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meizano+martinus-2020-jurnal-WPM_Keyboard_Lampung.pdf

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Word Per Minute (WPM) Lampung Script Keyboard

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***Abstract*—** Users of Font Lampung in previous studies have difficulty in typing because the layout of the Lampung script is complicated to understand. Re-designing the Lampung alphabet keyboard layout allows users to be able to type text in characters more easily. The purpose of this research is to create a Lampung alphabet keyboard layout for more effective typing of the Lampung alphabet. The methods used are UX (User Experience) that are, requirements gathering, alternative design, prototype, evaluation, and result report generation. The layout design is created by eliminating the use of the SHIFT key and regrouping parent letters, the child letters in a more effective composition. The layout design of the Lampung alphabet was printed using the Laser Engraver tool on the keyboard. Through the test, the typing speed increased to 208% of the average value of 62 seconds to 32 seconds. In addition to the results of WPM (Word Per Minute) on keyboard layouts with 8.7 WPM which is faster than previous WPM research but still slower than QWERTY keyboard WPM. Testing of character quality, readability, and difficulty level to know the flaws in the Lampung RaTaYa keyboard layout with good results. This research concludes that the keyboard layout of Lampung RaTaYa is more effective than using the font Lampung script.

***Keywords*—**Word Per Minute, WPM, Keyboard, User Experience.

I. Introduction

Indonesia has a variety of different cultures. One of the cultural diversities in Indonesia is Lampung culture. Lampung culture itself comes from a province known as Lampung province. Increasingly advanced and thriving age makes Lampung cultural diversity increasingly fading among modern society.

Lampung culture is unique in communicating, namely using the language of Lampung and also Lampung area. The language in Lampung called the Lampung language, Lampung people use unique writing called Lampung script or better known as Kaganga (A. Restuningrat 2017).

Lampung language itself is only used by a small group of Lampung people as well as Lampung script. The use of Script (*Aksara*) is only used and studied in school, the rest is Latin (G. F. Nama and F. Arnoldi 2016).

Modern society tends to use computer systems to communicate. No representation of Lampung script in the computer system. Research has been done before to solve the problem, which is research on font Lampung script to be used in a computer system (Meizano A. Muhammad dan Martinus 2015).

Font Lampung script can be used in the computer system, but still use a QWERTY keyboard. There is no direct interaction in typing, so it is still difficult to use the font because there is no keyboard created specifically to support the typing of the Lampung alphabet (A. Restuningrat 2017).

Research has been done before discussing the creation of the Font Lampung script for Unicode preparation (A. Restuningrat 2017). But the layout of the letters of Lampung script has not been efficient in typing and also not the availability of the Lampung alphabet keyboard. In order to be flexible to use in information technology media, therefore, this research is developing in keyboard layout for typing purposes Lampung script.

III. Research Methods

Design Science Research (DSR) Design Science Research (DSR) is a research method introduced by Ken Peffers, Tuure Tuunanen, Marcus A. Rothenberger, and Samir Chatterjee in a journal titled "A Design Science Research Methodology for Information Systems Research ". An overview of the flow of research using the DSR method can be seen in Figure 1 (K. Peffers, T. Tuunanen, M. A. Rothenberger and S. Chatterjee 2007);

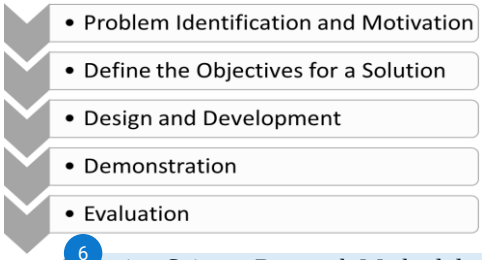

Figure 1. Design Science Research Methodology (DSRM) Process Model

A. Problem Identification and Motivation

This stage is done to know the needs of solutions:

a) Determine what the user is doing
The results of the study were found that the previous related research was obtained by writing accuracy, writing speed and typing difficulty. An irregular and hard-to-identify Keyboard Layout makes users difficult to find the characters you want to type.

b) Presenting the findings
Previous research has been known that the users of the Lampung alphabet fonts need an accurate keyboard layout to be used and memorized from each character letter.

c) User characteristic table
Types, characteristics of users and also how characteristics of the user effect on the system. User type is teacher with user Characteristic:
1. Easily understand and accept new things.
2. Create educational teaching materials.
3. Teach in the field of Lampung language.
4. Can only communicate using the characters.

