INTERFACE DESIGN GUIDELINES OF NUTRITIONAL INFORMATION APPLICATION FOR THE ELDERLY

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ABSTRACT

The aim of this study is to evaluate the interface design of nutrition information application for elderly people. Obtaining the proper nutritional information is an important aspect for elderly healthcare. Most information on healthcare can be found from the Internet. However, many elderly people face problems when using the Internet due to their inability to adapt to common platforms of interface design. Due to deterioration in physiological functions, elderly users have different requirements from adult users. A high fidelity prototype on nutrition was developed, taking into consideration the evaluation results from the initial need assessment focus group study. A questionnaire survey was conducted involving 30 respondents aged between 60 and 79 years old. The result reveals that most of the respondents gave a positive feedback to the three main features of interface design, which are simplicity (96%), directness (90%) and consistency (100%). Based on this outcome, it can be concluded that the interface design is well accepted by the elderly respondents.

Keywords: Nutrition information, elderly healthcare, interface design, web application, prototype on nutrition

INTRODUCTION

Adequate intake of energy and nutrients is a basic prerequisite for all physiological process, organ functions, physical and mental performance, health and well-being. Malnutrition often contributes to morbidity and mortality in the elderly. This indicates that the elderly should obtain a balanced nutrition for long-term health. However, the complexity of nutritional information often confuses the public (Manafo & Wong, 2012).

Web technology has become one of the main sources to gain nutrition information. There are a number of significant barriers faced by older people when using technology. One major barrier is inappropriately designed technological guidelines (Sofianiza & Muna, 2013). Most computer interfaces are designed and developed according to the needs of people in the young age group and the middle-aged adults group who are familiar with computer technology. Senior people struggle and force themselves to adapt to design guidelines that are specifically meant for younger users, and whether they are successful in adapting varies with age and cognitive factors (Malik & Azuddin, 2013).

In Malaysia, there are currently no official online nutritional information applications catered to the elderly. The objective of this study is to develop an online nutritional information application called Penuaan Sihat (PS) by following appropriate design guidelines for elderly for better user interaction. This paper reports the findings of a survey conducted to evaluate the prototype which was developed based on guidelines interfaces for the elderly.

BACKGROUND

This section highlights some online nutritional information existing in several countries such as Malaysia (nutrition.moh.gov.my) (Ministry of Health Malaysia, 2014), United States (www.nutrition.gov/life-stages/seniors) (Food and Nutrition Information Centre et al., 2004), Taiwan (chnh.mohw.gov.tw) (Ministry of Health and Welfare Taiwan, 2013) and Hong Kong (www.info.gov.hk/elderly/chinese/lifestyles.htm) (Department of Health The Government of the Hong Kong Special Administrative Region, 2011). The online nutrition information applications (Department of Health The Government of the Hong Kong Special Administrative Region, 2011; Ministry of Health and Welfare Taiwan, 2013; Ministry of Health Malaysia, 2014) consist of several features, such as web customisation functions and typography information organisation. Web customisation is a web technology that accommodates the differences among individuals in the way they browse for information, which enable users to modify the page layout or specify what content should be displayed (Mardziah et al., 2010). However, web customisations of ministry websites such as the Elderly Health Service by Department of Health, The Government of the Hong Kong Special Administrative Region (Department of Health The Government of the Hong Kong Special Administrative Region, 2011) and Chang Hua Nursing Home by the Ministry of Health and Welfare Taiwan (2013) are limited to text size customisations only. The web-based application of the Ministry of Health Malaysia (2014) enables users to modify the page layout but not the text size. These are among the current online information that relate to the elderly but still need further features enhancement.

There are three existing health applications which represent the three different interface styles that were tested by the elderly (Dhillon et al., 2011): MyFitnessPal (www.myfitnesspal.com), DailyBurn (www.dailyburn.com) and DailyStrength (www.dailystrenth.org). DailyBurn uses a good contrast of colours for most of the items presented on the interface, which immediately attracted the attention of the elderly. The weight chart presented on the interface introduces them to this application. MyFitnessPal provided the "What's on your mind?" text box feature which enables them to share. The elderly gave negative comments regarding the crowded information in DailyStrength. However, these three existing health applications possess no special design for the elderly.

