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MEASURING USABILITY AND USER EXPERIENCE IN EARLY IMPLEMENTATION OF WESIHAT3.0

Dwi Fiqri Qurniawan[1], Nazlena Mohamad Ali[2], Mohamad Hidir Mhd Salim[3*], Shaharizal Othman[4]

[1] Institute of IR4.0, Universiti Kebangsaan Malaysia
Email: p100277@siswa.ukm.edu.my
[2] Institute of IR4.0, Universiti Kebangsaan Malaysia
Email: nazlena.ali@ukm.edu.my
[3] Institute of IR4.0, Universiti Kebangsaan Malaysia
Email: mhdhidir@ukm.edu.my
[4] HPCS Sdn. Bhd.
Email: shaharizal@hpcs.my
[*] Corresponding Author

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Abstract:

Mobile applications are designed and developed to cater for various use by their targeted user. The recent rapid evolution of software development technology has enabled the implementation of various forms of interactive mobile applications for users of all ages of life. The technology employed in the development process can impact users, particularly regarding the mobile applications appearance, functionalities, usability and acceptance by the intended user. This research investigates the level of usability and user experience of an initial design for a mobile application named WESIHAT 3.0 using the System Usability Scale (SUS) instrument. WESIHAT 3.0 is a mobile educational application designed and developed to improve the cognitive ability of older adults. To make WESIHAT3.0 acceptable to the intended user, it is paramount that the usability and user experience must reach an acceptable level. This study's findings will be utilized to improve the usability and user experience of WESIHAT3.0 and make it more acceptable to the target audience.

Keywords:

Usability, User Experience (UX), System Usability Scale (SUS)

Introduction

The number of older adults in diverse families and communities grows with time. According to Pouria et al. (2016), the ageing population is expected to account for 21% of the global

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population by 2040. However, the number of old individuals in wealthy nations such as the United States of America, Germany, France, Italy, and Japan is causing worry (Majid et al., 2017). According to the United States Census Bureau, seniors aged 65 and up accounted for 12.8% of the total population in 1995. According to projections, older adults in the United States will account for one-fifth of the overall population by 2025. Similarly, in Japan, the elderly aged 65 and above accounted for 16% of the total population as of 1999 (Majid et al., 2017).

Global population ageing has become an inevitable trend in recent years due to medical science breakthroughs (Yang & Lin, 2019). As the number of older people grows, they will likely place an additional strain on healthcare and social services. As a result, the demand for technological services to meet the pressing needs of an ageing population will increase. When appropriately implemented, these technologies will not only improve the quality of life for the elderly but will also aid carers in delivering necessary services to these senior members of society (Maswadi et al., 2020).

This study explored how the System Usability Scale (SUS) might improve the user experience for health-related applications. The results of this study can be used to enhance the usability of health apps and make them easier to use.

Background Study

Technology and Elderly

People over the age of 60 are considered elders. People always assume that elders should take it easy at this stage of life and not worry about contributing to society. In contrast, seniors should engage in various activities, including technological use. The greatest obstacle for elderly adults to accept technology is their mentality, which makes them reluctant to utilise it and resistant to change. The limitations of understanding software and programmes also prevent the elderly from embracing technology. Therefore, the suggestion for creating applications for the elderly can encourage them to use technology more (Mat Surin et al., 2018).

Technology can boost communication, ease access, and improve the health of numerous systems. Medium- and long-term trends show a negative correlation between depression and technology use (Mitzner et al., 2019). Many seniors feel they need help to learn how to utilise technology because they find it difficult to use. Therefore, it's critical that the system's design continually considers the experience and perception of the elderly (Rocha et al., 2019).

To enjoy constantly evolving living in the 21st century, promoting a healthier, safer lifestyle with information and communication technology (ICT) devices and applications is essential. The number of elderly users using Internet-based services on mobile phones for educational, financial, or health reasons is rising in addition to communication needs (Chaumon et al., 2014; Helbostad et al., 2017; Monaco et al., 2019).

Seniors will accept technology if they have support. The assistance comes from user-friendly device support and assistance from others in using the application (Hunsaker et al., 2019). Using the Internet allows seniors to gain access to information about news or current events concerning a healthy lifestyle. Feeling independent, maintaining social networks, and having health-related information are all benefits for the elderly who use the Internet (Karavidas et al.,

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2005). Internet-based leisure and social activities can potentially improve the well-being of the elderly (Nimrod, 2009).

The presence of positive emotions and moods, such as contentment and happiness, and the absence of negative emotions, such as depression and anxiety, can be defined as well-being. The ability to communicate with family and friends, maintain an extensive social network, access information, and participate in online leisure activities improves the elderly's quality of life and well-being (Aggarwal et al., 2020).