How user characteristics affect the system:
1. User interface with accurate input.
2. Error warning required when entering input incorrectly.

d) Persona
Ari is a new teacher in elementary school, who has just moved from village to city, the field of study of subjects that he took is Lampung language. Today is a Wednesday, where Ari will teach the Lampung language in elementary school children 4th grade. A week earlier, Ari had told his students to study at home because next week will be held a Lampung alphabet test. Ari wants to try to make his own because using Lampung script. So, Ari tried to use the font and keyboard Lampung alphabet that has been developed to make the question of his character. After completing the problem of Lampung script without any mistakes in writing, the test of the Lampung alphabet went smoothly (Livechatin.com 2019).

e) Use Case Diagram
Image of Use Case Diagram can be seen in figure 2.

Figure 2. Use Case Diagram

B. Define the Objectives for a Solution

Previous research has been noted that testing for effectiveness, efficiency, and ergonomics. The effectiveness is represented by typing code, the efficiency represented by the typing speed, and ergonomically represented by the typing difficulty. Respondents who participated in this activity consisted of 30 people (A. Restuningrat 2017).

a) The number of typing time.
Previous research has obtained the research result in the form of Lampung alphabet typing time, which can be seen in table 1.

Table 1. Table of the Number of Typing Time

	Simple	Medium	Complex
Range	10 to 100	10 to 100	10 to 100
Mean	51.8	56.733	80.366

b) Difficult Level.
Previous research is getting research results in the form of difficulty level Lampung script, which can be seen in table 2.

Table 2. Table of difficulty level

	Simple	Medium	Complex
Range	1 to 10	1 to 10	1 to 10
Mean	3.233	4.533	5.3

c) Level of Writing Accuracy
Previous research has obtained the research result of the accuracy of writing Lampung script, which can be seen in table 3.

Table 3. Table of level writing accuracy

	Simple	Medium	Complex
Range	1% to 100%	1% to 100%	1% to 100%
Mean	60%	67%	63%

The results of previous research that has been done, showing the accuracy of typing in the use of Fonts Lampung script is still below 70%. The typing speed test can be noted that increases according to the difficulty level starts from ± 50 seconds to ± 80 seconds. The test results indicate that the available Lampung alphabet layout has drawbacks, so there need to be improvements to the keyboard layout or keyboard Layout.

C. Design and Development

Phase Prototyping aims to do initial modeling of the draft. The category used in this Prototype is High Fidelity. High Fidelity is very similar to the final design, either in form or in a function aimed at evaluating a new draft. The process can be seen in the steps below.

a) Layout Creation
   Layout creation has been calculated from the placement of the letters of Lampung script on the keyboard to the fingers in order to do effective typing.
b) Keycap Creation
   The creation of a keycap, the keycap will be filled with the paint and put in the writing of Lampung script using a laser engraver. Character printing on a keycap is done twice the combustion with a depth of 10mm. The purpose of burning twice is to ensure the depth of the printout in order to maintain the sharpness of the printed results.
c) Keyboard Assembly
   In the keyboard assembly, a printed keycap that has been printed in Lampung script, mapped on the keyboard according to the picture of the layout that has been created, so that it is not wrong.

D. Demonstration

The demonstration stage aims to make use of the preliminary design results. The example needed for a demonstration is how to use the draft to solve the problem.