According to Fisk et al. (2009) and Dhillon et al. (2011), an online application can be improved in the following ways particularly for elderly needs. Firstly, screen scrolling should be minimised. Secondly, there should be clearer instructions for users to better utilise the online application. For example, web-based applications should provide instructions to users on how to proceed to the next page. Lastly, web-based applications should present more visual information than textual information.

METHODS AND MATERIALS

Studies that incorporate the end-user perspective from the conception stage of the project are rare, with most technology trials commencing purely from a technical point of view; and obtaining feedback from real usage and users only at post deployment stage (Nazlena et al., 2009). An early needs assessment survey was carried out to identify the needs of elderly users in relation to the interface design of nutrition websites, and to develop a nutrition online application that addresses those needs. Three focus group interviews were conducted involving 18 respondents aged between 60 and 78 years old. A low fidelity prototype on nutrition was developed, taking into consideration the physiological changes of the elderly such as cognition and motion impairment based on Fisk's concepts (Fisk et al., 2009). Three theme features were derived from the early needs assessment studies using Thematic Analysis (Braun & Clarke,

2006) and these were simplicity, directness and consistency. The Penuaan Sihat (PS) prototype was developed based on these features. The early needs assessment studies were carried out using qualitative data analysis. This prototype was developed using PHP server-side scripting language and JavaScript programming language. PHP server-side scripting language offers stability and features of design patterns which are the cornerstones of building solid, stable, flexible, and feature-rich web applications (Saray, 2009). The language used in PS is Malay and contains five modules: (1) Daily Caloric Intake, (2) Menu, (3) Nutrition Tips, (4) Quiz and (5) Exercise Demonstration Video.

Based on an early needs assessment survey, three theme features on interface designs were generated. They are simplicity, consistency and directness, following theme guidelines as below:

i. Simplicity - Most researchers (Kurniawan & Zaphiris, 2005; Kurniawan et al., 2006; Fisk et al., 2009; Dhillon et al., 2011; Williams et al., 2013) emphasised the principle of simplicity as one of the interface design guidelines for the elderly. Simplicity is easily understood by the elderly who are not technologically perceptive. Hence, user interface should be simple, uncomplicated and easy to manage. Due to a slower rate of response, the application should not use auto-play media, have any pop-up advertisements or make use of flashing images (Kurniawan et al., 2006; Dhillon et al., 2011). These features add to an information overload and result in a break in user concentration. Instead, the application should allow the elderly to progress at their own rate, and to take their time to soak in the information presented. This concept had a similar interface design format in their design guidelines, such as: consistent brightness, alert tone for warning (Fisk et al., 2009; Williams et al., 2013), lesser capital letters, emboldened letters and several types of fronts mixed together, avoid signalling important information using short wavelength (blue-violet-green) contrast, reduce the use of three dimensional display (Kurniawan et al., 2006; Fisk et al., 2009), screen scrolling should be minimised, apply consistency, avoid minimising or ensure that the drop down or pop-up menu duration is long enough to carry out the demand (Kurniawan & Zaphiris, 2005; Kurniawan et al., 2006; Fisk et al., 2009) and provide location of the current page or breadcrumbs (Kurniawan & Zaphiris, 2005; Kurniawan et al., 2006).

ii. Directness - Due to information overload and a general lack of familiarity with browsing websites, the elderly may at times feel disoriented when browsing nutrition information websites. Therefore, such websites should be clear, direct and progress step-by-step with reader instructions. This discovery supported the finding of Grguric et al. (2010) where the computer literacy level of the elderly people is generally poor, and that they may face problems even with simple tasks. As colourful icons attract the attention of the elderly, therefore, different colours were used to represent each function button and a five-module menu bar was adopted to support this theme. There were also instructions of input format and sequence actions for users, along with a 'next' button to proceed to the next page and a 'previous' button to return to previous page. All buttons in the interface were designed with appropriate sizes for easy user-click tasks. Once clicked or hovered, the shadow of the button will be removed to show a clickable button or the task selected.

iii. Consistency – Consistency refers to the visual elements of the website's design, as well as, the organisation of information across the website. Consistency has always been considered the most important principle of user-interface design, as evidenced by virtually all currently available design guidelines today. Accordingly, this application uses the same background and menu bar for all modules so that the elderly will not

become confused as to which page they are on. In addition, this application presents information systematically and does not require scrolling or frequent switching of pages.

