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Virtual Keyboard Design of Lampung Script Based on Android

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Abstract

Lampung script fonts, in general, can only be used for typing on a computer system and have not been developed for typing on Android-based smartphones. Therefore, efforts to modernize and build typing using Lampung script for smartphone needs are very much needed on mobile phones so they can be used flexibly. This research makes a virtual keyboard / android keyboard application that can do typing using Lampung script. The virtual keyboard layout is designed by adopting several layouts found on the QWERTY keyboard by displaying all Aksara letters on one virtual keyboard display and grouping Aksara letters in a more attractive composition. To test the Lampung virtual keyboard script, the researchers used the usability testing method, namely aspects of effectiveness, efficiency, and user satisfaction, by 25 respondents. Through this test, an assessment of the effectiveness of the typing test on the success rate of respondents in doing the task was obtained, which was 75%. Evaluation of the typing efficiency aspect using time calculation gets the average result on the WPM score analysis, which is 34 WPM. This result is still below the average typing speed of people, which is 38 WPM. Testing on the aspect of user satisfaction using the system usability scale (SUS) method gets a SUS value of 76, and this result is included in the Acceptable/Good category Acceptable/Good so that users can type Lampung script through Android phones. The conclusion is that it can produce an optimal, efficient virtual keyboard layout and provide comfort for the user while using it with Android. It also could introduce the Lampung script to the younger generation.

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INTRODUCTION

Lampung culture has uniqueness in art, community behavior, and language structure. Along with the rapid development of the times, cultural values in Lampung society began to fade. One is the use of Lampung traditional language to communicate and the use of Lampung district writing. Lampung language and script is a language used from generation to generation as a self-identity for the Lampung community itself. It is a tool for communicating and interacting with community members daily. However, the use of the Lampung regional language and Lampung script is rarely found in some indigenous Lampung people [1], [2].

One of Lampung's cultural heritages that need to be preserved is the Lampung script. Commonly known as Had Lampung. It is a form of writing related to the Pallawa script from South India. The Lampung script has a phonetic type of writing with syllable types that include vowels and Arabic letters [3]. Lampung script is a form of a non-cursive script written from left to right and has 20 characters. Lampung script, commonly referred to as Kaganga, has seven unique punctuation marks placed at the script's top, bottom, or back (right) [4].

Lampung script fonts can already be used on computer systems developed for the Unicode preparation [5]. The previous research discussed the layout design of the

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RaTaYa Lampung script [6]. The keyboard layout for the Lampung script has been created that is more effective by eliminating the SHIFT key and regrouping the parent letter, the lower-case child, the top, and the sides, in a more compelling composition [7]. Then in 2016, Eliza Hara, with the title Lampung Script Handwriting Recognition System with Edge Detection Method (Canny) Based on Backpropagation ANN. This study has added edge detection as canny edge detection[1], [8].

However, the creation of Fonts from Lampung Script is only used for typing on computer systems and has not been developed for typing on smartphones. Therefore, modernization and development efforts against typing using Lampung Script for smartphones are needed to be used in mobile information technology media and make it easier for users to use it flexibly.

Almost all Android-based mobile devices use virtual keyboards, and the virtual keyboard has been embedded to make it easier for users to type [9]. The virtual keyboard is an application that virtualizes a hardware keyboard with different layouts allowing the user to change the design based on the application[10]. The virtual keyboard began with the discovery and creation of optical technology by IBM (International Business Machines Corporation) engineers in 1992. Virtual means only a visual representation of the keyboard and nothing physically[11].

In making this application, the researchers used Android Studio, an Integrated Development Environment (IDE), to build applications that can run on the Android platform [12]. The primary programming language used for coding the Android Studio application was the Java programming language [13]. Effectiveness is a test that shows the user's accuracy when performing the application tasks. Efficiency is a test related to how fast the user is doing the study to test the use of the application by using the time calculation. User satisfaction is a test related to the user's feelings towards the application and aspects of the benefits that the user gets when using the application [14].