E. Evaluation

This stage is evaluated whether the method has succeeded, and the evaluation of the data that has been obtained before, either qualitative or quantitative data.

a) Speed
   In *Aksara* Keyboard, it is typing in Lampung alphabet with time calculation to find out how good and efficient from the built-in Lampung alphabet layout.
b) Accuracy
   It does test user accuracy and accuracy, to be able to assess whether laying on the keyboard can be easily remembered.
c) Difficulty Level
   The test of difficulty in writing Lampung script, so it can be known by users experiencing difficulties in using the Lampung alphabet or not.

F. Communication

This stage has several stages such as designing an alternative explicit need implicit, functional, nonfunctional, affinity diagram, the scope of the interface.

a) Explicit and Implicit Needs
   Users who use Lampung Character Keyboard Layout Design:
   1. Teacher
   2. Student
   Explicit user needs:
   1. Writing Lampung script in a report
   What implicit user needs:
   1. No mistakes in writing
   2. Easily memorize the alphabet keyboard keys
   3. Good level of writing accuracy
b) Functional and Non-Functional Needs
   1. Functional Needs:
      Display the characters according to what is located on the keyboard
   2. None Functional Needs:
      Know the layout of the Lampung script in the keyboard layout.
c) Affinity Diagram
   An overview of Affinity Diagram can be seen in figure 3.

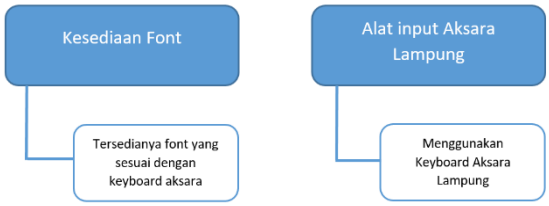

Figure 3. Affinity Diagram

IV. Results and Discussion

A. Prototype Creation Process

The final draft form of the Lampung alphabet Keyboard Prototype Layout will be formed at the stage of the Prototype creation process. This Keyboard Layout is created after taking into account many things before. High Fidelity Prototype display can be seen in figure 4.

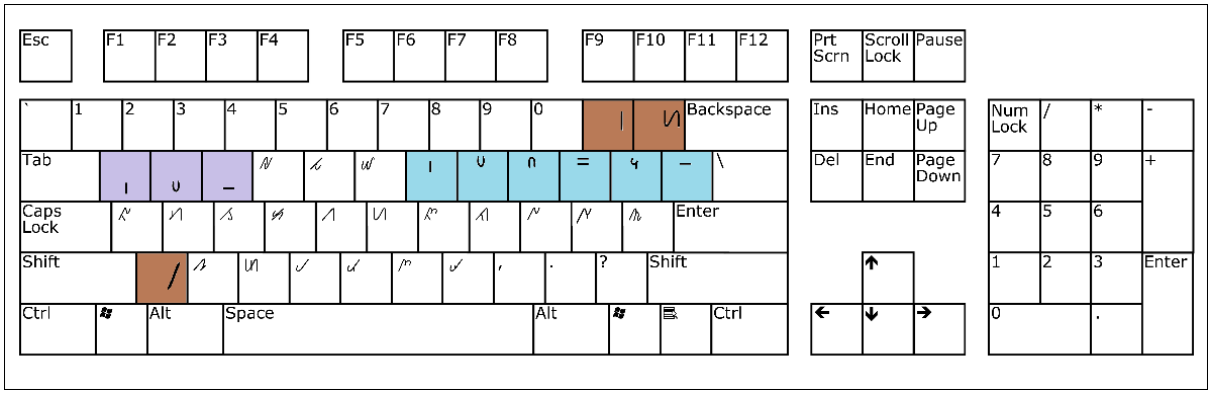

Figure 4. Lampung Alphabet Keyboard Layout

Implementation results on the keyboard prototype can be seen in figure 5:

Figure 5. Prototype Lampung Alphabet Keyboard

B. Word Per Minute

The average speed of a person in typing on a QWERTY keyboard is between 38 and 40 WPM, which translates into characters between 190 and 200 CPMS. The professional picker can type much faster with the average between 65 and 75 WPM (Mit.edu 2019).

