Learn Hangeul: An Android Korean Language Learning Application for Indonesian

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South Korea is a country that has been the center of world's attention because of its music and drama progress. The Korean language is a language that Korean people use to communicate with each other. Hangeul is an alphabet used to write the Korean language. Learning application is a way to introduce the Korean Language to people who want to learn the language; therefore, we built an application called Learn Hangeul. It contains an introduction to the alphabet and basic words, and also equipped with a quiz feature. Fisher-Yates Shuffle method is used for shuffling the questions in the application's Quiz feature. User satisfaction after using the application be measured using a Likert scale, and the result in usefulness, satisfaction, and ease of learning are satisfied.

Index Terms: Edu-game, Fisher-Yates Shuffle, Hangeul, Korean Language, Learning Application, Quiz.

I. INTRODUCTION

Current technological development is experiencing very rapid growth; one of the developments is in telecommunications. The main function of telecommunications was started only for calling and texting, but nowadays it has many support features, such as connections, image, audio and video, document processing, etc.There is a lot of functions from the mobile devices that can be used to support human activities; one of the functions can be used as a learning media for foreign language. One of foreign language that can be learned is the Korean language. Nowadays, the Korean language has gained a lot of interest and become one of the languages that favored learning by people all over the world. Prof. Andre Schmid [1] stated that this language is in demand because of the growth of Korean music known as K-Pop that is advancing rapidly and also the help of popularity from the Korean drama. There's a lot of media that can be used for learning the Korean language; one of the examples is by using the technology from the communication device, such as a smartphone.

Fisher-Yates Shuffle is an algorithm used to randomize a set of variables. In this study, Fisher-Yates Shuffle was used to randomize the mini quiz given in the application.

Yenni Kusumawati [2] from Universitas Kristen Duta Wacana had produced a puzzle game based on J2ME which implements the Fisher-Yates Shuffle method. From this research, a conclusion can be drawn is that the Fisher-Yates Shuffle algorithm has an advantage in the iteration process since there is no recurring possibility, and less time is needed than the usual randomization method.

In this study, an Edu-game to learn Hangeul was designed and built. The application was made based on Android. According to Avi Tejo Bhaskoro [3], the operating system is known to have an open-source operating system, which is becoming one of the main reasons why Android is so preferred. It is also the leading operating system in market share [4]. This application presents learning by providing sentences or words in the Korean language as well as their meanings and explanations. There is also a mini-quiz in the form of a game to guess sentences or words to evaluate learning outcomes that have been learned. Fisher-Yates Shuffle was incorporated in the mini-quiz.

II. LITERATURE REVIEW

A. Korean Language

The Korean language is the main language that was used by Korean people, both in South Korea and North Korea. The Korean language has its alphabet called 'Hangeul.' Before Hangeul is used, the official written language in Korea is classical Chinese. Hangeul was made by King Sejong on 15th century around 1443. There are two ways to write Hangeul, i.e., horizontally or vertically.

The following is the division of the Hangeul letters.

Table 1. Vowel Alphabet

No	Hangeul Letters	Letters' Name	Pronunciation
1	ㅏ	아 [a]	/a/
2	ㅑ	야 [ya]	/ya/
3	ㅓ	어 [ô]	/ô/
4	ㅕ	여 [yô]	/yô/
5	ㅗ	오 [o]	/o/
6	ㅛ	요 [yo]	/yo/
7	ㅜ	우 [u]	/u/
8	ㅠ	유 [yu]	/yu/
9	ㅡ	으 [ē]	/ē/
10	ㅣ	이 [i]	/i/

Table 2. Consonant Alphabet

No	Hangeul Letters	Letters' Name	Pronunciation
1	ㄱ	기역 [giyôk]	/g/
2	ㄴ	니은 [niēun]	/n/
3	ㄷ	디귿 [digēut]	/d/
4	ㄹ	리을 [riēul]	/r,l/
5	ㅁ	미음 [miēum]	/m/
6	ㅂ	비읍 [biēup]	/b/
7	ㅅ	시옷 [siot]	/s/
8	ㅇ	이응 [iēung]	/~ng/
9	ㅈ	치읏 [jiēut]	/j/
10	ㅊ	치읓 [chiēut]	/ch/
11	ㅋ	키읔 [khiēut]	/kh/
12	ㅌ	티읕 [thiēt]	/th/
13	ㅍ	피읖 [phiēup]	/ph/
14	ㅎ	히읗 [hiēt]	/h/

Table 3. Double Vowel Alphabet

No	Hangeul Letters	Letters' Name	Pronunciation
1	ㅐ	애 [æ]	/æ/
2	ㅒ	얘 [yæ]	/yæ/
3	ㅔ	에 [é]	/ é/
4	ㅖ	예 [yé]	/yé/
5	ㅘ	와 [wa]	/wa/
6	ㅙ	왜 [wæ]	/wæ/
7	ㅚ	외 [wei]	/wei/
8	ㅝ	워 [wo]	/wo/
9	ㅞ	웨 [wé]	/wé/
10	ㅟ	위 [wi]	/wi/
11	ㅢ	의 [ēui]	/ēui/