Research on the Lampung Script Virtual Keyboard as an effort to preserve Lampung culture can make it easier for users. However, what distinguishes this research from existing research is that the Lampung script can be accessed only through a mobile phone, and find out how effective and efficient the layout is for the Lampung Script virtual keyboard to provide satisfaction to the user with Android.

METHOD

The research method used in this thesis's implementation and work is the Rapid Application Development (RAD) method. The rapid Application Development method, or RAD, is a software development process model that is incremental (multilevel) by emphasizing its development cycle in a short time [15]. Rapid Application Development (RAD) uses an iterative system development method, where a working system model is constructed at the beginning of the development stage to determine user requirements[16].

In this method, there are stages in the process, namely the Requirements planning, Design process (user design), Construction, and Implementation (cutover):

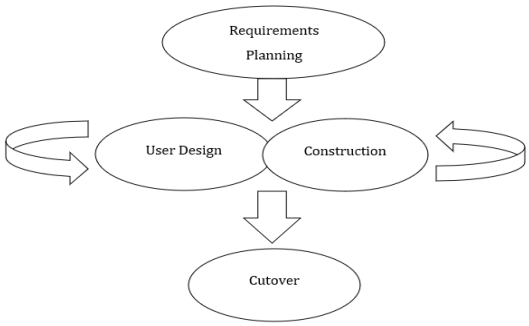

Figure 1. Rapid Application Development (RAD) Process model

Requirements Planning

This step identifies the objectives of an application or system. It identifies the need for information to achieve the goals and expectations for research and current and potential issues that need to be addressed [17]. This stage requires an active role from both parties, planning the needs that will be made as an effort from the development of the system, namely:

a. Identify the purpose of android-based Lampung script virtual keyboard application development.
b. Identify user needs on android-based Lampung script virtual keyboard application development.

c. Identify problems and collect information about developing the android-based Lampung script virtual keyboard application.

Based on the planning of the above needs, the use of user research produces information and user needs as follows:

Application Development Objectives

The Lampung Script font to be used on mobile phones is also needed as a solution for learning media in pandemic times that is done online by teachers to facilitate the creation of problems or interact with students using Lampung Script through mobile phones.

User Needs

Analyzing the users' needs resulted in the explicit and implicit needs and the functional and non-functional needs.

- Explicit and Implicit Needs of Users, including Teacher/School Teachers and Junior high school students
- Explicit needs of the user: Write Lampung Script in a message/text chat on a smartphone / mobile phone based on Android.
- Implicit needs of the user: Remember the characters on the virtual keyboard keys easily.
- There are no errors in writing the script on the virtual keyboard.
- Good level of accuracy in writing script on a virtual keyboard.

a. The Functional and Non-Functional Needs of the Users

- Functional Needs: Displays the letters of the script according to what is located on the virtual keyboard.
- Non-Functional Needs: Have known the effective layout of the virtual keyboard Of Lampung Script.

User Design

The design process includes a series of steps to describe all aspects of the software to be developed. At this stage, it is a process to design and make improvements if there is still a design discrepancy between the user and the analyst [18].

Unified Modeling Language (UML) is an important part of designing Object-oriented software development and the software development process [19]. This research uses Unified Modeling Language (UML) to make the system design. UML is a language for specifying, visualizing, and constructing the basic building blocks of software systems, including modeling business rules using diagrams and supporting texts.

Aspects produced in this stage include architectural design and layout design.

