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April 30, 2021

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Abstract— User Experience (UX) is needed to assess the usability of products or applications, important uses in the interaction between humans and computers (HCI). These uses include satisfaction of use, efficiency and effectiveness. A good and acceptable design of an application is also important especially when it relate to elderly with impairment. The purpose of this study is to evaluate the perceive acceptance and usability of healthcare application named WESIHAT mobile app among the elderly. We conduct a survey using System Usability Scale (SUS) among the elderly to get initial feedback on the prototype before we further refined it. 10 elderly participants aged over 50 years were recruited for this purpose to investigate the acceptance of our propose interfaces and the feedback from participants will be used to refined the design. Results from SUS have a score of 66.00 and some refinement and recommendations were listed out for improvement. Respondents agree that the App is easy to use, but there are some parts that are considered too complicated for the elderly.

Keywords: *usability, design for elderly, system usability scale.*

I. INTRODUCTION

The development of technology and industrial methodology has become very complicated. Enthusiastic content and greatly enhance user interaction and experience. Human interaction with the system is called user experience (UX). "User Experience" was popularized by a title chosen by Don Norman, User Experience Architect at Apple Computer, Inc. in 1993. According to Don Norman user experience is a form of attitudes, emotions and behavior of users when using products or services. Users have experience that involves their perception of what the benefits are when using the product. User experience is the subjective feeling of people when they use or interact with products, services, or websites, etc. While user experience design is the subject of how product designers and managers

provide users with a better experience, ease of use, intuitive interaction, high productivity, and even pleasant emotions, this also involves the amount of value that users will get from a product or service. When viewed, User Experience (UX) is very dynamic. This is felt when the user User Experience (UX) appears, then able to change values, abilities, technology and environment.

Although user interface (UI) and user experience (UX) have certain similarities, user experience (UX) does not mean UI. UX has a full complex while the UI is a small part of UX. Several factors that influence UX, such as project management, user research, usability evaluation, UI design and interaction design. UI is a visual form or display on the system and is aimed for user interaction. According to Nielson (Nielson, 1993), usability is defined as the ability of the system to meet the needs of users with five attributes of assessment namely: learnability, efficiency, memorability, errors and satisfaction. Meanwhile, according to international standards ISO 9241-11 (Bevan, 1995) [1], usability is the extent to which a product can be used by specified users to achieve the targets set with effectiveness, efficiency and satisfaction.

User evaluation needs to gain positive user experience and better usability with the product. Understanding of the usability will improve user satisfaction, mainly for users with limitations such as the elderly. User evaluations need to get a positive user experience and better usability with the product. An understanding of usability will increase user satisfaction, especially for users with disabilities such as the elderly.

In many ways, it would be beneficial to provide healthcare services through mobile technology that covers a variety type of users. A lot of mobile health applications currently being developed for older people [3]. Hazwani et. al. [4] indicates that seniors citizen are interested in learning more advanced smartphone apps. The work by Nazlena et. al [5] discusses the use of touch screen communication in the design of an older adult on the educational food program. Findings show that most of the older people

participating in this study believe that educational toolkit is useful in delivering nutritional and safe lifestyle information.

Due to ageing, older people face additional obstacles as they communicate with the mobile application interface relative to younger people [6]. It could be due to physical disorders, cognitive problems, and inexperience with computers. The process of gaining experience, however, is also part of cognition from a general point of view and can be treated as cognitive issues [7]. Medical problems are caused by worsening in physical conditions such as visual impairment, haptic degradation and decreased hearing. Presbyopia, cataracts, age-related macular degeneration, chronic open-angle glaucoma and diabetic retinopathy are the five most common causes of visual impairment in the elderly. [8],[9].

This paper presents our work in designing and evaluating a mobile-based health application name WESIHAT that is design for elderly. It is an iterative design processes. Feedback from this phase will be refined for improvement of the application. The following Section 2.0 describes the design interface for WESIHAT mobile application and the evaluation process among participants. Section 3.0 shows the findings on the evaluation and the conclusion.