The PS prototype applies a background information contrast with a contrast ratio of at least 50:1 (text content in black on a white background) (Fisk et al., 2009) even though Kurniawan and Zaphiris (2005) has mentioned that background screens should not be pure white. A study (Dhillon et al., 2011) has found that the elderly preferred light blue or green backgrounds although Kurniawan and Zaphiris (2005) suggest that blue and green tones should be avoided. Some similar design formats were widely used in previous studies, as well as in this study, such as larger sized fonts, keeping information simple (Kurniawan & Zaphiris, 2005; Kurniawan et al., 2006; Fisk et al., 2009; Dhillon et al., 2011; Williams et al., 2013) and Jargon-free language (Kurniawan & Zaphiris, 2005; Kurniawan et al., 2006; Fisk et al., 2009; Williams et al., 2013).

The PS nutrition application is developed by considering the aforementioned design guidelines. The following explains the five modules that are incorporated in the application. The contents briefly describe, and the corresponding figures illustrate some main screen interfaces.

Module 1: Daily Caloric Intake: This module can determine the BMI (Body Mass Index) category and suggest the ideal daily caloric intake for the elderly. In this module, the elderly only need to enter their body weight (kg) and height (cm) into the input box and select their daily level of physical activities. The daily caloric intake module shows the user's BMI category, whether they are underweight, normal weight or overweight. If the elderly falls under the category of underweight or overweight, this module gives a warning sign and the ideal body weight is displayed. This module also displays the ideal daily caloric needs for the elderly to achieve or maintain a normal body weight. The calculation of the ideal daily caloric intake is based on the "quick" method by Cole and Camerini-Davalos (1970) (Suzana et al., 2009) which multiplies the current body weight (kg) with the factors according to weight status and physical activity as shown in Table 1.

TABLE 1. Quick Method

	Overweight	Normal weight	Underweight
Sedentary Activity	20-25 *kcal/kg* weight	30 *kcal/kg* weight	35 *kcal/kg* weight
Moderate Activity	20-25 *kcal/kg* weight	35 *kcal/kg* weight	40 *kcal/kg* weight
Marked Activity	20-25 *kcal/kg* weight	40 *kcal/kg* weight	45 *kcal/kg* weight

Figure 1 shows the screen shot for this module. It displays five modules in the menu bar and the input components for user information.

FIGURE 1. Module 1: Daily caloric intake

Module 2: Food Menu: This module is divided into two parts. The first part provides a view of all suggested menus in this module, which includes the menu for 1200kcal, 1500kcal and 1800kcal. These menus were adapted from the study by Suzana et al. (2009). In this part, three buttons are linked to each suggested menu where the details of the menu are displayed in the second part. Figure 2 displays the browsing page for the 'Menu' module. This page presents all recipe images on one page, where the users can acquire an overview of all the recipe choices available. Red image borders were used to indicate that the recipe images can be magnified when users click on them. This feature provides a larger image for users to view before proceeding to recipe details. A brushing and linking technique was applied to show the connection between the thumbnail images and the magnified images that corresponded to each step. Brushing is an interactive selection process that is often, but not always, combined with linking, a process for communicating the selected data to other views of the data set (International Cartographic Association, 2005). Brushing enables users to select data on one chart and see how it is reflected on other linked charts (Amir et al., 2013). After brushing, selected items are highlighted in order to make them stand out against the rest of the data (Aigner et al., 2011).

FIGURE 2. Module 2: Menu

Module 3: Nutrition Tips: The contents were adapted from a study by Intan (2005). However, charts and graphics were used to represent some of the contents so they may be more easily understood and accepted by the elderly. Figure 3 shows the screen shot for this module.

FIGURE 3. Module 3: Nutrition Tips

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Module 4: Quiz: Quiz questions from this module were randomly adapted from the study by Intan (2005) and developed in a multiple-choice format. A total of 9 questions were included to test the knowledge level of the elderly after they had browsed through the Nutrition Tips module.