According to Dvorak, before World War II, researchers have found that after three years of typing instruction, the average speed of students typing is 47 net words per minute (NWPM). Because the clerks were rare during the war, the U.S. Navy chose fourteen scribes for the study in 1944 to assess whether Dvorak's retraining would be viable. Dvorak found that it took an average of only 52 hours of training for the speed of the scribe on the keyboard Dvorak to achieve the average speed on the QWERTY keyboard. At the end of the study, their Dvorak speed was 74 percent faster than their QWERTY speed, and their accuracy increased by 68 percent (C. Karat, et al 1999).

Brandon Raziano conducts QWERTY Keyboard WPM Research in 1997. In his research conducted the WPM grouping with an average speed of Fast is 40 WPM, Moderate is 35 WPM, and Slow is 12WPM.

When grouping is separated into "Fast", "Moderate", and "Slow", the average speed of each is 40 WPM, 35 WPM, and 23 WPM (Undang-Undang Republik Indonesia, 2003).

Table 4. The Average Value of the Typing Time

	Simple	Medium	Complex
Range	10 to 100	10 to 100	10 to 100
Mean	17.8	37.73333333	43.43333333

The average typing time for simple sentences is 17.8 seconds for 3 words, with 13 characters, typing speed increased to 291% when compared to previous research, which is 51.8 seconds.

The average typing time for moderate sentences is 37.73 seconds for 5 words, with 23 characters, typing speed increased to 150% when compared to previous research, which is 56.7 seconds.

The average typing time for complex sentences is 43.43 seconds for 6 words, with 33 characters, the typing speed increases to 185% when compared to previous research, which is 80.3 seconds. Here's how to search for WPM (1)

$$\frac{Mean}{Word\ Count} = \text{WPS}$$

$$\frac{60\ Sec}{WPS} = \text{WPM} \tag{1}$$

The formula (1) for finding WPM is to look for Word Per Second (WPS) i.e. the average value divided by the number of words in the sentence that generates the WPS, then 60 seconds divided by the WPS that has been obtained.

The average level of typing time per minute or WPM is obtained on the Keyboard of Lampung RaTaYa which is 8.7 WPM from the overall calculation of both the simple, medium and complex sentences. The average value of typing time per minute in previous research was 4 WPM.

WPM Keyboard Lampung script even increased speed, remained into a slow category based on WPM QWERTY.

The average difficulty for a simple sentence is 3.8 which has improved when compared to previous research, which is 3.2.

The average difficulty for moderate sentences is 4.6 which has been improved when compared to previous research, which is 4.5.

The average difficulty for complex sentences is 5.1 which has been decreased when compared with previous research, which is 5.3.

Respondents had trouble with the Lampung *Aksara* keyboard layout because it was only known and not used to. Based on LAW number 20 the year 2003 about the national education system discusses that local content must be taught at ELEMENTARY and JUNIOR level. Local content such as Lampung script is only known by the people of Lampung to SMP who have an impact on the recognition ability of Lampung script.

The font of the RaTaYa keyboard itself cannot be registered into a Unicode Font. Unicode itself is an industry-standard designed to allow the text and symbols of all the world's writing systems and forms to be displayed and manipulated consistently by computers.

V. Conclusion

The keyboard layout for the Lampung script has been created that is more effective, by eliminating the use of the SHIFT key and regrouping, the parent letter, the lower-case child, the top and the sides, in a more effective composition. Typing speed increased to 208% from an average value of 62 seconds to 32 seconds. This is evidenced by the typing of Lampung script which becomes faster than respondents by using the new Lampung alphabet keyboard layout. Keyboard RaTaYa gets WPM value of 8.7 WPM, faster 208% than the previous layout that gets 4.3 WPM. Users experience typing difficulties using the Lampung alphabet keyboard because users are not accustomed to recognizing Lampung script in everyday life and the absence of phonemes on the Lampung alphabet keyboard.

Acknowledgment

The authors wish to thank the Institute for Research and Community Service of Lampung University, for the support to the Informatics Engineering Degree.

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