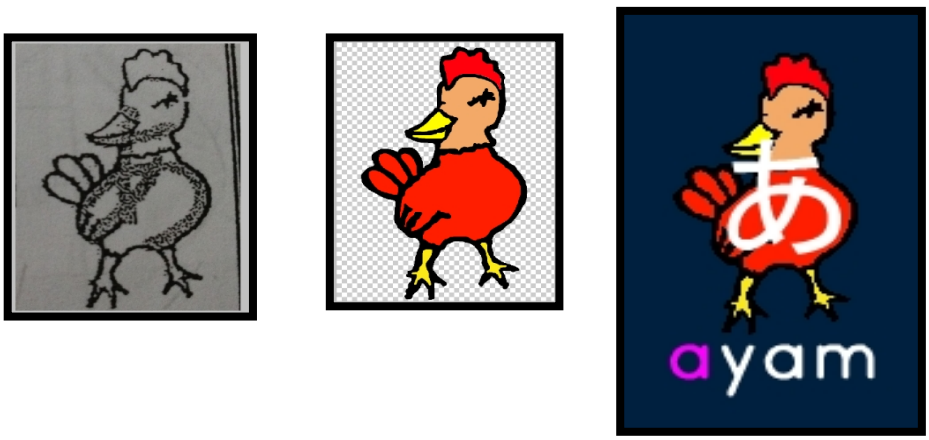

Fig. 12. Designing Graphics Using Adobe Photoshop CS5

Figure 12 shows the flow in designing graphics that were used for mnemonics in the "Learn" module. First, the researcher obtained images of the mnemonics by snapping pictures of them with a smartphone. Subsequently, the pictures were edited on Adobe Photoshop CS5, whereby the researcher edited 46 pictures of mnemonics by redrawing and recolouring the images. After image editing was performing, the images were then saved in .jpg format and compiled on Adobe Flash CS6 with their matching syllables.

4.3 Sound

After the ATAMJHS interface sketching process was done, the researcher obtained a collection of sound bites that were suitable for the application. The sound sets contained male and female voices pronouncing Hiragana syllables. However, the sets were in .mp4 format which needed to be altered to .wav format using Audacity as shown in Figure 13.