Module 5: Exercise Demonstration Video: The final module contains exercise demonstration videos. This module is adapted from a study by Nazlena et al. (2012). According to Nazlena et al. (2012), this module aims to help the elderly adopt an active and healthy lifestyle, which can help improve their lives and health. As such, this module demonstrates and teaches the elderly about different types of exercises, which are easy to remember, learn and practise at home.

EXPERIMENT DESIGN

The experiment was carried out by performing the following: (1) a set of questions was prepared to filter respondents in order to fit the sample selection criteria; (2) a set of open-ended Mini-Mental State Examination (MMSE) in Malay was prepared;   (3) a set of open-ended demographic data questionnaire was prepared; (4) the introduction and objective questionnaire, the questionnaire questions, and the web exploration of the PS prototype was made; (5) the post-questionnaire survey was conducted; and (6) findings of the acceptance evaluation test were then analysed.

The questionnaire survey was carried out with 30 respondents at two different locations: Cheras Baru Seniors Activity Centre in Kuala Lumpur, Malaysia and Darul Insyirah Seniors Care and Education Centre in Bandar Baru Bangi, Selangor, Malaysia. At the Cheras Baru Seniors Activity Centre, a membership system welcomes the involvement of all elderly Malaysians regardless of age, religion or ethnicity. However, the Darul Insyirah Seniors Care and Education Centre only welcomes the involvement of elderly Malaysian Muslims. The demographic make-up of the respondents at both the centres does not reflect the demographic structure of the elderly population in Malaysia. However, the respondents who have participated in the questionnaire survey were ethnically diverse, and include respondents who are of Malay, Chinese and Indian descent: the three largest ethnic groups in Malaysia. However, the respondents who have participated in the questionnaire survey were ethnically diverse, and include respondents who are of Malay, Chinese and Indian descent: the three largest ethnic groups in Malaysia.

To ensure that respondents were the target audience of the questionnaire survey, three criterions were formulated to which respondents must answer before they were chosen to be part of the questionnaire survey. First, respondents must be 60 years of age or above because according to the Social Welfare Department of Malaysia, the elderly are defined as those aged 60 years or above (Jabatan Kebajikan Masyarakat Malaysia, 2013). Second, respondents were required to be able to read what was on a monitor screen. Finally, respondents must pass the Mini-Mental State Examination (MMSE) in Malay to ensure that they were in good cognitive state so as to follow the questionnaire survey properly.

Respondent selection began by asking elderly respondents the following questions: (1) "Are you 60 years old or above?"; (2) "Can you read a computer screen?"; (3)"Can you understand Malay?"

The elderly who said yes to all the questions, were asked to take the Mini-Mental State Examination (MMSE) in Malay which was validated by Norlinah et al. (2009). The MMSE was developed as a brief cognitive screening tool which allows serial assessment and monitoring of the cognitive function of patients with dementia over time (Norlinah et al., 2009). MMSE is considered to be a brief mental status test that measures a single underlying characteristic of broad cognitive capacity, reflected in the test score of an individual (Schultz-Larsen et al., 2007). The MMSE, which contains 19 items and has a maximum score of 30

points (10 points for orientation, 6 for verbal memory, 5 for concentration and calculation, 5 for language, 3 for praxis, and 1 for visuospatial construction) is the instrument most widely used for screening cognitive dysfunction in older adults in both clinical and research settings (Kim et al., 2012). According to Norlinah et al. (2009), the validation studies of all 3 versions of the MMSE among the Malay-speaking community are valid and reliable in the screening of dementia among Malaysians, at different cut-off scores. The cut-off score of the Malay MMSE version that was used for this study was 21 and above. The elderly who scored enough points were invited to become respondents in the questionnaire survey as they possess good cognitive status.

A set of Demographic Data Questionnaires were distributed to respondents to collect the following information: their gender, age, ethnicity, marital status, occupation, education level, experience in using computers and frequency of using the internet.

In the questionnaire survey, the respondents were asked to browse through the application and answer the questionnaire based on the application. A researcher was present to provide guidance to the respondents along the survey sessions. The maximum duration of each session was set at 35 minutes and the study employed the 5-point Likert Scale. Likert item data display several distinct characteristics: discrete instead of continuous values, tied numbers, a restricted range and participants specify their level of agreement to statements with typically five or seven ordered response levels (Winter & Dodou, 2012). Accordingly in the survey, the respondents answered the questionnaire survey questions by degree of agreement (1 = strongly disagree, 5 = strongly agree).