Usability

Usability is defined as the ability of the system to meet users' needs with five attributes of assessments: learnability, efficiency, memorability, errors, and satisfaction. Meanwhile, according to the International Standards ISO (Bevan et al., 2014), usability is the extent to which specified users can use a product to achieve the target set with effectiveness, efficiency, and satisfaction. User evaluation needs to gain a positive user experience and better usability with the product.

Evaluation from users of the system is positive and good for the system. Understanding usability will increase user satisfaction in terms of user experience, which is called user experience (UX).

User Experience (UX) is how users feel about interacting with their products. User Experience (UX) is a person's perception and response resulting from the user's use and anticipation of a product, system, or service (International Organization for Standardization, 2019). To get a good user experience, a product must interact with its users, namely the compatibility between the product features provided and the needs required by the user. This can determine whether the product is valuable or valuable, so if the product is easy to find and use the first time, then the product can make users feel happy when using the product. Moreover, another thing is that the product must be easy to use to get things done or do what the user wants.

Seven factors can be considered in the user experience: Useful, Usable, Desirable, Findable, Accessible, Credible, and Valuable (Morville, 2004).

Useful

Useful means that the products offered are helpful and meet users' needs. If the product is not useful, then there will be no users who will use the product and search for the product.

Usable

Usable means that the product offered must be easy to use. The product must be easy to use to be able to know whether the product is good or not. The purpose of the usable factor is so that users can use the product efficiently and effectively to achieve the goal.

Desirable

Desirable means that the product has the required identity, image, brand, and elements. The product must have this to attract user interest. Therefore, the product must have a solid appeal to compete, an attractive design, and supporting elements to increase user interest.

Journal of Information System and Technology Management
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Findable

Findable means that the product is easy to find. Users can easily find the content or features provided by the product to get a good user experience.

Accessible

Accessible means that the product can provide an experience that is accessible to all users with various abilities and can be accessed by people with disabilities, even many products that are less accessible to people with disabilities.

Credible

Credible means that users can trust the product or content created. The product must have or think about how users can trust the product to feel comfortable and safe when using the product. At this time, technology can develop very quickly, so cybercrime cannot be avoided.

Valuable

Valuable means the product can have value for the users who use it. The value offered influences the user's decision to continue using the product.

User comfort and convenience are essential in building product systems (Li et al., 2020). The system's success can be determined by the ability of the system to provide a good user experience (Yoon et al., 2020). As a liaison between the system and users, system design plays an important role, the role of system interface design is to provide an easy and pleasant user experience for the product (Shin et al., 2020).

A system usability scale (SUS) is a measurement tool that can be used to measure the level of usability of a system. As formed by John Brooke in 1986 (Brooke, 1996), the system usability scale (SUS) can measure the usability level of various products such as hardware, software, mobile apps, and websites.

Some of the advantages of using a system usability scale (SUS) include the following:

- Easy to use and accepted by respondents
- It can be used on small research samples with accurate results
- Proven valid in determining whether the system can be used properly

The way to calculate the measurement results of the system usability scale (SUS) is as follows:

- For each question in an odd order, subtract one point. Example question 1 has a score of 4. Then remove 4 from 1, so the score for question 1 is 3.
- For each question in even order, subtract the score from five. Example question 2 has a score of 1. Then remove 5 from 1, so the score for question 2 is 4.
- Add up the values of the even and odd numbered statements. Then the sum is multiplied by 2.5

Study Method

WESIHAT 3.0 is an application developed purposely for the elderly. The main page of the WESIHAT 3.0 mobile application has memory improvement guides, a health diary, and healthy food options. Ten strategies were offered in the module for memory improvement, including managing blood sugar and cholesterol levels through diet, increasing intake of fish, fruits, and vegetables, practising calorie restriction, taking part in mentally stimulating

Journal of Information System and Technology Management
JISTM
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activities, abstaining from alcohol and smoking, developing strong social networks, staying physically active, and getting annual health exams. The health diary module in Module 2 tracks blood pressure and test results for older adults. As soon as values go outside the advised range, an alarm is sent, allowing the user to keep an eye on the readings. The nutritious dishes in Module 3, "Healthy Food Diary", are suitable for older folks. The goal of WESIHAT 3.0 is to encourage older adults to have healthy lives. Videos illustrating senior-friendly workouts were also available in the WESIHAT 3.0 smartphone application.

This study employed a qualitative and quantitative methodology by utilising a system usability scale (SUS) used in health-based apps (WESIHAT 3.0). Ten respondents were enrolled in application testing and then were given the SUS questionnaire.