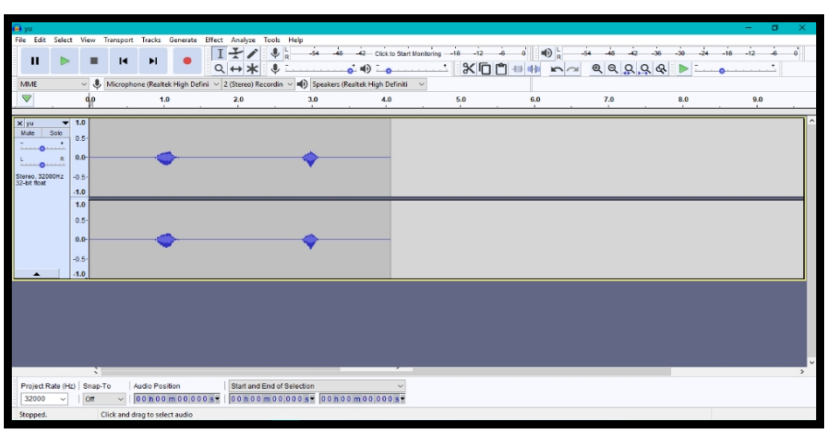

Fig. 13. Audio Files Format Conversion

4.4 Button

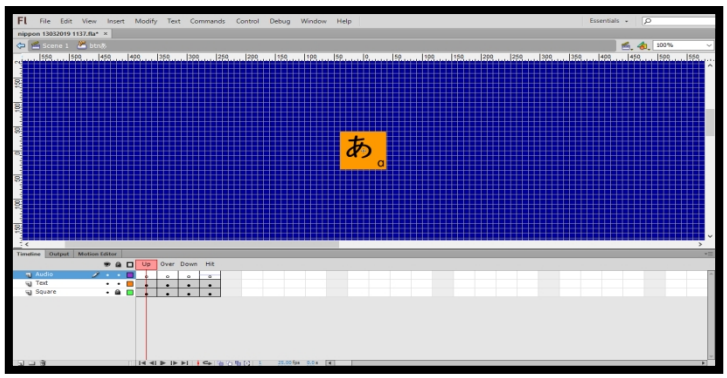

Fig. 14. Designing Buttons Using Adobe Flash

Figure 14 shows the process of designing a button. The button designed in the figure above was used in the "Learn" module. The button was attached with a sound set that matched the syllable stated on it.

4.5 Navigation

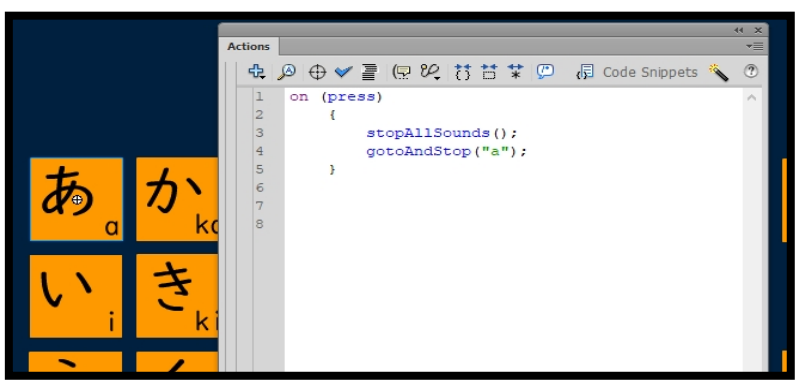

Fig. 15. ActionScript in Navigating Through the Application

Figure 15 shows an example of the script used on Adobe Flash CS6. The script chosen was ActionScript 2.0. In this figure, the script was used to navigate to a frame labelled "a" and the screen produced is as shown in Figure 12.

5. Desktop Application Development

After the ATAMJHS interface sketching process was done, the researcher put together a collection of images and sounds that were suitable for the application. The images were used in both the "Learn" and "Gallery" modules, whereby the ones incorporated in the "Learn" module were obtained from a book used in high school titled "Nihongo Daisuki 1". The researcher then captured photographs of images from the book, totalling 46 images. The images were then redrawn and recoloured using Adobe Photoshop. Adobe Flash Professional CS6 acted as a medium to assemble all the components, consisting of a collection of images, sounds and objects such as buttons.

5.1 Welcome Page and Main Menu

Fig. 16. Screenshot of Welcome Page

Figure 16 is the Welcome Page which is the first page in ATAMJHS application. The interface includes an "ENTER" button that collects the user's name which will be used later in the application.

Fig. 17. Screenshot of the Main Menu

Figure 17 is the Main Menu. On this page, there are three buttons, which are "LEARN", "QUIZ" and "GALLERY" along with the "Quit" button on the bottom right of the screen. Above the three buttons is a greeting phrase in Japanese, "Hajimemashite User-Chan" which translates to "Nice to Meet You, User".

5.2 Learn Module

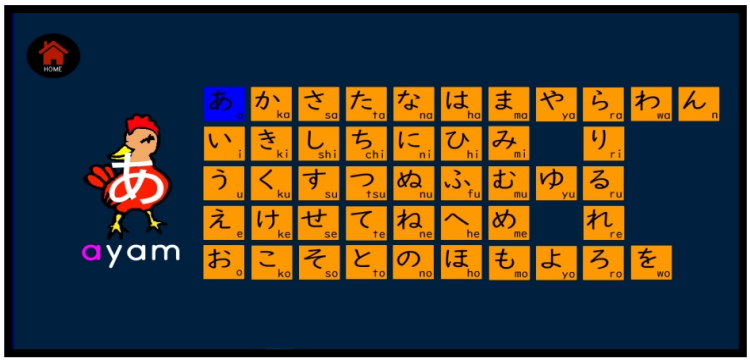

Fig. 18. Screenshots of Learn Module

Figure 18 shows the Learn Module. After choosing Learn Module on the Main Menu, the application proceeds to user interface. Figure 18 is a table of basic Hiragana syllables in the form of buttons along with their Romanised pronunciation. The Hiragana syllables are organised by placing vowels on the horizontal side and consonants on the vertical side. When the button is clicked, the individual syllable sound and mnemonics related to the shape of the syllable are played. The sound produced is in both female and male voices.

