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Design of an interactive digital nutritional education package for elderly people

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Abstract
Designing a system for the elderly is crucial, as aging is associated with physiological changes that may impair perception, cognition and other social aspects; therefore, many aspects need consideration, especially in interface design. This study was conducted to develop a digital nutritional education package (WE Sihat) by following appropriate guidelines for elderly people to achieve better design interface and interaction. Touch-screen technology was used as a platform for user interaction. The nutritional content was based on previous nutrition studies and a lifestyle education package on healthy aging, which contains four modules. The questionnaires were distributed to 31 Malay subjects aged 60–76 years old, containing an evaluation about the overall content, graphics, design layout, colour, font size, audio/video, user-perceived satisfaction and acceptance levels. The findings showed positive feedback and acceptance. Most subjects agreed that the digital nutritional education package can increase their nutritional knowledge for a healthy lifestyle and is easy to use. The touch-screen technology was also well accepted by elderly people and can be used as a kiosk for disseminating nutrition education for healthy aging.

Keywords: *Interactive system*; *interface design*; *elderly*; *nutrition education*

1. Introduction

The aging phenomenon caused by demographic transition has increased the world's elderly population yearly, in many countries including Malaysia (United Nations: Population Ageing and Development 2009). This phenomenon might be due to the decreasing birth rates and increasing life expectancy percentages. In 2010, the total population in Malaysia was approximately 28.25 million, where elderly people aged 65 years and above constituted 4.7% of the total population (Department of Statistics Malaysia 2010). Elderly people in Malaysia were predicted to comprise 11.3% of the total population by 2020 (Department of Development of Family Health 2007).

According to the World Health Organisation (Nutrition for Older Persons: Geneva 2010), elderly people are particularly vulnerable to malnutrition. Based on the study by

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Suzana et al. [1], only 6.7% of total elderly people in Malaysia have adequate nutritional knowledge. Nutritional education thus plays an important role in improving the quality of life and health of elderly people, as well as aiming to reduce malnutrition problems and chronic diseases among the elderly [2].

Some studies have shown that the digital form of a nutritional education package can improve the knowledge and confidence of elderly people [3–6] and save costs in the long term more efficiently than traditional nutritional education materials [7]. Recognising the importance of nutritional education for the elderly, we conducted this work to develop a digital nutritional education package and assess its acceptance among elderly people in Malaysia. Touch-screen technology was used as a platform to deliver the nutritional education package.

This paper is organised as follows. Section 2 explains the background work related to interactive design for older adults and touch-screen user interaction technology. Section 3 then presents the design and development of the WE Sihat digital system with some design rationales. Section 4 discusses our research design in the evaluation study, followed by Section 5, which explains our findings and discusses them. Section 6 presents a summary and our future work.

2. Background and related work

In the late twentieth century, some potentially important new media were used particularly for health promotion, including interactive computer programs, mobile technology, television and Internet applications using the World Wide Web and e-mail [7]. Based on the study by Brug et al. [8], nutritional education using computers is more effective than traditional nutritional education, as the digital nutritional education package is more readable and memorable than the traditional educational materials, including booklets and pamphlets.

Nutritional educators have begun to emphasise the use of computers to convey nutritional information. One common media format used was interactive multimedia (IMM). The concept of IMM was applied by combining different elements, including text, audio, video and graphics, to facilitate communication between users and computers. In addition, combining text, audio, video and graphics helped people who were illiterate [7]. Based on the study by Gould and Anderson [7], nutritional education using IMM has positive feedback with a higher acceptance level among low-income subjects.

Jantz et al. [9] investigated the effectiveness of IMM at increasing knowledge regarding the importance of having breakfast among low-income Hispanics. The knowledge and attitude of respondents in the intervention group changed and improved when compared with the control group after the intervention. Gould and Anderson [7] also proved that using IMM can save costs in the long term when compared with traditional educational materials such as brochures.