The SUS questionnaire has five points Likert scale ranging from 0 to 4. For items 1, 3, 5, 7, and 9, the score is the position of the scale minus 1. The score is five minus the scale position for items 2, 4, 6, 8, and 10. Whole system usability is obtained by multiplying the total contribution score by 2.5. SUS scores ranged from 0 to 10 [11]. The formula for calculating the SUS score:

$$SUS\ Score = ((Q1 - 1) + (5 - Q2) + (Q3 - 1) + (5 - Q4) + (Q5 - 1) + (5 - Q6) + (Q7 - 1) + (5 - Q8) + (Q9 - 1) + (5 - Q10)) * 2.5)$$

SUS was a simple scale to use and could efficiently separate between systems that could be used and those that couldn't, allowing participants to be employed on tiny sample sizes with solid findings. According to the prior study, SUS scores greater than 68 were regarded as above average and less than 68 were below average. A (91-100 score), Scale B (81-90 score), Scale C (71-80 score), Scale D (61-70 score), and Scale E were the classification scales (0-59 score).

Ten participants of this study participated in discussion meetings as part of the qualitative method.

Results

Ten elderly adults were enrolled in the evaluation study, which included two women and eight men over 50. The goal of the initial user study was to collect input on the recently created prototype mobile application. This data was then utilised to inform the iterative design process that followed to make further improvements. The survey includes every area of usability, including interface design, memory efficiency, programme utilisation, communication capabilities, and data integration.

Table 1: SUS Score

P	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	S
R1	2	3	3	2	2	3	3	3	2	3	65.00
R2	2	2	3	2	3	2	3	2	3	3	62.50
R3	3	3	2	3	3	3	3	3	3	3	72.50
R4	2	2	3	2	3	4	3	3	2	2	65.00
R5	2	3	3	2	3	3	3	2	3	3	67.50
R6	3	2	2	3	3	3	2	3	3	3	67.50
R7	3	2	3	2	3	3	3	2	2	3	65.00
R8	4	3	4	2	3	2	3	3	3	2	72.50

Journal of Information System and Technology Management
JISTM
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R9	3	2	3	2	2	2	2	3	2	2	57.50
R10	3	3	3	3	3	2	3	2	2	2	65.00
Average SUS Score											66.00

P: Participant; Q: Question; S: SUS Score

The SUS score for each question is addressed in Table 1. 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 on the likers scale. At the same time, the negative aspects of the SUS questionnaire (even numbered questions) are higher than the neutral values found in numbers 2 and 4. Results from the questionnaire shows that the user experiences complex aspects of some features in the system, so it requires help from others to use the applications of the system. Table 2 shows each usability question with mean values indicating that overall improvement is needed for the design.

Table 2: Usability Questions

No	Usability Question	Mean
Q1	I think that I would like to use this system frequently.	3.7
Q2	I found the system unnecessarily complex.	2.5
Q3	I thought the system was easy to use.	3.9
Q4	I think that I would need the support of a technical person to be able to use this system.	2.7
Q5	I found the various functions in this system were well integrated.	3.8
Q6	I thought there was too much inconsistency in this system.	2.3
Q7	I would imagine that most people would learn to use this system very quickly.	3.8
Q8	I found the system very cumbersome to use.	2.4
Q9	I felt very confident using the system.	3.5
Q10	I needed to learn a lot of things before I could get going with this system.	2.4

The study discovered that the answers to the questions on even numbers had unacceptable ratings based on the results of the SUS questions given to the participants. Because even-numbered questions in the SUS questions were anticipated to receive low scores (Strongly Disagree), in the end, it would impact the outcomes of high SUS scores. When using the application, participants reported feeling complicated (for question number 2). Participants also need assistance to operate the WESIHAT3.0 prototype (for question number 4).

The above findings were supported by three significant feedbacks from ten participants in further qualitative studies.

"This application needs to be improved, especially in the food module. The language must also improve so that some older adults can understand it. However, this application is beneficial and good to use to record and share information about the health of the food and activities that are carried out in our daily activities" [R9],

"Interesting…. It contains information for supporting healthy living "[R2]

"Need improvement on the dietary menu because not all food restricted for me to take "[R7]

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The application, according to some respondents, needs to be enhanced. Users may use the application correctly, particularly in language, without encountering usability issues. In addition to stating that they find the WESIHAT 3.0 application to be very helpful [R9], Users also provide positive remarks. They claimed the application's advice on maintaining a healthy lifestyle is fascinating [R2]. The reviewer discovered that the contents must be regularly updated to give users the required information [R7].

Conclusion

This study involved ten elderly participants that required to use WESIHAT 3.0 mobile application. The SUS tool was used to evaluate the usability level of the WESIHAT 3.0 application. Apart from the quantitative survey, this study also involves qualitative study in the form of in-depth discussion.

The findings clearly show that users encountered difficulties while using the application. They can only use the application if they get assistance. However, some respondents stated that the application's content helps share information about healthy eating and living. The user experience (UX) factors highlighted in this study are usable and useful. The system usability scale can help determine whether the system can be used correctly when engaging with users.

An in-depth interview will be conducted to understand further the design methods that match users' needs to improve the existing application.

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