5.3 Quiz Module

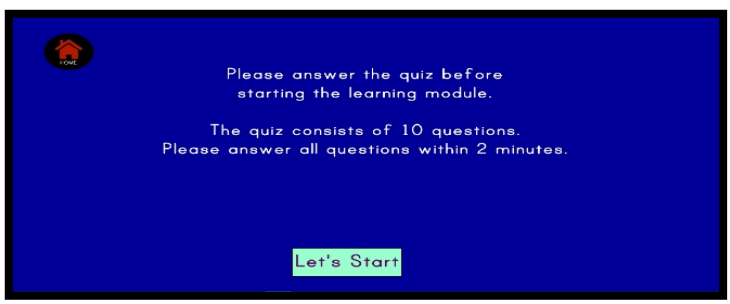

Fig. 19. Interface of Quiz Starting Page

Figure 19 shows the interface after the user initiates the quiz. On this screen, an instruction is given to the user to inform them about the quiz. Apart from that, the "Let's Start" button is located on the bottom of the screen that will bring the user to the questions once clicked.

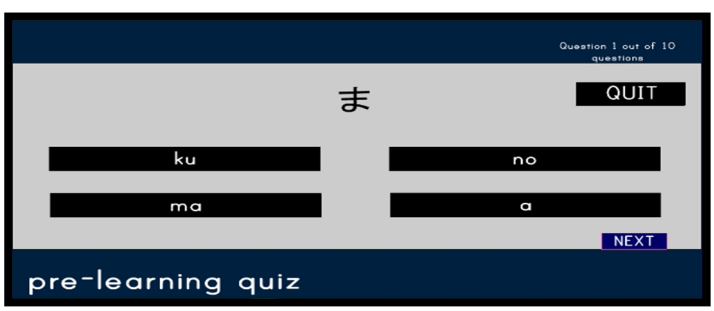

Fig. 20. Interface of Quiz

Figure 20 exhibits the quiz question interface which consists of the syllables and the answer options. The top left of the screen locates the "HOME" button while the top right has the "QUIT" button and the question

number. On the bottom left, there is a description showing the type of quiz attempted by the user, whether it is a "Pre-learning Quiz" or "Post-learning Quiz". Lastly, on the bottom right, the "NEXT" button brings the user to the following question of the quiz.

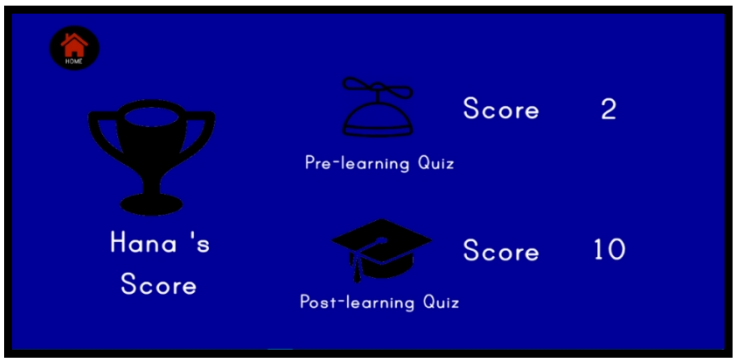

Fig. 21. Scores Interface

Figure 21 displays the scores obtained and time taken by the user in finishing both quizzes, complete with the name of the user. The different icons used differentiate the "Pre-learning Quiz" and "Post-learning Quiz". There is also a "HOME" button that brings to the user back to the Main Menu.