Table 4. Double Consonant Alphabet

No	Hangeul Letters	Letters' Name	Pronunciation
1	ㅃ	쌍비읍 [sangbiēup]	/p/
2	ㅉ	쌍지읏 [sangjiēut]	/c/
3	ㄸ	쌍디읃 [sangdigēut]	/t/
4	ㄲ	쌍기윽 [sanggiyôk]	/k/
5	ㅆ	쌍시읏 [sangsiot]	/t/

B. Fisher-Yates Shuffle

Fisher-Yates Shuffle is an algorithm that returns random permutation from a finite set or to shuffling a finite set [5, 6]. Fisher-Yates Shuffle has two methods; there are original method and modern method. The original version was implemented manually, using pencil and paper, with a predetermined table of random numbers to create an element of chance. The modern version of the Fisher-Yates Shuffle, designed for computer use, was introduced by Richard Durstenfeld in 1964. The original procedure is simple and suitable for human usage, but it is computationally inconvenient because it has a quadratic asymptotic complexity $O(n)^2$. Hence in modern programs, an improved version of the algorithm with a linear complexity $O(n)$ is used [7].

Table 5. Example of Fisher-Yates Shuffle [8]

Range	Roll	Scratch 12345678	Result
1-8	6	1 2 3 4 5 **8** 7	6
1-7	4	1 2 3 **7** 5 8	4 6
1-6	3	1 2 **8** 7 5	3 4 6
1-5	5	1 2 8 **7**	5 3 4 6
1-4	2	1 **7** 8	2 5 3 4 6
1-3	1	**8** 7	1 2 5 3 4 6
1-2	1	**7**	8 1 2 5 3 4 6
Result			7 8 1 2 5 3 4 6

III. RESEARCH METHOD

The research method is divided into several steps, as follows:

1. Data Gathering

   Data gathering carried out in this study was done by using the USE QUESTIONNAIRE and Likert scale. This questionnaire was used to measure the level of user interest in using the application made in this study and to measure the level of satisfaction on the user while using the application.

2. System Design

   System design used in this study was first made by a rough design or picture of the system that will be built. We also determined the system function that has been adjusted with the latest specification. On this stage, interface design and database structure will also be created.

3. System Programming

   On this stage, an implementation of the design that was made previously will be carried out. System programming process will be adjusted based on functionality and specification that has been designed. The programming was done using the Android Studio IDE for making the main application, and Firebase for database, and Sublime for making the database.

4. System Testing

   System testing that carried out in this study serves to ensure all the determined functionality is running well. The testing is done using an Android-based smartphone.

5. Evaluation

   Evaluation in this research is done based on how the application can help the user to learn about Korean language and to spread the questionnaire to the respondents, which will be counted by using the Likert scale.

IV. RESULTS AND EVALUATION

A. Application Results

In this section, several screenshots of the built application 'Learn Hangeul' are given. Fig. 1 shows the home page of the application when it is launched. There's a logo that contains an image and 'Learn Hangeul' name displayed using the splash screen. Fig. 2 shows the main page, where four menus are displayed, i.e., learning, quiz, about, and history.

Figure 1. Home Page

Figure 3. History Page

Figure 2. Main Page

Fig. 3 shows the brief history of the Korean language, while Fig. 4 explains the 'Learn Hangeul' application.

Figure 4. About Page

Fig. 5 shows the category of learning and quiz available in the application. Fig. 6 shows the learning page display from each category. The explanation would be served using listview View in Android. Fig. 7 shows the quiz page display which had been equipped with Fisher Yates Shuffle algorithm.
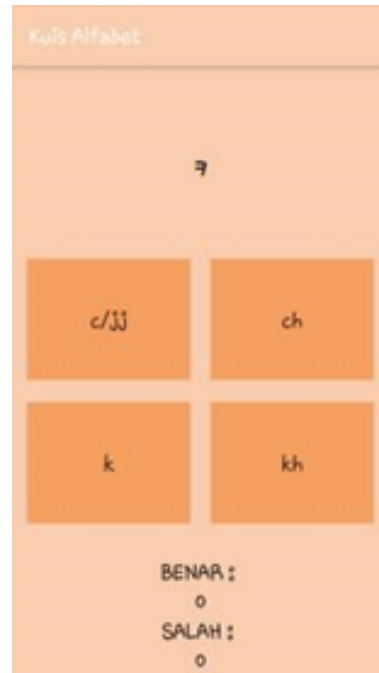
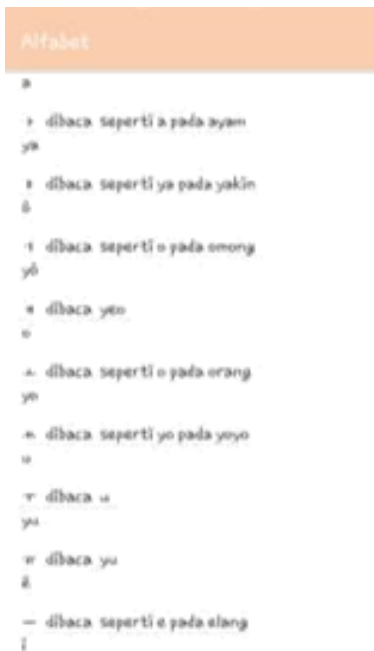**Figure 5. Learning and Quiz Category Page**

