Behavior of Inexperienced Elderly toward Smartphone Technology

Azir Rezha Norizan, Naim Che Pee, Zulisman Maksom

Researcher, FICT, UTeM, Hang Tuah Jaya, 76100, Malacca, Malaysia.
Senior Lecturer, FICT, UTeM, Hang Tuah Jaya, 76100, Malacca, Malaysia.

ARTICLE INFO
Article history:
Received 13 November 2013
Received in revised form 19 December 2013
Accepted 23 December 2013
Available online 1 February 2014

Keywords:
Elderly, Smart Phone, Usability, Behavior and Technology

ABSTRACT
Smartphone technology is currently very important communication gadget and has become an essential part in everyday life. However, elderly seems to be the neglected user group in the design of recent smart phone interface due to the low penetration of the technology for the elderly. In order to develop an elderly-friendly user interface, we believe one should study the behavior of the target user and collect related relevant information. Hence this paper attempt to observe the behavior of inexperienced elderly people towards smart phone and report some issues on usability. The methods used in this study are observation, interview and task evaluation where the three elderly volunteers age 60s were given current smart phone technology. Each participant was observed and given sets of task to be evaluated and finally they're interviewed to know their opinion about the smart phone technology. All three participants were evaluated separately in an isolated control room. As a result, we found that a lot of improvement must be done in order to develop and design a smart phone that may facilitate inexperienced elderly on using the technology.

INTRODUCTION

Smartphone technology adoption in Malaysia has increased over the past ten years, however the widespread use of this technology can only be seen on teenagers, children and corporate groups. The elderly are often seen left behind in the technological advances (Naji, 2012). Previous studies indicate these people have several factors to be the constraints acceptance of new technology.

Most of smart phone latest models use touch screen technology as a primary input, thus we can see the evolution of the smart phone interface design in accordance with the touch screen. The use of touch screen-based input has been proven to increase the usability of computer technology, therefore, a lot of research carried out to adapt the touch screen technology to computer technology regardless of device size. Increasing age causes a decline of cognitive, perceptual and psychomotor function and the decline is capable of affecting the usability of a technology. Previous studies indicate touch screen technology can facilitate engagement by the elderly but should be supported by interface design that appropriate for the type of device and user (Peter, 2007).

Previous research has explored adequate target sizes for tap gestures on large touch surfaces (Jennifer et al., 2009), PDA (Kunjachan, 2010), or more recently on tablets and smart phones (Henzeet al., 2011), including for the elderly as a target user. It is commonly accepted that visual acuity, contrast sensitivity, visual search capabilities (Fisk et al., 2009), fine-motor skills, hand dexterity (Carmeliet al., 2003) and touch sensitivity (WickremaratchidanLlewelyn, 2006) suffer considerable losses with age. Additionally, natural age-related declines of the sensory and psychomotor systems can be further aggravated by diseases such as cataracts, glaucoma, osteoporosis, stroke, Parkinson and others (Kurniawan, 2008). Movement can be severely affected by these diseases, causing symptoms such as weakness, numbness, loss of muscle coordination, pain, stiffness, tremors, rigidity and slow movement. Therefore, we may assume that the target sizes that have been found to be adequate for younger adults will also provide a comfortable user experience for the elderly.

A study by Leitao and Silva (2012) found that the performance of the elderly at best with a touch target size of between 14 and 17.5 while the official operating system guidelines put target size between 7 and 11 mm appears small for the elderly. Correspondingly, many interface developed specifically for the elderly users with implementation of large target size. The use of a large target size help senior citizens to see the target and distinguish between objects close by, and also allows them to accurately touch the target. In addition to the large size of the target also balance the issues related arms control and efficiency of movement.

Corresponding Author: Azir Rezha Norizan, Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka, Malacca, Malaysia.
E-mail: azirrezha22@gmail.com
However, most studies were assuming the elderly target user has at least a little experience in using previous technology of feature phone or common mobile phone with some extra features besides the basic communication functions. We believe different issues will be found with an elderly group of inexperienced users. Hence this paper attempt to collect information on the behavior of inexperienced elderly towards smart phone technology.

MATERIAL AND METHODS

This study aims to observe the behavior of elderly whom does not have experience using any previous technology of smart phone such as feature phone or PDA in handling current smart phone. An initial literature review was done in order to collect information on previous research which related to smart phone and inexperienced elderly user and compare the issues with our objectives. Most of the previous study assumed the penetration of smart phone technology towards the elderly people already at the peak, while in most developing country such in Asian the penetration of smart phone technology towards elderly are still very low compared to a younger user. Therefore, this study was done with three volunteers age 64-67 years old whom only used to the old mobile phone and only use the device as a communication tool to make calls and sent a short message.

The volunteers were initially tested using a Mini Mental State Evaluation (MMSE). The MMSE is a brief 30-point questionnaire test that is used to screen cognitive impairment (Lenore and Meredith, 1999). The MMSE test includes simple questions and problems; for example, the time, location of the experiment, repeating lists of words, simple arithmetic, such as serial sevens, language use and comprehension, and basic motor skills. A score of greater than or equal to 25 points (out of 30) is deemed to be effectively normal.

The volunteers were isolated in a control room at a different session for each participant with an Android smart phone of 4.8” screen size for the tasks and observation processes. The volunteers were told to hold the smart phone while being asked to do some tasks as follows:

1) Turn on the smart phone.
2) Unlock the home screen.
3) Answer the incoming phone call.
4) Find and press a button to make voice calls.
5) Find and press a button to use messaging service.