II. WESIHAT: MOBILE APPLICATION INTERFACE FOR ELDERLY

Several researchers have suggested different solutions in a mobile application user interface to address the needs of older people. Visual and haptic deteriorations are by far the most often dealt with in the implementation of the design guidelines for the older people [10]. The font used in the interface design must be enlarged. We suggest using 12--14-point san serif fonts because the older people preferred that font specification for screen reading. There are studies stated the older people could read faster with 14-point text compared with 12-point text [11], [12] and the colour should be high contrast. The background colour should be contrast with the font colour, to make it easy for older people, especially to read text messages [13], [14]. Both specifications are suggested to overcome visual impairment issues.

We design and develop applications that use design principles for the elderly for WESIHAT mobile applications. The WESIHAT mobile application consists of several modules, namely the main page containing a guide to improve memory, a health diary and a diary, video exercises and pictures of activities that can be carried out by the elderly. WESIHAT is a cellular application that consists of several modules namely a module to improve memory that includes healthy foods and vitamins for consumption as well as healthy and safe movement activities for the elderly, in addition there are health diary modules that are useful for recording blood sugar, calories and various things about health and health records of the elderly can be a reminder note at any time has increased or decreased and of course there is a food diary module that contains food that can be consumed by the elderly in the morning or at night which is certainly healthy. WESIHAT is developing to empower the elderly in healthy living.

On the main page there are three modules consisting of guidelines to improve memory, health diary and eating diary. The guide to improve memory is a feature to maintain health for the elderly where there are several features such as blood sugar control, blood fat control, taking vegetables and fruit, taking fish, low-calorie diet practices, activities to stimulate memory, exercise, avoid smoking and drinking alcohol, good attitude and behavior and maintain good health. Blood sugar control feature is provides information or guidelines for the elderly on how to maintain blood sugar levels ranging from reserves of dislike in consuming milk, the importance of drinking water, as well as providing information on various fibrous foods that can maintain blood sugar. There are features for guiding blood fats that contain information on the effects and types of danger of blood fats on memory and the body and food information that has high and low fat content.

In the memory module, a feature of taking vegetables and fruit in which this feature provides information in the form of procedures and restrictions on consuming fruits and vegetables as well as the properties of fruits and vegetables. There is also feature of taking fish which contains information about the benefits of consuming fish and how to cook fish so that the fiber that is exposed to the fish does not disappear as well as the practice of a low calorie diet where the feature is almost the same as other features that provide information on how to apply the diet based on the advice of every religion. In the activity feature stimulates the memory, which contains information on activities that are able to maintain the memory of the elderly and also practice exercise information that can be done by the elderly to maintain body fitness. In the guide to improve memory there is also a prohibition to consume cigarettes and alcohol and information on the effects of consuming it and there is a feature of information for attitudes and behavior that can be done by the elderly as well as information that contains procedures for maintaining sensory health.

Still in the module on the application on the main menu there is a health diary feature where the diary is a record for the elderly in recording a health trail containing the amount of cholesterol in their bodies, these notes can be added and reduced based on the desired time period. To note this note is useful to determine the impact of the use of food or activities carried out previously so that these records can be a comparison record in each period of activity and food that the elderly consume.

In the diary, there are foods that must be consumed for the elderly ranging from morning to evening and include other types of food menus that can be consumed as well as tips for eating based on available rats that are owned by the elderly where this feature provides convenience in the form of types of food that can be consumed to maintain the memory of the elderly and the pattern of life that the elderly do so that the elderly are still low, forgetfulness.

In addition, WESIHAT mobile application has a feature in the form of videos and pictures where this feature contains information in the form of videos and pictures for the elderly to continue a healthy lifestyle in the form of simple gymnastic videos that can be done by the elderly and is a feature where simple activities can be done by the elderly to support the healthy lifestyle of the elderly.

Figure 1 shows the examples of WESIHA mobile application interfaces layouts that are designed with large font and high contrast colour to ensure that older people will not face any difficulties when they use the application.