5.4 Gallery Module

Fig. 22. The Map of Japan Gallery Interface

Figure 22 shows the choices of interesting places on the Map. It is tagged with clickable map locator feature showing the name of the place and when clicked, it will lead the user to the screen in Figure 23. There is also an instruction that informs the user to click on the map locator, located at the top of the screen.

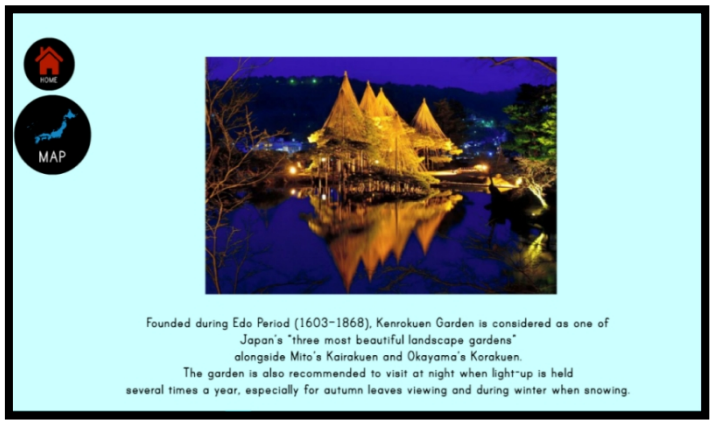

Fig. 23. Details of the Chosen Location

Figure 23 shows the details of the location chosen in Figure 22. This interface includes an image as well as a brief description of the location. On the top left, there are two buttons, namely, "HOME", and "MAP" button which will bring the user back to the screen in Figure 22.