Additionally, each volunteer was observed and interviewed for about 45 minutes including the time to do all the tasks given. Basically, the participants were asked to do a basic phone tasks as above while their behavior were being observed. Additional tasks were also given such as make a phone call to a certain number and type a simple text message. The volunteer also were tested to recognize the function of some icons shows on the menu screen to evaluate the icon design. An interview being conducted at the same time in order to know what was in their mind while doing the tasks and after doing the tasks. Besides, the interview conducted to collect their precious opinion on the current smart phone technology and what should be done to improve the usability towards other elderly users.

RESULT AND DISCUSSION

Initially, each participant was a little surprised after receiving a smartphone that only has a screen and a physical button on it. They are given the opportunity to inspect the smart phone physically before he was asked to turn the device on. Two of the participants were able to switch on the smart phone once requested and another one appeared to be wondering the function of the physical buttons on the top and sides of the smart before being able to switch it on. Each participant stated that the icon design on the power button is quite commonly seen at any electronic equipment or remote control and get to know the function of the button. Yet the icon size was too small for their visual perception.

The participants who have switched on the smart phone will then see the lock screen and they were asked to unlock by following the instructions that appear on the screen. An instruction on the screen is asking for the user to swipe a finger on the screen to unlock and directly go to the home screen. The three volunteers appeared to be able to unlock the smart phone easily after reading the instructions given. Written instructions are very helpful especially to those who first used smart phone.

The participants who have switched on the smart phone will then see the lock screen and they were asked to unlock by following the instructions that appear on the screen. An instruction on the screen is asking for the user to swipe a finger on the screen to unlock and directly go to the home screen. The three volunteers appeared to be able to unlock the smart phone easily after reading the instructions given. Written instructions are very helpful especially to those who first used smart phone.

The next task was given in order to evaluate the available icon design in the smart phone and the participants were asked if they were able to recognize the function of each icon on the home screen. Our observations found that all three volunteers were able to know some of the icon functions by looking at the combination of image and text. However, their knowledge seems to be limited to basic mobile phone’s function such as dialer, phonebook, messaging, and some easy to know icon such as camera and digital clock. One of the volunteers knew a little about internet what can you do with the internet but admit he never use the services
even on a desktop computer. Generally, every participants claim they only knew a few of the smart phone functions due to the lack of knowledge towards technological education especially related to smart phone.

The Volunteers then were tested again with different method where we made a surprise phone call to the smart phone held by them in order to observe their response towards incoming notification. All participants did not take long to answer the call. They claim that the green phone icon was easily recognized as a button to answer incoming call because the similar icon was used even for the conventional mobile phone.

Each participant was asked next to make a voice call to a certain phone number given. The time taken to complete this task was recorded and each of their interactions was observed to look at the rate of error. Two volunteers successfully made the voice call in less than 30 seconds without committing any interaction error while another volunteer made the voice call after interact with the smart phone dialer for nearly 50 seconds. This test shows the default dialer in the 4.8 inch screen size smart phone is more suitable to use by the elderly user. The default dialer interface developed resembled previous mobile phone keypad and not to be a problem even for a new user. The button size is large enough to be touched by each participant despite having different motor-skills might affect the time taken for the interaction.

The final task requires the participants to type a short message that contains 30 characters of alphabets. This task is a bit similar to the voice call task but with a different set of interface which contain of set of button represent a digital keyboard. As a result, we found this task is much harder for each participant as the time taken was more than 3 minutes to complete the typing test. They are having a very hard time to interact with the digital keyboard as the button size was very small and compact. Most errors occur are mistypes due to the small gap between buttons and all volunteers state that they are not familiar with the use of qwerty keyboard for typing purpose rather than the numeric keypad. However they personally gave a thought about the use of qwerty keyboard might be better for typing purpose on the touch screen device because it will be harder and time consume to multi-tap a single touch button for a single output. On another thought, they prefer typing with a physical button keyboard.

**Observation on Behavior:**

Based on the observation made during the experiment, participants looked quite uncomfortable in interacting with the touch screen. In addition they also often ask before making any action or interaction and this is normal for a new user as a precaution. The participants interact on the touch screen by pressing a bit harder as they were pressing a physical button. Moreover, they use both hands to use the 4.8 inch screen smart phonewith one hand to hold the smart phone and touch the screen with the finger of the other hand. They state that less comfortable to interact with one hand while using the thumb to touch the screen due to the decline in their psychomotor function.

Effects of psychomotor function decline can also be seen during the typing test, they claim the button size of the keyboard are too small and makes it difficult for them to touch the target, plus the keyboard button arrangement relatively close to each other. An elderly with a short motor skills will be having a hard time to touch the exact button without not touching buttons around. However, this effect did not show significant problems when interacting to perform voice calls because of the suitable size and spacing between the buttons for elderly users.

Decline in cognitive function is reflected by the time taken when performing a task. Each participant took some time before making a decision or taking an action such as touching a button that was asked. However, all selected participants were tested with MMSE before any tasks carried out and all three participants pass the test indicates their cognitive functions are still in good condition.

**Conclusion:**

This study was conducted towards three elderly volunteers who inexperience in using a smart phone or any feature phones and successfully collected information by using several methods such as observation and interview. Generally, our observation shows that the elderly may handle a recent touch screen smart phone for a few basic usage despite having a difficulty from the declining of perception, motor skills and cognitive functionalities. Based on these reasons, changes need to be made in respect to the rising issues of interface and hardware design. Experiences in using previous technology are another factor that might help to increase the usability of new technology and this factor are relevant regardless of age. Therefore, Technological education is critical to improving the use of technology including smart phones. A few suggestions can be made based on this study such as improvement in term of interface layout, button and spacing sizes for the touch targets, effectively apply the accessibility function and the implement of physical keyboard.

**REFERENCES**


Lenore, K. & W. Meredith, 1999. The Mini Mental State Examination (MMSE), Best Practices in Nursing Care to Older Adults. 3.