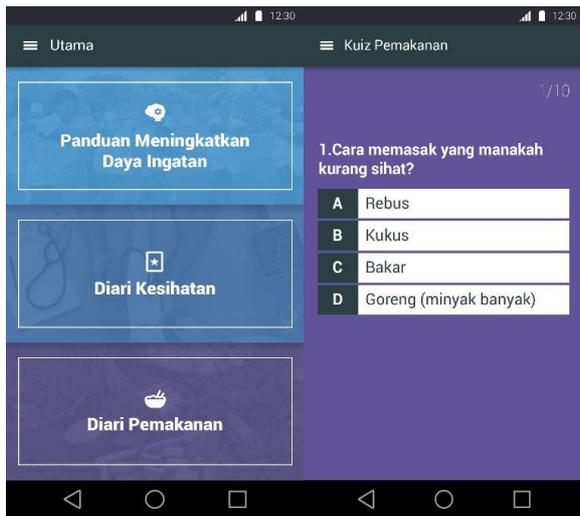


Figure 1 Examples of WeSihat application interfaces with large font and high contrast colours.

While the proposed guidelines to help older adults with haptic deterioration problems are by making large button size and spacing. It would shorten the reaction time for older people and increase the effectiveness of the application [15]. The app should minimize the used of the keyboard for interaction. This category of users is prone to make an error while using the touch screen application. Hence, elements such as pickers and checkboxes are recommended as an alternative to help them use the app [16]. Instead of taps, the designer should think of using movements of drag and pinch. Studies conducted by [17] found that older people tend to prefer dragging and pinching on the touch screen application rather than tapping.

Figure 2 shows some of the examples of WESIHA mobile application interfaces that are designed according to the guidelines for older people with haptic deterioration problems.

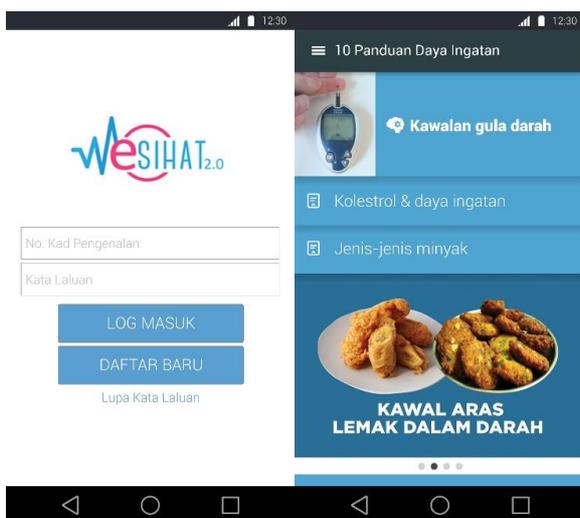


Figure 3 Examples of WeSihat application interfaces that are designed with large button size and spacing, minimizing the use of keyboard and using drag and pinch movement.

III. RESULTS

Ten elderly participate in the initial user evaluation study. The aim for the experiment is to gain feedback on the newly developed mobile application and used the feedback for further improvement in the next iterative design process. The participant's ages are above 50 years old. Participants were given a set of questions name System Usability Scale (SUS) consisting of ten questions. The participants were first asked to try the application with our demonstration followed by questionnaires to be filled out by participants.

One of the usability tests is done using the System Usability Scale (SUS). In 1986 John Brooke developed SUS which was originally used to evaluate various products and services. Based on research, SUS scores above 68 will be considered above average and scores below 68 below average where John Brooke has classified Scala A values 91-100, Scala B 81-90, Scala C 71-80, Scala D 61-70 and Scala E 0-59 (Likert scale 1 - 5?). SUS is an easy scale to manage so that participants can be used on small sample sizes with reliable results and can effectively distinguish between systems that can be used and those that cannot be used. The SUS questionnaire includes ten questions to evaluate system usability and ease of use. Questionnaires represent all aspects of usability including interface design, reduction in the size of memory used by applications, features to communicate, and data integration [2].