Figure 7. Quiz Page

Figure 6. Learning Page

B. Evaluation Results

The questionnaire that had been shared has three main aspects, i.e., usefulness, satisfaction, and ease of learning [9, 10]. Based on the questionnaire that has been shared to the user who used the Android-based system, the result will be shown below.

Usefulness aspects:

1. percentage score from the introduction of the history of the Korean language is 85.2%
2. percentage score from the introduction of the alphabet in the Korean language is 88%
3. percentage score from the introduction of numbers in the Korean language is 87.6%
4. percentage score from the introduction of introductions and greetings in the Korean language is 88.4%
5. percentage score from the introduction of greetings (asking news) in the Korean language is 89.6%
6. percentage score from the introduction of times in the Korean language is 86.8%
7. percentage score from the introduction of expressions in the Korean language is 86.8%
8. percentage score from the introduction of foods in the Korean language is 87.2%
9. percentage score from the introduction of colors in the Korean language is 86%
10. percentage score from the introduction of animals in the Korean language is 87.6%
11. percentage score from the introduction of families in the Korean language is 87.2%
12. percentage score from this application is suitable for knowing and learning basic Korean language is 89.2%
13. percentage score from this application could enhance knowledge about the Korean language is 85.6%

Satisfaction aspects:

1. percentage score for satisfaction from using this application is 82%
2. percentage score for users' knowledge increase after using this application is 83.6%
3. percentage score for the application interface is user-friendly is 84.4%
4. percentage score for the application is running well is 82.4%
5. percentage score for didn't find any failure from the application is 76.4%
6. percentage score for this application is fun to learn basic Korean language is 82%
7. percentage score for this application is enjoyable to use is 80.8%
8. percentage score to recommend the application to a friend is 80.8%

   Ease of learning aspects:
1. percentage score for the application is easy to use without written instruction is 81.6%
2. percentage score for the application is easy to use is 83.6%
3. percentage score for the application usage is easy to remember is 84%
4. percentage score for easy to knowing about the alphabet in the Korean language is 83.2%
5. percentage score for easy to knowing about numbers in the Korean language is 83.6%
6. percentage score for easy to knowing about introductions and greetings in the Korean language is 82.4%
7. percentage score for easy to knowing about greetings (asking news) in the Korean language is 83.6%
8. percentage score for easy to knowing about times in the Korean language is 84%
9. percentage score for easy to knowing about expressions in the Korean language is 83,2%
10. percentage score for easy to knowing about foods in the Korean language is 82.8%
11. percentage score for easy to knowing about colors in the Korean language is 84%
12. percentage score for easy to knowing about animals in the Korean language is 82.8%
13. percentage score for easy to knowing about families in the Korean language is 84%
14. percentage score for easy on the introduction and learning the Korean language is 85.6%

V. CONCLUSION

An Android-based application for the introduction and learning of Korean language using Fisher-Yates Shuffle algorithm has been designed and created as 'Learn Hangeul' application. Based on questionnaires that have been shared and evaluated, to review the usefulness of the application, most of all users strongly agreed that the application help learns about Korean language history, alphabets and numbers, introductions and greetings, times, expressions, foods, colors, animals and learning about families in Korean. Based on the survey's results, almost 89.2% of users strongly agreed that the application of 'Learn Hangeul' is a suitable application to introduce and give users basic learning to learn about the Korean language. Moreover, in the aspect of

satisfaction, 82% of users strongly agreed that they feel satisfied while using the application, and last but not least in the aspect of ease of learning, 83.6% of users strongly agreed that the application was really easy to use.

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AUTHORS PROFILE

Nadyati had just recently graduated from Universitas Multimedia Nusantara in 2019 and received her Bachelor degree in Computer Science. She has actively participated in many events during her study at UMN and finished it with a flying score.

Seng Hansun had finished his Bachelor and Master degree from Universitas Gadjah Mada, majoring Mathematics and Computer Science program. Since 2011, he has been a lecturer and researcher at Universitas Multimedia Nusantara and published more than 75 papers both nationally and internationally. His research interests mainly in time series analysis and machine learning domain where he has successfully granted some research grants from the government and UMN institution.