Normality tests are supplementary to graphical assessment of normality, such as the Kolmogorov-Smirnov (K-S) test and Shapiro-Wilk test, and are recommended only for a sample size of less than 50 (Ghasemi & Zahediasl, 2012). In the survey, the obtained data was not normally distributed as shown by the p-value of less than 0.05 for both tests. Hence, for data analysis, the parametric statistical test adopted in this study was the Mann-Whitney (or Wilconxon-Mann-Whitney) test (Hart, 2001). The Mann-Whitney U test can be used to answer the questions of the researcher concerning the differences between his group participants; and can also be applied when the measured variables are of the ordinal type and were recorded with an arbitrary and not very precise scale (Nachar, 2008). Additionally, SPSS version 19.0 was employed to analyse all the collected data.

RESULTS AND DISCUSSIONS

A total of 30 elderly respondents were invited to involve in the questionnaire survey as they have fulfilled the criteria. They were divided into 2 groups, namely Group A and Group B. Group A involved the respondents who have previously joined the needs assessment focus group study. Group A respondents were selected to evaluate the developed application whether application fulfil the early analysis study result. On the other hand, group B involved new respondents who did not join in the focus group study earlier. Such an arrangement was to observe significant differences in the respondents' perceptions and to study whether the suggested design guidelines are also well accepted by the elderly who did not join in the study. The questionnaire sessions were conducted over a 2-week period.

TABLE 2. Demographic characteristics of the respondents.

Demographic	Group A n (%)(n =15)	Group B n (%) (n =15)	Total n (%) (n =30)
Gender			
Male	3 (20%)	0 (0%)	3 (10%)
Female	12(80%)	15(100%)	27(90%)
Age group			
60-64 years	5 (33%)	3 (20%)	8 (27%)

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65-69 years	3 (20%)	6 (40%)	9 (30%)
70-74 years	4 (27%)	2 (13%)	6 (20%)
75-79 years	3 (20%)	4 (27%)	7 (23%)
Ethnicity			
Malay	5 (33%)	12(80%)	17(57%)
Chinese	9 (60%)	3 (20%)	12(40%)
Indian	1 (7%)	0 (0%)	1 (3%)
Marital status			
Single	2 (13%)	2 (13%)	4 (13%)
Married	5 (33%)	10(67%)	15(50%)
Widowed/Divorced	8 (53%)	3 (20%)	11(37%)
Education Background			
Do not have	0 (0%)	1 (7%)	1 (3%)
Primary level	6 (40%)	7 (46%)	13(43%)
Secondary level	7 (47%)	6 (40%)	13(43%)
Diploma level	2 (13%)	0 (0%)	2 (7%)
Degree level	0 (0%)	1 (7%)	1 (3%)
Occupation			
Self-employed	1 (7%)	2 (13%)	3 (10%)
Private pensioners	5 (33%)	2 (13%)	7 (23%)
Government pensioners	0 (0%)	2 (13%)	2 (7%)
Unemployed	9 (60%)	9 (60%)	18(60%)
Computer literacy			
Yes	15(100%)	7 (47%)	22(73%)
No	0 (0%)	8 (53%)	8 (27%)
Frequency of using the Internet			
Daily	3 20%)	4 (27%)	7 (23%)
Weekly	2 (13%)	0 (0%)	2 (7%)
Monthly	0 (0%)	3 (20%)	3 (10%)
Rarely	10(67%)	0 (0%)	10(33%)
Never	0 (0%)	8 (53%)	8 (27%)

a.   Three theme features

TABLE 3. Fulfilment evaluation of three theme features

Theme Feature	Positive Feedback	*Asymp.Sig. (2-tailed), p*
Simplicity		
Pictures/diagrams/illustrations	100% ($n = 30$)	0.128
Video display mode	100% ($n = 30$)	0.446
Sentences	96% ($n = 29$)	0.545
Content	100% ($n = 30$)	0.264
Navigation using button only	100% ($n = 30$)	0.369
Directness		
Different colour represent different function	100% ($n = 30$)	0.128
Red colour as essential sign	100% ($n = 30$)	0.015
Button design	100% ($n = 30$)	0.710
Understanding of page locations	90% ($n = 27$)	0.062
Understanding of navigation steps	90% ($n = 27$)	0.061
Consistency		
Background	100% ($n = 30$)	0.050
Colour each function	100% ($n = 30$)	0.070
Menu bar position	100% ($n = 30$)	0.022
Switch between pages	100% ($n = 30$)	0.671