Table 1 presents the distribution of the participant's responses for this experiment. Based on Table 1, the overall average score of SUS value was 66.00.

Table 1. Overall feedback from experiment

| Classification | | Number | SUS Score / 100 | Percentage |
|----------------|--------|--------|-----------------|------------|
| Gender | Male | 8 | 530 | 80% |
| | Female | 2 | 130 | 20% |
| Age | > 51 | 10 | 660 | 100% |
| Total | | 10 | AVG 66.00 | 100 % |

10 participants with a total of 8 male, we obtained an SUS score of 530 (80% of the SUS score) and from 10 participants with a total of 2 female, we obtained an SUS score of 130 (20% of the SUS score).

The SUS score for each question is addressed in Table 2. The average rating of responses to each question shows that agreement with the positive aspects of SUS (odd numbered questions) is always higher than the neutral value. While the negative aspects of the SUS questionnaire (even numbered questions) are higher than the neutral values found in numbers 2 and 4. Based on the questionnaire shows that the user experiences complexity aspects in some features in the system so that it requires help from others to use further applications of the system.

Table 2. List of usability questions

| No | Usability Question | Mean |
|----|--|------|
| 1 | I think that I would like to use this system frequently. | 3.7 |
| 2 | I found the system unnecessarily complex. | 2.5 |
| 3 | I thought the system was easy to use. | 3.9 |
| 4 | I think that I would need the support of a technical person to be able to use this system. | 2.7 |
| 5 | I found the various functions in this system were well integrated. | 3.8 |
| 6 | I thought there was too much inconsistency in this system. | 2.3 |
| 7 | I would imagine that most people would learn to use this system very quickly. | 3.8 |
| 8 | I found the system very cumbersome to use. | 2.4 |
| 9 | I felt very confident using the system. | 3.5 |
| 10 | I needed to learn a lot of things before I could get going with this system. | 2.4 |

Based on the SUS score of the questions given to respondents, we found two even numbered questions that were on the undesirable score because on SUS questions with an even number were expected to have a low value (Strongly Disagree) from the responses given by the participants because getting a low score on an even numbered question will be able to produce a high SUS score. In measuring using SUS although it is not too significant, namely the questions with even numbers, namely numbers 2 and 4, from this question it was found that participants felt complicated when they used the application (question number 2). The participants who have problems with the feature agree to solve the problem by needing help from others who understand how to overcome the use of the application (question number 4). Although the trial using SUS is an instrument that is very easy to use, but SUS does not provide a solution for disclosing application flaws. But based on that the value obtained from all respondents received a SUS score of 66.00, which is closer to the average SUS score (68.00).

As for excerpts from some respondents, it says that it looks complicated because there are some correlation modules that are still not running and some modules that still look complicated to use and the whole module is not displayed on the main page so that respondents feel

confused to go to a module that they want to use other than that respondents said there were modules that were not needed like the pictures.

As for quotes from some respondents about this application, they stated "this application needs to be improved, especially in the food module consumed along with language that can be understood by some elderly, but this application is very helpful and good to use to record and share information about health of the food module and activities that are carried out daily "

IV. CONCLUSION

In the research using questionnaire items from the system usability scale (SUS), with a total SUS score obtained 66.00. these results are still below the average (68.00) needed to further improve this application. Although experiments using SUS are an easy method for measuring usability. However, SUS is inadequate to reveal the shortcomings of the application and the system so the evaluation needs to be done together. Based on a review of participants, some features require improvements that are considered still complicated in the system so that respondents need help from others in using the system.

Future work for this initial evaluation is to improve the design of WESIHAT based on feedback. Another iterative design process will be carried out among the elderly. User experience has an impact on a system that is given by participants in the form of how the evaluation of a system to be better in the future so that they can interact with users according to what is needed by users of course elderly so that the system is easy to use for them so as to improve quality healthy life.

V. ACKNOWLEDGMENT

We would like to thanks all participants involved in this study.

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