Nutritional education using computers was more effective than traditional nutritional education, as it is more readable and memorable compared with traditional education materials, including leaflets [8]. Busstra et al. [10] developed a digital educational package, which aimed to promote active learning and reduce the cognitive load among students. The study found that 66–88% of the students had better knowledge about human nutrition studies after using the digital application package.

Rifkin et al. [11] conducted a study on a digital photo receiver called CEIVA, which was an image-sharing technology for receiving, storing, displaying and arranging photos. The study involved a number of nutritionists and graphic designers, who created slideshows related to the importance of eating breakfast, fruits and vegetables, aiming to increase

the intake of folic acid among low-income people. Their findings showed that the digital photo receiver was useful in providing nutritional education to lower income people.

Marci et al. [12] conducted a randomised study on developing and evaluating nutrition education using the CD-ROM in the Special Supplemental Nutrition Program for Women, Infants and Children. Although the CD-ROM program could increase healthy eating knowledge, changing the subjects' attitude remained difficult. Oh and Kim [13] found that most Korean children like to play computer games; therefore, they developed a nutritional education program based on a computer game and applied the IMM concept to educate children about the importance of having a balanced diet and to encourage them to eat more fruits and vegetables. Most research has applied the IMM concept, including that by Hans et al. [14], which showed that the understanding level of the educational content and how to use computers were satisfactory among heart disease patients. A majority of asthmatic subjects (mean age 52.7 years) also commented that using computers was easy and a suitable guide for improving a patient's knowledge about asthma [15]. The digital education acceptance level was also 100% among colon cancer subjects [16].

In 2002, the Assisting Carers using Telematics Interventions to meet Older persons' Needs project was performed, which involved elderly subjects, caregivers for the elderly and professionals. Magnusson et al. [5] found that all subjects were satisfied and accepted the program's benefits. Anna et al. [4] developed eight educational modules using the IMM concept with touch-screen technology and a mouse for heart disease patients (mean age 74 years). Most subjects were satisfied with the program and agreed that the program was user-friendly and did not require any computer experience. In 2006, Anna et al. [3] conducted a further study using educational materials developed in 2002 and only used touch-screen technology to provide education to heart disease patients (mean age 70 years). The education succeeded in improving subjects' knowledge about heart disease.

Rifkin et al. [11], who applied the IMM concept with a digital photo receiver as media, showed that most subjects opined that information was more readable and understandable in a digital form. In the study, some subjects suggested that the screen should be enlarged and accompanied by audio.

The aforementioned literature mainly concerned providing digital content to the elderly with little concern about user interaction with computer devices. In addition to providing digital content for educating the elderly, utilising good design principles is also important, as good interaction design may affect how the content is understood. Caprani et al. [17] described the importance of utilising a good design interface for older people and that designers should consider how the effects of aging may influence the way in which older adults interact with systems and devices. Their work focused on designing a browser to help human memory from the perspective of browsing life-logging images among the non-technical elderly.

The reduced interaction between the elderly and input devices might be due to lower motor ability [18]. Reduced perception and cognitive functions would also affect the interaction [19]. A decrease in motor ability would adversely affect the use of input devices by older persons. For example, a decrease in motor ability would slow the user interaction with a mouse when selecting objects on the interface, especially on a small object [18]. Thus, an interaction design interface for the elderly needs appropriate consideration and particular emphasis on their abilities and cognitive levels.

One technology suitable for user interaction is the touch-screen interface, based on a direct touch device. When using touch-screen technology, input devices, including keyboards and mouse, are no longer needed. A study among 251 elderly subjects in the

USA showed that using a touch screen with fingers is better in user experience and satisfaction than using a touch screen with a stylus [20].

Interacting with the interface using a keyboard and mouse was reported to have the same effect on user performance, whereas using touch-screen technology showed promising results with the highest performance level [6]. Wood et al. [21] also demonstrated this improvement in their study, showing that difficulties experienced by the elderly when using traditional input devices, such as the keyboard and mouse, could be significantly reduced using touch-screen technology. This was because a touch screen could offer a more intuitive user interaction. In addition, touch-screen technology provides direct manipulation of objects and requires less vision coordination [21]. Nicholas et al. [22] also showed that touch-screen technology was appropriate for and easy to use by the elderly, as it supports on-going movement in all directions and does not require memorisation. It could thus reduce the memory load of the elderly. At present, touch-screen kiosks have become one potential way to convey health information [22].