In accordance with Table 3, all the respondents have agreed that pictures/diagrams/illustrations, video display mode, and contents used in PS prototype were simple. All of the respondents (100%) have also agreed that navigation by clicking only on buttons was simple and easy to use. This finding was similar to the study of Hanson (2001),

which stated that scrolling is particularly difficult for seniors for a number of reasons related to a combination of visual and motor factors. In terms of visual impairments, the small size of the scroll bar, particularly the target box, can be problematic (Hanson, 2001). In terms of motor skills, scrolling requires the complex sequence of moving the mouse to the small target box, holding down the mouse button, and continuing to hold down the button while moving the mouse in the direction needed for scrolling. Moreover, a majority of the respondents (96%) have agreed that sentences used in the PS prototype are perceived to be simple. However, one of them neither agrees, nor disagrees. Overall, there are no significant differences between Group A and Group B on the acceptance of the "Simplicity" theme.

The average evaluation on the theme of "Simplicity" by all 30 respondents (100%) gave a result of 5 (Md$\geq$5), which is a positive assessment. This statement reveals that all the respondents agree that the interface design PS prototype meets the theme of "Simplicity".

In accordance with Table 3, all the respondents agreed that the use of colourful buttons to differentiate functions and modules gave respondents direction on sequence actions and module pages. The respondents (100%) further agreed that the colour red, which represents the meaning of "essentiality" primarily, directs them to read the sentences or words in that colour. Additionally, 100% of the respondents agreed that the affordance of the button design is clicking. This finding was similar to the study by Susan (Weinschenk, 2011), which stated that cues in the button's shadow tell people that it can be pushed in, in the way a button on an actual device can be pushed in. Most of the respondents (90%) were directed to and were familiar with the page locations and navigation steps, but some of the respondents (10%) felt confused. In general, there were no significant differences between Group A and Group B on the acceptance of the "Directness" theme except for the statement of "red colour as essential sign". However, this significant difference can be ignored, as it merely reflects the difference between two different degrees of positive feedback: "agree" and "strongly agree". Essentially, in Group A, 47% of the respondents have agreed and 53% of the respondents have strongly agreed; while in group B, 7% of the respondents have agreed and 93% of the respondents have strongly agreed.

The average evaluation of the theme of "Directness" by all 30 respondents (100%) is equal to or more than 4 (Md$\geq$4), which is a positive assessment. This statement demonstrates that all the respondents believe that the interface design PS prototype meets the theme of "Directness".

According to Table 3, all the respondents agreed that the design background of the PS prototype has fulfilled the "Consistency" theme, as the background colour for all the pages were consistently white. In addition, the respondents have also unanimously mentioned that the colour of each function or module is consistent. This is for instance, on every page the previous and next buttons were in the colour hex #6fe18d, which is composed of 43.5% red, 88.2% green and 55.3% blue. Moreover, 100% of the respondents agreed that the menu bar position is consistently placed on the top of every page and believe that the design is consistent when switching between the pages. There were no significant differences between Group A and Group B on the acceptance of the "Consistency" theme, with the exception of the statement on "menu bar position is consistent". However, this significant difference can be ignored, because the significant difference is merely between two different degrees of positive feedbacks: "agree" and "strongly agree". In relation to this, in Group A, 53% of the respondents have agreed and 47% of the respondents have strongly agreed; while in group B, 13% of the respondents have agreed and 87% of the respondents have strongly agreed.

The average evaluation of the theme "Consistency" by all 30 respondents (100%) is equal to or more than 4 (Md$\geq$4), which is a positive assessment. This statement uncovers that all the respondents believe that the interface design PS prototype meets the theme of "Consistency". In analysing the above data, it was concluded that the elderly have accepted that

nutritional information websites offer three key features, namely simplicity, directness and consistency.