a. Architectural Design

Use Case Diagram in figure 2,

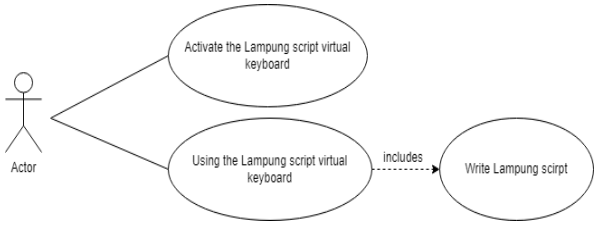

Figure 2. Use Case Diagram

Activity Diagram can be seen in figure 3,

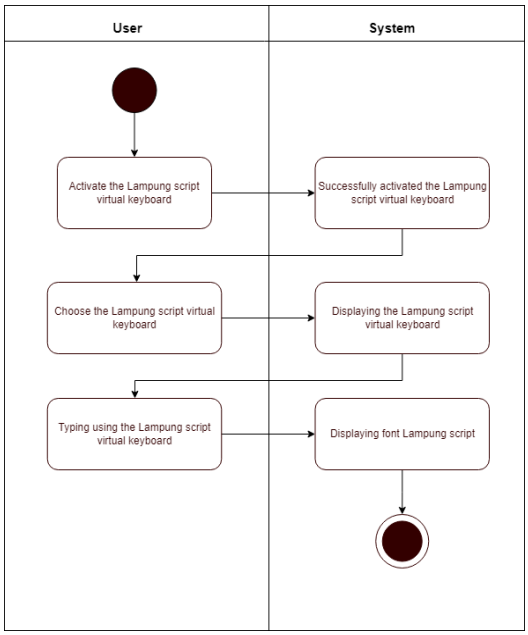

Figure 3. Activity Diagram

b. Layout Design

The layout design created has two views, namely the virtual layout display of The Lampung Script keyboard and the display of the virtual layout of the Lampung Script keyboard using the SHIFT key. Here is the layout display image listed in Figure 4 and Figure 5,

Figure 4. Mock-up Layout of Lampung Script Virtual Keyboard

Figure 5. Mock-up Layout of Lampung Script Virtual Keyboard Using the SHIFT Key

Construction

After the system's design has been made and approved by both the user and the analyst, the programmer builds and develops the system into a program [20]. In the development stage of the Lampung script, a virtual keyboard application based on Android is created using Android Studio in the Java programming language. Next, coding on the system until the application is successfully created so that the application can be implemented.

Cutover

This step includes data conversion, testing, replacement with the new system, and training for users. The test is carried out using the usability testing method based on three aspects of usability measurement: effectiveness, efficiency, and satisfaction.

RESULTS AND DISCUSSION

The latter four Rapid Application Development (RAD) stage results are presented here.

Requirements Planning

Requirement Planning is the stage carried out by the designer to determine the needs needed by the user in completing the task. To identify user needs, User Research has been carried out at the Requirement Planning stage, namely the purpose of application development and User Needs.

User Design

The final layout design stage of the Virtual Keyboard of Lampung Script will be formed in the process of creating layout design. Lampung's Virtual Keyboard Layout is created after considering many things before. Factors considered in making changes to the design of the new layout are:

a. Ease of typing without using the SHIFT key
b. Maximizing the placement of the Lampung Script Virtual Keyboard by grouping the letters of the alphabet to be placed on the top left, top right, and bottom right sides of the keyboard.

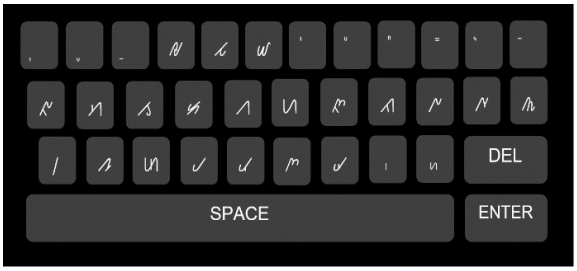

Figure 6. Final Layout of Lampung Script Virtual Keyboard

Construction

The development stage of the Lampung script Virtual Keyboard application based on Android was created using Android Studio in the Java programming language by coding the application until the application was successfully built. Here is the following software specification for making the Lampung script virtual keyboard application in table 1.