3. Methods and procedures

We developed a digital nutritional education package, called WE Sihat. WE Sihat was developed by applying the IMM concept, which combined text, audio, video and graphics. The language used in WE Sihat is Malay and contains four modules: Healthy Eating Guidelines, Quiz, body mass index (BMI) Calculator and Exercise Demonstration Video.

Arthur et al. [23] mentioned some guidelines when designing for an older population, which can be grouped into physical characteristics, navigation, information organisation and conceptual guidelines. Concerning issues related to the elderly, including perception, cognitive, attention and movement control, the following design guidelines are important considerations:

- *Physical characteristics* – The application design should be suitable for a touch screen to encourage novice computer usage. The size of the graphics and buttons should be designed and displayed as sufficiently large to permit elderly people to easily read content, increase usability and encourage interaction. The font size should be set at a minimum of 14 pt to accommodate vision difficulties and should focus on good contrast between the text and background colour.
- *Navigation* – No scrolling should be required throughout the application. Items should be accessible by elderly users. Instruction should be provided on each page to help elderly users efficiently navigate through all information.
- *Information organisation* – The design and layout of each page should be standardised and consistent. A help option can be highlighted in red to ensure that elderly people can readily see the information. Actions should be easily visible, including how to move between modules and exit the package.
- *Conceptual* – The language used should be generalised to be understood by novice computer users. A standardised format should be applied within the package in its overall layout, buttons and icon design.

Our WE Sihat digital package development considers the aforementioned design guidelines. No mouse or keyboard is used during interaction. The following explains the four modules that are incorporated in the package. We briefly describe the content, and the corresponding figures illustrate some main screen interfaces.

Module I: *Healthy Eating Guidelines* – The content is adapted from the study of Suzana and Intan [24]. However, charts and graphics represent some of the content so it can be

more easily understood and accepted by the elderly. More pictures, graphics and illustrations are incorporated into the Healthy Eating Guidelines to make it more attractive. The Healthy Eating Guidelines were constructed from the study of Suzana and Intan [24], called the 10 Nutrition Guidelines for the Elderly and initially published in booklet form. These Guidelines for the Elderly were formed based on a literature review of some existing guidelines, including the Malaysian Dietary Guidelines (National Coordinating Committee on Food and Nutrition 1999), Australian Dietary Guidelines (National Health and Medical Research Council 1994), Dietary Guidelines for the Elderly in Australia (National Health and Medical Research Council 1999) and the US Dietary Guidelines (US Department of Health and Human Services and US Department of Agriculture 2005). The Healthy Eating Guidelines start with the introduction of healthy ageing and the effect of ageing among the elderly. Each guideline ends with 'Tahukah Anda?' ('Did you know?') information. The 'Did You Know?' information is an important part of every guideline to emphasise and recall the guidelines. Figure 1 shows the interface for Module I.

Module II: *Quiz* – This module is divided into two parts. The first part is the guideline for answering the quiz, which includes the tutorial. This guideline briefly explains how to answer the questions. The second part is the quiz, based on a knowledge, attitude and practice (KAP) questionnaire adapted from the study by Suzana and Intan [24]. There are three types of quizzes, all of which aim to test the levels of nutrition KAPs of the elderly.

Module III: *BMI Calculator* – It can determine the BMI category for the elderly. In this module, elderly people only need to enter their body weight (kg) and height (m) into the input box. The BMI calculator shows their BMI category, whether underweight, normal weight, overweight or obese. The ideal body weight based on their body height is also displayed. In this module, an 'Info' button is provided to help the elderly who want to know the classifications of different BMI categories. Figure 2 shows the screen shot for this module.