5.5 Code Snippets

Fig. 24. Displaying User's Name Entered on the Previous Page

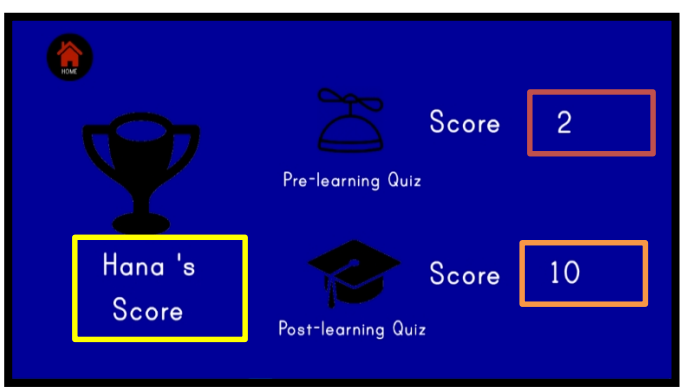

Fig. 25. Displaying the Score from both Quizzes and User's Name

6. Tangible material development

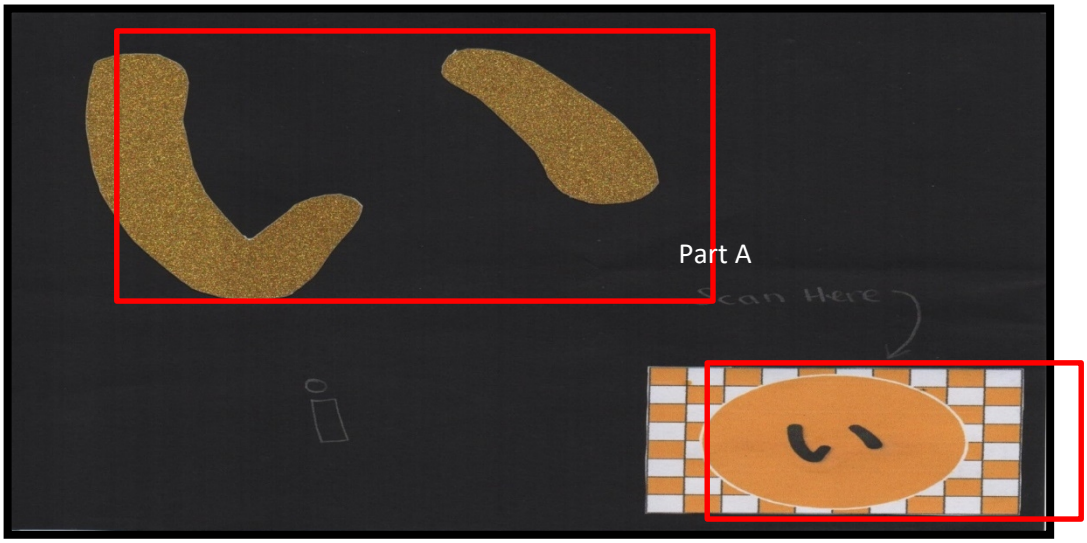

Fig. 26. Tangible Material Design

Figure 26 depicts the design of tangible material with Part A showing the syllable "i" that was made of textured paper. This is to encourage multiple sensory learning involving kinesthetic or touch sensory. It encourages users to practise writing the syllable with their hands as the size suits the size of an average adult size finger. As mentioned previously, the significance of choosing this design and method is that multiple sensory learning reduces cognitive load (Bagui, 1998).

Part B shows the tagged image. Once the smartphone is installed with HP Reveal, the third-party application used for a simple Augmented Reality experience, is hovered over the image, where a video as in Figure 27 is displayed on the smartphone screen. The previously tagged images are then published and can be accessed with any smartphone with HP Reveal installed.

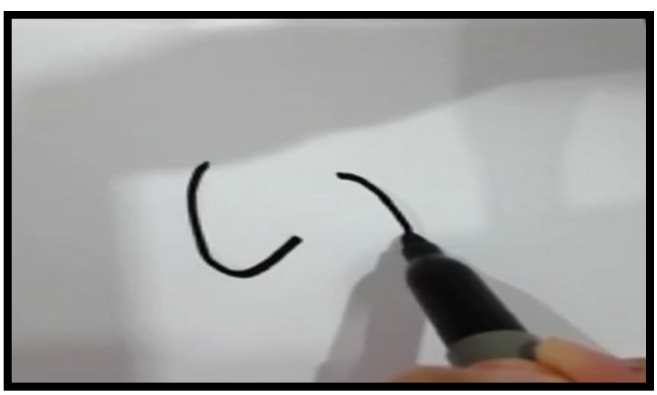

Fig. 27. Video Display Upon Smartphone Hover Over Tagged Images

As seen in Figure 27, the videos used demonstrate how to write a syllable and were recorded. The videos were separately overlayed on each unique tagged image. However, there were some faults where some videos displayed were paired with incorrect tagged images. These faults were subsequently corrected.

8. User testing and findings

In order to evaluate the effectiveness of ATAMJHS, an evaluation was carried out on 34 respondents from two different faculties, namely, Faculty of Computer and Mathematical Sciences (FSKM) and Faculty of Applied Sciences (FSG). A simple experimental analysis of pre-test and post-test on the learning of Japanese syllabary was conducted on these participants. It was found that ATAMJHS was able to increase Japanese literacy among the respondents with prior Japanese learning experience as well as those without it.

Table 1. Pre-test and Post-test Scores

	Knowledge		Responses					
	Criteria		1	2	3	4	5	Mean
	I can differentiate Hiragana syllables from each other							
1	Pre-Test	FSKM	13	2	2	0	0	1.35
		FSG	0	6	6	2	3	3.12
	Post-Test	FSKM	0	0	3	11	3	4
		FSG	0	2	5	5	5	3.76
	I can pronounce Hiragana syllables							
2	Pre-Test	FSKM	12	3	0	2	0	1.53
		FSG		3	1	10	3	3.76
	Post-Test	FSKM		1	3	9	4	3.94
		FSG		0	2	8	7	4.29
	I can read Hiragana syllables							
3	Pre-Test	FSKM	13	1	1	2		1.53
		FSG	2	5	5	3	2	2.88
	Post-Test	FSKM	1		4	11	1	3.65
		FSG	0	1	6	4	6	3.88
	I am aware of the use of mnemonics in learning Hiragana syllables							
4	Pre-Test	FSKM	14		3			1.35
		FSG	4	6	3	4		2.41
	Post-Test	FSKM			2	11	4	4.12
		FSG	1	1	1	6	8	4.12