Table 1. Software Specification

Software	Android Studio
Version	4.2.1
Language	Java
Min SDK	API 28: Android 9.0 (Pie)
Running platform	Windows 10, 64-bit OS

Figure 7. Display of Lampung Script Virtual Keyboard

Task Determination

Six tasks need to be done by the user, namely typing two superficial level sentences, two medium level sentences, and two complex level sentences. Determination of the sentences used as tasks that need to be completed by the user for typing testing is based on the Lampung Language Textbook for Elementary School and Junior High School. Here are the following sentences that will be used in the typing test

a. First simple sentence

Table 2. First Simple Sentence

Sentence : *Tekirap batu jala* [21]
Script:

b. Second Simple Sentence

Table 3. Second Simple Sentence

Sentence : *Dan kenani juga sai haga* [21]
Script:

c. First Medium Sentence

Table 4. First Medium Sentence

Sentence : *Cutik genok nayah kughang* [22]
Script:

d. Second Medium Sentence

Table 5. Second Medium Sentence

Sentence : *Puluh pandai, sebelas ngelulih* [22]
Script :

e. First Complex Sentence

Table 6. First Complex Sentence

Sentence: *Lain ago bejudei, ngejuaro jaweh ano* [23]
Script:

f. Second Complex Sentence

Table 7. Second Complex Sentence

Sentence: *Lain munih nandangken banei, atau ago ngeguai kuco* [23]
Script:

Typing Effectiveness Results

Measurement of effectiveness can be calculated based on the success and failure of the task that each respondent has done. The measurement of typing effectiveness is obtained from the average value based on the success and failure of the user from 6 tasks carried out by four respondents. The average overall score of respondents on testing the efficacy of typing on the success of respondents doing the study was 75%. In comparison, the overall average of respondents testing the effectiveness of typing on the failure of respondents doing the task got a result of 25%.

Typing Efficiency Results

The measurement of typing efficiency is obtained from the average value based on the speed of typing carried out by the respondent using time calculations. The assessment was obtained by testing the efficiency of typing speed using the WPM calculation formula. WPM or Words Per Minute is the number of words processed per minute, most commonly used to measure and indicate a person's typing speed. The average rate of a person typing using a mobile keyboard only reaches 38 WPM [24].

The formula used to find the WPM value is:

$$\frac{Number\ of\ words\ typed}{Time\ taken\ (in\ seconds)} \times 60 = Typing\ speed$$

The formula to find WPM is the number of successfully typed words divided by the time it took to type, then multiplied by 60 to get the WPM result. Here's the following table of results from the WPM calculations on each respondent.

Table 8. WPM Calculation Results for Each Respondent

No.	Respondent	Number of Words	Time Required	WPM
1.	Respondent 1	155 characters	5.3 minutes	29.2
2.	Respondent 2	155 characters	3.2 minutes	48.4
3.	Respondent 3	155 characters	4.9 minutes	31.6
4.	Respondent 4	155 characters	5.8 minutes	26.7

Based on table 8 about the results of the WPM calculation for each respondent, getting the average typing time per minute or WPM using the Lampung script virtual keyboard is 34 WPM from the overall calculation of the respondents.

User Satisfaction Results

Assessing the user satisfaction will use the System Usability Scale (SUS) method, which consists of 10 statements and is given answer choices on a scale of 1 to 5 based on how much they agree with each information on the Lampung script virtual keyboard application [25].

The SUS score can indicate the level of user acceptance. The range of the questionnaire values is from 0 to 100. The average score on the System Usability Scale (SUS) is 68. If the SUS score is above 68, the respondents who have been tested are satisfied with the application/product [26]. The SUS score must be worth more than 70 to be included in the Acceptable category [27], [28], [29], [30].

The questionnaire results from user satisfaction testing using the System Usability Scale (SUS) method with a total of 25 respondents, consisting of 4 teachers and 21 students on the Lampung script virtual keyboard test, getting a SUS score of 76. This value proves that the Lampung script virtual keyboard application that has been created is included in the Acceptable category because it exceeds the value of 70. SUS score on the Lampung Aksara virtual keyboard gets a score of 76, which means the SUS score is considered Good if it is worth more than 70.4 [31].

CONCLUSION

It is proven based on the effectiveness test that the respondent's success doing the task is 75%. The results of the user satisfaction test using the System Usability Scale (SUS) method, getting result 76, which is SUS score is included in the Acceptable category. It is necessary to analyze the ergonomic approach or Human Factor Engineering related to the adjustment of the layout design that will be used on the Lampung script virtual keyboard. It can produce an optimal, efficient virtual keyboard layout and provide comfort for the user while using it with Android.

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