Module IV: *Exercise Demonstration Video* – The fourth module contains two parts, which are the exercise demonstration video and a quiz. This module is important to increase the physical activities of elderly people, as they often do not exercise. This module also aims to help the elderly adopt an active and healthy lifestyle, which can

Figure 1. Module I: healthy eating guidelines.

Figure 2. Module III: BMI calculator.

help guarantee their lives and health. This module demonstrates and teaches the elderly about different types of exercises, which are easy to remember, learn and do at home. This exercise video contains the following three types of exercises: flexibility, endurance and body balance exercises. These three types of exercises are appropriate for the elderly to perform at home. The demonstration duration for flexibility and body balance exercises is 10 min for each and for the endurance exercise it is 5 min. After watching the video, elderly users must answer five questions related to the importance of the exercise, which test their understanding on the exercise and its necessity.

There are two layers of colours, light orange and white, for every background page in WE Sihat. The colour for the content text is black, and the title text colour is dark red. The font type used for both the WE Sihat title and content text is Arial Baltic, and the font sizes used are 27 and 23 pts, respectively. We used a slow and easy listening type of background music.

There are some important buttons in the interface, including the home, close, audio, previous and next buttons, shown in Figure 3. The home button was designed to return to the main module selection page. The close button was designed to close the WE Sihat nutritional education package. The audio button served to control the audio volume, including the option to turn off/on the narrator's voice. The previous and next buttons were used to return or continue to the previous or next page, respectively. All buttons in the interface were designed with appropriate sizes for easy user click tasks. Once clicked or activated, a button is displayed slightly larger than the inactive buttons to show the task selected. This can also assist an elderly user with poor vision.

Figure 3. Button designs.

According to Zhao et al. [25], the suitable button size for elderly people should range from 16.51 to 19.05 mm^2. However, the distance between the buttons should be between 3.17 and 12.7 mm. Lorenz and Oppermann [26] mentioned that a dark background was considered tiring and also reduced readability for elderly people. Readability was found to be much better on a white background, but elderly people did not feel comfortable with high brightness. They therefore recommended an orange or grey background in two layers and font colours in black, white and turquoise. Lorenz and Oppermann [26] also recommended a non-serif-Arial font type and 30–54 pixels of text size for designing the touch-screen interface.

According to Tsai and Lee [27], there is a significant association between icon feedback performance and the attention and concentration factors. Movement, magnification and colour changes in touched icons give the best performance for elderly people. Lee et al. [28] also proved that multimodal application, which combined vision, touching and hearing, can give better stimuli to elderly people.

The WE Sihat nutritional package considered the guidelines mentioned above. In brief, we designed buttons and icons for a finger to touch and interact with within modules. When a user touches a button or icon, an action immediately happens, as when a button changes its colour and slightly grows in size, showing that the button is currently active. We make the overall screen colour bright rather than black, so finger smudges and fingerprints are not visible, as the mode of interaction is screen touch. A bright background colour was chosen, which is believed to reduce tiresome feelings and is suitable for the elderly. We also designed buttons large enough for a broad finger to touch easily. The buttons were designed to be prominent and consistent in every module screen. The design does not apply the scroll bar (scrollable screen). Instead, the screen layout was broken up into sections, so that each screen easily fits on one monitor screen. Navigation between screens is provided using the 'next' buttons instead of the scroll bar.

4. Research design

We conducted user evaluation, intending to evaluate the digital nutritional education package acceptance levels among elderly people. To evaluate WE Sihat, self-completed questionnaires, which included questions on demography data and evaluating contents, graphics, colour, font size, audio, usefulness and ease of use, were prepared. This evaluation was also inspired by a previous work performed in measuring user acceptance of a computer system by perceived usefulness, ease of use and other related variables [29].

The sampling method used in this study was convenience sampling, which involved 31 elderly people aged 60 years and above, who could read and write in the Malay language, with no known mental or acute illnesses, who were neither blind nor deaf. In Malaysia, the Senior citizen club is a club established to provide a comfortable and conducive environment for senior citizens to meet and relax while organising various activities for their mutual benefit. The user evaluation occurred at three different places: *Senior Citizen Club of Jalan Siakap, Senior Citizen Club of Bandar Tun Razak* and *Senior Citizen Club of Sri Sabah*, which are located in the Klang Valley, in Central Malaysia.

