ASIA-PACIFIC INSTITUTE OF INFORMATION TECHNOLOGY

Human Computer Interaction

(*Research Paper*)

Usability for Older Adults

By:

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1. Introduction:

The aging of population is an unchangeable trend in the future. It is foreseeable that the pace of aging will increase drastically when the baby boomers (who born between years 1946 to 1964) reach their age of retirement in the coming 25 years.

As a result of the advancement of the medical and health care, the human had achieved longevity. It is obvious that older adults today will have longer duration to enjoy their life after retirement form the workspace. They have the potential of becoming the major group of consumers in the future.

However, most of the computer technology design (hardware, software, web pages) today is design by and design for the typical users who are physically healthy. Most of the older adults' requirements are ignored. It make the older adults find that the computer is not usable for them.

It is different from our perception; the older adults are actually willing and able to learn new technology. It is hard to find excuse that why older adults can enjoy using the VCR and VCD players but not the PC.

So no matter for the reason of social responsibilities or profit making, older adults right for using technology should not be ignore. This main purpose of this paper is to examine on the physical and mental attributes of the older adults that reduce their ability of utilizing the technology and reviewed ways suggested by previous research to improve the computer usability for them.

After this introduction section of the paper, it is follow by the age classification section. Section 3 will discuss on the effect of aging on the use of computer. Then the ways of improving the computer usability suggested in other research will be looked back in section 4. Section 5 is the critical appraisal of this paper. Finally the paper will be summarized in section 6 and the bibliography will be in section 7.

2. Age Classification:

One of the major problems in research of computer usability for older adults is the lack of standardization in the age classification.

However, to make the paper clear, certain classification of age is required. The term "older adults" mention throughout this paper are them who are 60 years old and above. "Younger adults" and "typical users" in this article will be them who age below 60.

The next section wills discus how the aging process influences the older adult ability to use the technology.

3. How Aging Reduce Usability:

Generally, aging process will cause the older adults to experience different degree of physical impairments such as reduce of working memory, degrade of vision, hearing loss, and lower motor coordination. Besides the physical differences, the differences of the cognitive psychology of older adults also cause them to shy away from technology.

3.1 Memory Impairment

Older adults normally experienced the reduction of working memory. This causes the difficulties in carry out relatively complicated task and to trace back their previous action.

It is proven that they had the most problems with tasks that required 3 or more clicks (Mead, S.E., Spaulding, R.A., Sit, B.M. and Walker, N., 1997) and are less able to trace and navigate a route (Wilkniss, S.M., Jones, M., Korel, D., Gold, P., and Manning, C., 1997).

The exploratory learning that is required in the learning of using computer is also affected by the memory impairment. The memory impairment also reduces their ability of building conceptual model while learning to use the computer (Zajicek, 2001).

3.2 Vision Degradation

By the age of 65, older adults normally will experience certain degree of vision degradation. The older adults ability of focus, resolve images, distinguish colors and adapt to light change is decline (Christopher, P.). Their eye also will get tired easier than when they are young.

Yellowing of lens also cause them hard to see colors such as blue, green, and violet (Microsoft, 1999). Design that does not aware of these factors may cause difficulties to the older adults.

3.3 Hearing Loss

Older adult experience the loss of hearing as a result of the aging process. This causes them to miss out some of the sound indication from the computer about the computer status.

The hearing loss do not cause a big problem in using computer since the volume of speaker can be adjust easily in the operating system or at the speaker itself. However, developer should not use sound as the only means of feedback on the users' action.

3.4 Motor Coordination

Reduce of small motor coordination on older adults cause the following phenomenon:

- Small movement to be difficult (Holt, B., 2000).
- Slower respond, type and mouse slower (Nielsen, J., 2002).
- Double clicking of mouse and scrolling scrollbar become difficult (Microsoft, 1999.) (AgeLight LLC, 2001).

Research also shows that effect of age is largest for tasks where successful performance is primarily dependent on speed (Sharit, J., Czaja S.J., 1994).

3.5 Cognitive Psychology

We know that many older adults live well without technology in the past. We also see that most of the media advertising of technology today is featuring to the children and younger adults. So it is not surprise that some older adults feel that the technology is not relevance for them. Besides that the news on traditional media about the cyber crime on Internet also discourages them from using the technology (Zajicek, M., 2001).

Older adult cautious on everything they do on the Internet (Tullis, T., 2003). This restricts their exploratory learning ability, which is highly required in the learning of computer technology.

Current designs of computer also confuse the older adults (especially for them who never use computer before retire). For example, many older adults unable to differentiate the URL box in browser and the search box in the search engine (Christopher, P.).

The next section will focus on the common practice on the design hardware, software and web pages that is usable for the older adults.

4. Ways to Promote Usability to Older Adults:

To promote better usability to the older adults, I generally divide the suggestion of practices into three categories:

- Usable Design
- Enhanced I/O (Input / Output) Devices and Methods
- Training and Assistance

4.1 Usable Design:

To design for older adult, there were four important principles to be noticed. These principles are simplicity, customizable, stable and consistency.