Before using the ATAMJHS, none of the respondents from FSKM were able to differentiate the Hiragana syllables from each other, while two respondents from FSG agreed and three strongly agreed on the ability to differentiate Hiragana syllables. However, after the implementation of ATAMJHS, it was found that the results escalated to 14 respondents from FSKM while 15 from FSG were in agreement. There were 21 students who showed disagreement about differentiating Hiragana syllables with the matter before treatment and this tally decreased to only two respondents after treatment. The mean score difference between pre-test and post-test also showed a noticeable difference between these two faculties as a mean score difference of 2.65 was obtained for respondents from FSKM and 0.64 for respondents from FSG.

In pronouncing the Hiragana syllables, two respondents from FSKM agreed while 13 FSG students agreed and strongly agreed with the ability to pronounce Hiragana syllables. After ATAMJHS, the scores improved with 13 from FSKM agreeing and strongly agreeing, while 15 FSG students also responded in a similar way. The mean score difference between pre-test and post-test also reflects an obvious difference between these two faculties as a mean score difference of 2.41 was computed for respondents from FSKM and 0.35 for respondents from FSG.

ATAMJHS also affected FSKM and FSG respondents in the number of respondents who were able to read Hiragana syllables. An increase from two to 12 FSKM students and from five to 10 students FSG was recorded. The mean score difference between pre-test and post-test also shows a clear difference between these two faculties with a mean difference of 2.12 for respondents from FSKM and 1.0 for respondents from FSG.

In terms of awareness of using mnemonics in learning Hiragana, none from FSKM were aware while only four students from FSG registered awareness of mnemonics in learning Hiragana syllables. However, the results improved to 15 respondents from FSKM and 14 FSG students who were aware of mnemonics in learning Hiragana. The mean score difference between pre-test and post-test also shows significant differences between these two faculties with a mean score difference of 2.77 for respondents from FSKM and 1.71 for respondents from FSG.