A total of 31 elderly people, 14 men and 17 women, aged 60–76 years (mean age 65.4 ± 4.3 years) were recruited to evaluate the acceptance level of the digital WE Sihat package. All subjects were given 60–90 min to familiarise themselves with the package by browsing and exploring the content. Subjects were asked to complete a questionnaire to evaluate their acceptance level. We used SPSS version 17.0 to analyse all collected data.

In the user evaluation of WE Sihat, data were collected using a set of questions given to subjects. Informed consent was obtained from the subjects, and the Medical Research and Ethics Committee of Universiti Kebangsaan Malaysia (UKM) approved this study. Our assessments mainly tried to ascertain the acceptance level among the elderly for using a technology in the context of a digital nutritional package. Based on the literature and background work, a touch screen has been identified to be a useful platform for nutritional content delivery to the elderly.

5. Results and discussion

Of the 31 elderly subjects involved in the acceptance level evaluation of the digital nutritional education package (WE Sihat), 45.2% ($n = 14$) were men and 54.8% ($n = 17$) were women.

As given in Table I, all elderly subjects ($n = 31$) in this study were Malays, and their ages ranged between 60 and 76 years old, with a mean age of 65.4 ± 4.3 years. With respect to marital status, the men ($n = 14$) were all married, whereas only 47.1% ($n = 8$) of the female subjects were married. It was found that 71.0% of the elderly subjects were still living with their spouses. Men had a higher education level than women, with 71.4% ($n = 10$) and 21.4% ($n = 3$) of men having an education up to secondary school and higher education institutions, respectively, compared with only 41.2% ($n = 7$) of female subjects who were educated up to secondary school level only. Almost half of the female subjects (52.9%) had only primary school level education, and there was one female subject who had never attended school.

All male subjects were retirees, whereas only two female subjects were still working as traders. Only 32.3% ($n = 10$) of the elderly subjects had experience using a computer. Computer experience was defined as any experience using a computer system or PC/laptop in general. Of these 10 elderly subjects, 7 subjects were male and 3 were female.

Table I. Demographic profile.

Demographic profile	Men ($n = 14$)	Women ($n = 17$)	Total ($n = 31$)
Age:			
60–69	11 (78.6)	15 (88.2)	26 (83.9)
70–79	3 (21.4)	2 (11.8)	5 (16.1)
Race:			
Malay	14 (100.0)	17 (100.0)	31 (100.0)
Marital status:			
Single	0 (0.0)	0 (0.0)	0 (0.0)
Married	14 (100.0)	8 (47.1)	22 (71.0)
Divorced	0 (0.0)	2 (11.8)	(6.5)
Widow	0 (0.0)	7 (41.2)	7 (22.6)
Education level:			
Never	0 (0.0)	1 (5.9)	1 (3.2)
Primary school	1 (7.1)	9 (52.9)	10 (32.3)
Secondary school	10 (71.4)	7 (41.2)	17 (54.8)
High education institute	3 (21.4)	0 (0.0)	3 (9.7)
Employment:			
Working	0 (0.0)	2 (11.8)	2 (6.5)
Retired	14 (100.0)	15 (88.2)	29 (93.5)
Computer experience:			
Yes	7 (50.0)	3 (17.6)	10 (32.3)
No	7 (50.0)	14 (82.4)	21 (67.7)

Table II. Aspects of information to facilitate understanding of WE Sihat.

Aspects of assessment	Men (n = 14)	Women (n = 17)
Text	35.7	41.2
Sentences/language	57.1	41.2
Picture/diagram/illustration	78.6	58.8
Dietary information/recommendations	57.1	35.3

Note: Cumulative percentage is greater than 100% because a subject could choose more than one answer.