Research shows that smaller number of options make selection easier for the older adults (Zajicek, M., 2001). So keep the interface design simple is very important to design usable interface for older adults.

Customizable is important especially when the design is aim for both typical users and older adults. It provides a means for user to customize the interface to suite their personal needs.

Interface should be stable to increase the older adults' confidence and reduce their anxiety of learning new technology (Tullis, T., 2003). A software application or web sites that change the design too frequent is very discouraging for the older adults because they have to learn to adapt to the new design again and again for doing same set of tasks.

Consistency is important not only for the older adult but for all users. No one will appreciate the "creativity" of a web master who makes the web sites design different form page to page.

Below are some of the guidelines in the design of usable interface for the older adults.

4.1.1 Text

As suggested by many papers and researches, the text used for older adults should have following characteristic:

- Font size of 14 pt with regular font weight for paragraph texts (AgeLight LLC, 2001) (Holt, B. 2000) (Christopher, P.)
- San Serif font (i.e. Arial, Verdana, etc) for display on screen (Bailey, b., 2001)(Holt, B. 2000)
- Left justification and double spacing between line of texts for paragraph (Holt, B., 2002)
- **Bold font face**, ALL CAPITAL, and Center justification should only be use in the title because it reduces the readability of the text (Holt, B. 2000) (Christopher, P.).

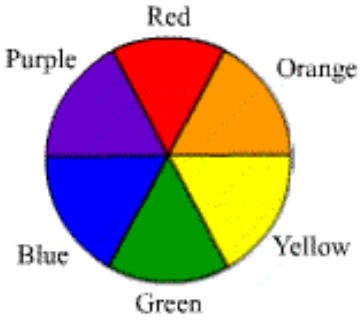
- Contents should be short and precise. Consider breaking long contents in to smaller part to reduce text per page and scrolling of page (Tullis, T., 2003).
- Avoid jargon that may not be understand by older adults (i.e. ‘Back’, ‘Previous’, ‘URL’, ‘menu bar’, ’toolbar’, etc) (Tullis, T., 2003).

If really had to use jargons, never forget to include a glossary for the older adults

User should be providing with the option to change the font size. Not only that, step to change the font size should be visible and always available to them. Microsoft Windows operating system does offer such customization (in “Appearance” tab of the “Display Properties”) but not much people know about it.

For them who don’t like to have an article to be broken into a few pages, a printer-friendly page can be prepared for them. In this way, all users’ need is taken care.

4.1.2 Color



A colors wheel could help in making selection of colors with high contrast. Article from AgeLight LLC (2000) has illustrated how to select color with the help of color wheel.

“For example when choosing a primary color such as blue, its complementary color would be yellow. Adjacent colors to avoid would be orange and red or blue and green as they do not offer a high level of differentiation to the aging eye. An alternative choose colors from opposite side of the color wheel. (AgeLight LLC, 2000).”

The colors that are safe to use will be black, white, yellow and blue. Colors like brown, green, violet, red, and gray should be avoid (AgeLight LLC, 2000). Black type with white background is easy to read; while text in yellow is hard to read (AgeLight LLC, 2001) (Holt, B. 2000) (Microsoft, 1999).

Use patterned background or floating text on images is very distracting for older adults no matter how contrast is the colors (AgeLight LLC, 2000), (Holt, B. 2000), (Christopher, P.), (Microsoft, 1999).

Things become worst when the background pattern is static and remain unmoved when scrolling a page. The commercial website with watermark company logo as background should aware that their page design hard for older adults to read.

4.1.3 Graphical User Interface (GUI)

Older adults often prefer a larger button or link with much space around (Tullis, T., 2003) (Holt, B. 2000) (Christopher, P.) (Nielsen, J., 2002). And they do not prefer GUI elements such as pull down menu, scrollbar and icon that need double-clicking.

Animation, blinking and flashing banner is distracting for the older adults (Tullis, T., 2003) (Holt, B. 2000) (Christopher, P.). Scrolling texts also is hard for older adults to read.So

animation should be used only when it is necessary (i.e. showing progress or status of a process) or it is related to the contents.

The hyperlinks should always stick to the defaults color scheme (Tullis, T., 2003) (Holt, B. 2000) (Nielsen, J., 2002). This can help older users to trace their path while browsing. Site map is very effective to guide older adults in browsing.

Older adults are very cautious in everything they do on Internet (Tullis, T., 2003). The possibility for them to click a link or button is higher if they clear about the consequences of clicking (Tullis, T., 2003). So the use of buttons and hyperlinks should always provide a hint for them to predict the consequences of clicking.

Last but not least, error message should be simple with suggestion of corrective action. (Nielsen, J., 2002)

4.2 Enhanced I/O Devices and Methods:

Starring at the monitor not only causing problem for older adults, but it is tiring for the typical users as well. TFT screen is a better choice compare to the eye-tiring CRT screen.