TABLE 4. Theme design guidelines

Theme	Design Guidelines
Simplicity	Static pictures / figures / illustrations without the use of flashing images.
	Provide start-stop function buttons for video and do not auto-play video.
	Do not use implicit and passive sentences.
	Content that is easy to understand and unscientific.
	Navigation using button only.
Directness	Use of colours to differentiate the function of buttons.
	Red colour signalled the meaning of "precedence".
	Design of realistic button.
	Understanding web page locations with varied menu colours.
	Understanding the navigation steps with design of 'next' and 'previous' that is clearly visible to user.
Consistency	Consistent background design.
	Consistent colour for each function.
	Consistent menu position.
	Minimum need for scrolling.

Table 4 shows the 14 design guidelines for the three theme features.

b.   Interface design evaluation

TABLE 5. Acceptance evaluation of interface design

Interface Design	Positive Feedback	*Asymp.Sig.(2-tailed), p*
Font size	100% ($n = 30$)	0.150
Font type	100% ($n = 30$)	0.281
Font colour	100% ($n = 30$)	0.277
Background colour	100% ($n = 30$)	0.073
Colourful button	100% ($n = 30$)	0.203
Icon with text	100% ($n = 30$)	0.264
Button size	93% ($n = 28$)	0.334
Pictures/diagrams/illustrations	93% ($n = 28$)	0.741
Audio/sound/ voice	100% ($n = 30$)	0.001
Menu bar position	96% ($n = 29$)	0.055
Interesting information	96% (n = 29)	0.825
Well information order arrangement	93% (n = 28)	0.500
Suitable categorization	93% (n = 28)	1.000
Preview of all menu ease navigation	100% ($n = 30$)	0.203
Preview of all menu accelerate navigation	100% ($n = 30$)	0.369

Based on Table 5, all respondents have concluded that the use of 18pt font size, Arial font type and black or white font colour are suitable for the elderly. The table has also indicated that colourful buttons are attractive to senior people. This finding was similar to the study of Dhillon et al. (2011), which stated that colourful icons attract the immediate attention of the elderly, although the use of too many colours will confuse and frustrate elderly users (Williams et al., 2013). The respondents have also collectively agreed that the use of icons with text as compared to text only, was favourable which was similar to previous researches (Fisk et al., 2009; Dhillon et al., 2011; Williams et al., 2013). Additionally, the use of texts would assist the understanding of the icon metaphor. Of the elderly respondents, 93% favoured the use of suitable button sizes, suitable pictures/diagrams/illustrations, well-organized information and suitable categorization of information. Moreover, one of the respondents has suggested that the size of the buttons can be smaller but prefers large picture sizes. All of the respondents have

agreed that the audios/sounds/voices applied in the PS prototype were suitable. In terms of menu bar, 96% of the respondents gave a positive feedback on the placing of the menu bar at the top of the pages, while one respondent suggested placing the menu bar at the bottom of the pages to reduce the denseness of information layout. Additionally, most of the respondents (96%) have agreed that the information in PS prototype was interesting. The same percentage of respondents gave a positive feedback on information order arrangement and on information categorization, which was 93% (n=28). On the design of preview of all menu images, all the respondents have agreed that this design eases and accelerates the navigation process. On the overall, there were no significant differences between Group A and Group B on the evaluation of interface design with the exception of the audios/sounds/voices section. However, this significant difference can be ignored, as the difference is merely based on different positive feedbacks: "agree" and "strongly agree". In Group A, 33% of the respondents have agreed and 67% of the respondents have strongly agreed; while in group B, 7% of the respondents have agreed and 93% of the respondents have strongly agreed.

The average evaluation of 15 interface design statement results by all 30 respondents (100%) is equal to or more than 4 (Md≥4), which is a positive assessment. Thus, the interface design of PS prototype is well accepted by all the respondents.

CONCLUSION

This study evaluates the respondents' perception on the interface design of PS prototype. A majority of the respondents have given a positive feedback on a few aspects of the perceived usefulness of the prototype. However, as the respondents were selected from only two locations, they were not good representatives of the diverse elderly population in Malaysia. Hence, it is suggested that future studies on the subject be conducted with a sample of respondents that mostly represent the elderly in Malaysia in order to further refine the findings from this study. From the study, it is concluded that elderly internet users require a nutritional information website that is simple, direct and consistent. A conceptual design of the prototype was well accepted by the elderly users.

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