According to Table II, the subjects also commented that the text, pictures, diagrams or illustrations displayed in WE Sihat are aspects that can facilitate their understanding of the content or information in WE Sihat. For example, 78.6% of the male subjects and 58.8% of the female subjects agreed that pictures, diagrams or illustrations used to represent content are easy to understand. The table also indicates that the dietary recommendations laid out in the package are easy to understand, as they were written using simple and brief sentences. Our finding was similar to the study of Ruzita and Rasyedah [30], which demonstrated that drawings, diagrams and illustrations play an important role in nutrition education materials and can facilitate understanding and keep the reader's attention.

In this study, the subjects also provided some suggestions on how to increase the understanding of WE Sihat content. Based on Table III, most subjects, 78.6% of the men and 70.6% of the women, suggested that the number of pictures, diagrams and illustrations could be increased further to improve understanding and attention to WE Sihat. In addition, the subjects suggested that sentences in WE Sihat should be simplified and the use of some scientific terminology, including 'osteoporosis', should be reduced.

Of the elderly subjects, 96.8% concluded that WE Sihat used suitable images, attractive colour combinations, suitable font sizes (which were easy to read) and clear audio to facilitate reading and understanding the content. However, according to Table IV, a male subject found that the picture was not clear, the colour was too bright and the font size was too small.

The questionnaires in the user evaluation also asked subjects about their preferences for using a digital nutritional package rather than a traditional booklet or brochure. Of the respondents, 92.9% of men (n = 13) and 88.2% of women (n = 15) preferred the nutritional education package on a digital touch screen, as used in this study, compared with only 7.1% of men (n = 1) and 11.8% of women (n = 2) who preferred the nutritional education package in the traditional booklet. Most subjects preferred the nutritional education package in the digital form, as it was perceived as more interesting and readable than the nutrition education in a booklet. The preference for the digital format is probably due to the integration of multi-elements, including graphics, image, audio and video, in

Table III. Suggestions to improve the understanding level in WE Sihat.

Aspects of assessment	Men (n = 14)	Women (n = 17)
Add more pictures/diagrams/illustrations	78.6	70.6
Simplify the sentences	28.6	47.1
Reduce the scientific terminology	28.6	17.6

Note: Cumulative percentage is greater than 100% because a subject could choose more than one answer.

Table IV. Assessment aspects of images, colour, font size and audio in WE Sihat.

Assessment aspects	Men (n = 14)	Women (n = 17)	Total (n = 31)
Suitable images	13 (92.9)	17 (100.0)	30 (96.8)
Less/not suitable	1 (7.1)	0 (0.0)	1 (3.2)
Colour combinations:			
Attractive	13 (92.9)	17 (100.0)	30 (96.8)
Less/not attractive	1 (7.1)	0 (0.0)	1 (3.2)
Font size:			
Easy to read	13 (92.9)	17 (100.0)	30 (96.8)
Hard to read	1 (7.1)	0 (0.0)	1 (3.2)
Audio:			
Clear	14 (100.0)	17 (100.0)	31 (100.0)
Less clear	0 (0.0)	0 (0.0)	0 (0.0)

conveying the nutritional information. This finding also agrees with a study by Brug et al. [8], which showed that nutritional education in a digital form is more readable and memorable than commonly used traditional educational materials, such as brochures.

Although not all elderly subjects have a tendency to support digital nutritional education packages, all subjects (n = 31) still supported the digital WE Sihat and agreed that WE Sihat is suitable as a media tool to educate all elderly people in Malaysia about healthy diet and exercise.

Table V shows the assessment of perceived usefulness, ease of use and affinity towards the digital nutritional education package among the elderly subjects, assessed using a Likert scale. In the evaluation of the perceived usefulness of WE Sihat, 29.0% of the subjects (n = 9) strongly agreed and 64.5% (n = 20) agreed that this system could increase their knowledge about healthy eating. For the second statement, 'This system can increase my knowledge about the importance of exercise', 25.8% of the elderly subjects (n = 8) strongly agreed and 61.3% (n = 19) agreed with this statement. In addition, 32.2% of the elderly subjects (n = 10) strongly agreed and 61.3% (n = 19) agreed that this system could raise their awareness about adopting a healthy lifestyle.