Mouse seems to be the major barrier for older adults to use the computers. There were two answers to this question: light pen, and the combination of sticky icon and area cursor.

4.2.1 TFT screen

Research (Ziefie, M., 2001) show that the use of TFT screen is benefits all users and older adults benefit more than younger adults. Their performance of searching text on monitor screen is much better when using TFT screen compare to the CRT screen.

Besides that, 18 from 24 testers prefer TFT screen rather than CRT screen show its potential of replacing CRT screen in the near future.

4.2.2 Light Pen

The experiment by Charness, N., Bosman E.A. and, Elliot R.G. in years 1995 have prove that the use of light pen improve performance of both typical users and older adults. The improvement of older adults is more significant compare to the typical users.

4.2.3 Stick Icon and Area Cursor

Basically, sticky icon is the icon (or any clickable object) that will become larger when the cursor is moving toward it. Area cursor is cursor that having a larger hot spot (12 x 12 compare to traditional cursor with 1 pixel hot spot).Research by Worden, A., Walker, N., Bharat, B. and Hudson, S. in years 1997 show that the use on sticky icon and area cursor are improve performance of all users.

Like light pen, older adults benefits more than the younger adults in the using of sticky icon and area cursor. If both sticky icon and area cursor is used together, their performance increases by 57%.

Unlike TFT screen and light pen that is design for typical user but benefits the older adults, sticky icon and area cursor is design for older adults but benefits all users.

Based on all the research above, it is obvious that the enhancement of I/O devices and methods for older adults can actually benefits all group of users.

4.3 Training and Assistance

Practice make perfect. A proper training scheme will helps a lot for older adults to use technology. The criteria of proper training include the following:

4.3.1 Short and Concise Instruction

Older adults tend to read all texts on screen (Tullis, T., 2003) and they can retain more information from shorter message (Zajicek, M.). So, concise instruction is crucial for them.

Instruction should never base on colors. Example, instead of saying, “click on green button”, it is better to say, “Click on round button”.

4.3.2 Task Oriented

Older adults learn better if they are taught with the training that told them exactly how to accomplish an activity on certain tasks, and training that was more conceptual on other tasks (Wiedenbeck, S., Zila, P.L., 1997). Complicated tasks should be break into subtasks to ensure their learning are more efficiently (Christopher, P.).

4.3.3 Right Timing

Research has show that more older adult prefer to use computer at morning. They performance on memory task improve in the time they prefer (Intons-Peterson, M.J., Rocchi, P., West, T., McLellan, K., and Hacney, A., 1998). So, it is suitable to carry out the training for them at the time they prefer.

4.3.4 Fully Utilize Keyboard

It is not reasonable to ask the older adults to memorize all shortcut keys in order to use computer. But certain usage of keyboard should be taught to reduce their dependent on mouse, the input devices that troublesome for them.

Examples of these shortcut keys include:

- Use “Page Up” and “Page Down” to scroll the scrollbar
- Single Click on Icon and then click “Enter” instead of double click
- Use “Tab” to move from textbox to textbox while filling in a form.

5. Critical Appraisal:

After completing this paper, I had learned some new ideas that I never thought of before. Below are some of the important ideas to be shared

When we are design for older adults, we should not think that the designs will only benefits older adults. Most of the advancement of I/O devices that benefits older adults is actually improving typical users’ performance as well.

Second, we should realize that applying senior friendly design doesn't means that it will reduce usability for others users. Most of the design guidelines suggested are actually apply to all user such as using suitable color scheme and font in design.

Besides, applying designs that promote usability for older adults is not just make product easy for them to use, but make sure they are benefits from using computer. It is meaningless to design something that usable for older adults but they can't gain much benefit from using it.

So it is not necessary for us to loudly announce that our design is very usable for older adults. Instead, we should tell that this is the design for everyone. Some older adults will refuse to use products that specially design for elder since they do not want to admit that they are old.

Psychology behaviors of older adults are an important area to be notice. Design should always try to relate their previous experience with the use of computer to speedup their learning process. This can build their confidence and initiative of learning computer technology.

Customization is very important for all users. But the reason it is important is different for different group of users. Typical users customize things to suit their preferences; older adults customize things to suit their physical ability.

Commercial advertisement on computer related products always stress on their pioneer technology also give older adults an impression that computer is different from electrical devices such as television that they use on daily life. Older adults may feel that they can't handle these "high-tech" devices.

Finally, designers should always keep in minds that they are not design for someone else because they will face the same aging process in the future.

6. Conclusion:

Aging is a natural process and the older adult should not be treated like a stranger. Population aging is a global trend. Perhaps the older adults might become the "typical users" in the future.

Due to the aging process, older adults feel difficult to utilize computer technology. Design of technology should take care of the older adults need and want.

A number of design guidelines for older adult usable interface are discussed. It is believes that the researches on enhance older adults usability on technology also bring benefits to all users.

My suggestion of future study of this field will be experiment on integration of the light pen and the area cursor to see it effect on older adults.

We should always remember that what we design today would be what we use tomorrow.

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