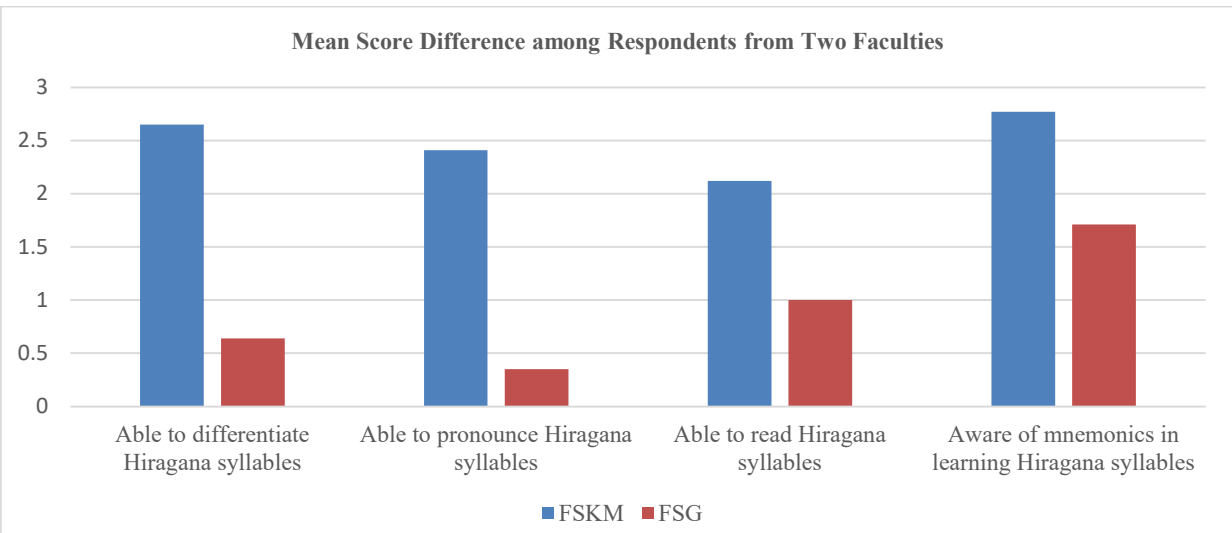

Fig. 28. Mean Scores Difference among Respondents from the Two Faculties

Based on the results from Figure 28, multiple criteria that were evaluated showed differences in the scores obtained as well as the mean score difference between respondents from FSKM and FSG. The criteria evaluated were ability to differentiate Hiragana syllables, ability to pronounce Hiragana syllables, ability to read Hiragana syllables, and awareness of mnemonics in learning Hiragana. As the results imply, the results of mean score differences show greater value among FSKM respondents, in comparison to FSG students who had received prior education of and exposure to the various aspects of Japanese culture from their instructor as well as through Japanese anime and manga. Therefore, FSG students had a lower learning curve compared to FSKM students.

9. Conclusion

The research, Assistive Tool for Assimilating Mnemonics in Japanese Syllabary (ATAMJHS), was carried out with the aim of designing and developing an application to support the learning of Japanese syllabary, using sensory learning and Tangible User Interfaces (TUIs) based on the five-step ADDIE model. The different types of interface and functions of the application have been clearly explained in the preceding sections. This paper also specifies the hardware and software requirement that were used throughout the development of this project and has attempted to sketch the development of the interface up to the final stage when the application was created. The screenshots are provided as proof of the development process done by the researchers.

Further, the research also evaluated the effectiveness of the application in increasing Japanese literacy among Introductory Japanese students with interest in learning Japanese language in UiTM. Pre-test and post-test were administered to establish the effectiveness of ATAMJHS in increasing learner knowledge of Hiragana syllabary. Usability testing showed that the application fulfilled the requirements as a supporting tool to learn Japanese Hiragana syllabary especially for self-learning.

In summary, the detailed step-by step process in developing this application, named ATAMJHS for the learning of the Hiragana syllabary, using Malay mnemonics as the learning guide, thus, makes it a truly novel application for use by any Malay-literate learner in South East Asia and anywhere beyond, ensuring a more rewarding and sustainable partnership with Japan in the future, through quality education (SDG 2030: Goal 4), specifically in upholding and realising the Look East Policy by the Malaysian government. It is hoped that the application can be further enhanced and used in the real or virtual classroom environment and for self-learning so as to support the learning of Japanese language in any emergent economy.

10. Future works

ATAMJHS focuses on only 46 basic Hiragana characters or gojūon, while there is still another type of Hiragana which consists of 20 dakuon, five handakuon, 36 yōon, one sokuon and six additional letters that describe more sounds of modified forms of Hiragana. Therefore, ATAMJHS can be improved further by including the remaining Hiragana and other Japanese writing systems, such as Katakana and Kanji.

The sound sets used in this learning module were unstable and thus, require further improvement for clearer and more stable audio output. ATAMJHS also comprises learning, quizzes, and gallery modules which can be further improved with inclusion of more modules such as activities and mini-games which can increase learner engagement with ATAMJHS.

It is contended that the Tangible User Interfaces (TUIs) in this research are inadequate to support the learning of the entire Hiragana as TUIs for only five syllables were provided. Therefore, the TUIs components should be further increased with better quality videos to increase user learnability.

Lastly, in this model of ATAMJHS, the user's progress was not documented. Therefore, users were not able to preview their progress and achievements. Therefore, MySQL database can be implemented to retrieve, store and edit data including learners' achievements and progress.

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