In the assessment of the perceived ease of use of WE Sihat, 32.2% of the elderly subjects (n = 10) strongly agreed and 58.1% (n = 18) agreed that this system is easy to learn. In addition, 25.8% of the elderly subjects (n = 8) strongly agreed and 48.4% (n = 15)

Table V. Assessment of perceived usefulness and ease of use.

	Evaluation				
Aspects	1	2	3	4	5
Usefulness of WE Sihat:					
Increase knowledge on healthy eating	0 (0.0)	0 (0.0)	2 (6.5)	20 (64.5)	9 (29.0)
Increase knowledge on the importance of exercises	0 (0.0)	0 (0.0)	4 (12.9)	19 (61.3)	8 (25.8)
Raise awareness to adopt healthy lifestyle	0 (0.0)	0 (0.0)	2 (6.5)	19 (61.3)	10 (32.2)
Ease of use of WE Sihat:					
Easy to learn	0 (0.0)	0 (0.0)	3 (9.7)	18 (58.1)	10 (32.2)
Contents easy to remember	0 (0.0)	0 (0.0)	8 (25.8)	15 (48.4)	8 (25.8)
Easy to use	0 (0.0)	0 (0.0)	2 (6.5)	20 (64.5)	9 (29.0)
Interested to use this system again	0 (0.0)	1 (3.2)	2 (6.5)	15 (48.4)	13 (41.9)

Notes: 1, very much disagree; 2, disagree; 3, neutral; 4, agree; 5, very much agree.

agreed that the contents of the system were easy to remember. Additionally, 29.0% of the elderly subjects ($n = 9$) strongly agreed and 64.5% ($n = 20$) agreed that the system is easy to use.

Overall, 91.4% of the elderly subjects gave a positive opinion about the perceived usefulness of WE Sihat, and 86.0% of the elderly subjects gave a positive opinion on the ease of use of WE Sihat.

Based on Table V, 90.3% of the elderly subjects were interested in using this system again, if given a future chance. A technological system is considered successful when most consumers are interested in using the technology that helped them believe that these systems are easy to use and beneficial [29,31,32].

Overall, the subjects gave positive feedback on our developed nutritional education package in its embedded features and usage. The positive reactions and acceptances during the evaluation might have occurred due to the Hawthorne effect. When a user is introduced to a new technology (i.e. a digital package or system) instead of using a traditional method (i.e. non-digital), people tend to prefer the digital form, as a digital application can provide more intuitive interactions and easily integrate with other multimedia elements, including graphics or audio/video. This scenario presents avenues for further exploration. Despite the positive feedback and support, the study also has limitations. The language currently used is Bahasa Melayu, which is suitable for the Malay community only and, thus, the subjects and experiment only involved Malay elderly people. We could not generalise our findings for the entire population. The study covered only three senior citizen clubs, and it should be conducted with larger samples and different communities, such as Chinese and Indian citizens. Studies should also thoroughly assess the elderly, including education levels, gender and other demographic characteristics, to make the findings more relevant and to evaluate the impact on the community and societal wellbeing.

6. Conclusion

In conclusion, we have demonstrated that the digital nutritional package developed for elderly people received positive acceptance and preferences. Our findings in the evaluation show that user preferences are for using a digital and interactive package with a touch-screen interface. Utilising a proper design and guidelines for elderly people is important, as they can contribute to the acceptance and positive user experience for interacting with the system, increase the content understanding and educate the elderly about healthy diets.

Further study is being conducted to determine the effectiveness of the digital WE Sihat in increasing awareness and nutritional knowledge, particularly in food intake among elderly people in a longitudinal study. We are also developing the WE Sihat package in the Chinese language, and further experiments will be performed in the Chinese community. It would also be interesting to implement the package into a web-based application, so more users can access and benefit from it.

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