Exploring the Benefits of Age-Specific Electronic Product Training Programs

Wang-Chin Tsai* and Chang-Franw Lee **

** National Yunlin University of Science and Technology, Graduate School of Design*
Taiwan, piliwangwang@mail2000.com.tw
*** National Yunlin University of Science and Technology, Graduate School of Design*
Taiwan, leecf@yuntech.edu.tw

Abstract: The present proposal explored advantages of age-specific electronic product training programs for older adults. With a rapid increase of an ageing population in Taiwan, the number of active older adults willing to interact with new electronic products is also growing. The ultimate goal is to develop a set of systematic and iterative training programs that could be used in the development of electronic product interfaces for older adults. The researcher explored three approaches in the dimensions of motor, sensory, and cognitive ability relevant to electronic product interactions and described how these could be used to apply to a given training design.

Key words: training, older adults, user capability, product demand.

1. Introduction

With an increasing aging population, there is a growing recognition of the need to consider older adult users when designing products. In general, electronic products such as digital cameras, mobile phones, and multimedia players have not been designed in considerations of the needs of older adults and are usually difficult for older adults to use [5]. There are different approaches to improve the compatibility between technical devices and older adult users. One of the useful approaches is to bridge the gap and train the elderly to learn how to handle current technological devices. This proposal focused on the capability requirement and product demand to older adults and explored some benefits for this population in the training process. By means of adequate trainings, individual methods are activated and deficits are compensated. Elderly users would be able to transfer their knowledge and experience to other devices and be independent of specific electronic products [6]. The present research project aimed at assisting the elderly in learning to use electronic products successfully.

There are several reasons why older adults tend to have more difficulties in learning to use electronic product interfaces. Many older adults have less experience using computers and technical devices than young adults, which decreases their opportunities for positive transfers. Older adults also generally demonstrate a tendency to have more difficulties than young adults in acquiring new technological skills [2, 4]. Their ability to operate electronic devices is more or less hindered by natural declines in psychomotor, processing speed, and verbal as well as visual-spatial working memory [3]. Interacting with electronic product interfaces (e.g., buttons for several context-dependent functions, small screens that limit the amount of information shown at once) may also be more complicated and laborious for older adults as it places demands on the user's different capabilities. Therefore, the present research question was: What technology training is appropriate for older adult users with age-related decline in the use of electronic products? Take three case studies on older adults' using of electronic products, including digital cameras, mobile phones, and multimedia players, as examples, the researchers investigated how older adult users could be supported from trainings to use technical devices.

2. Characterizing older adults' capabilities and electronic product demands

Human Factors and Ergonomic theory on gerontology describes four main components when considering older adults' interactions with technology: (1) the user, (2) the product, (3) the environment or context, and (4) the activities and tasks over time that constitute the interaction [1]. The main concern is to evaluate the match between older adults and the electronic product by utilizing various measures of compatibility. The assessment of older adults' compatibility with electronic devices can be conducted with a number of human functioning levels, including the sensory, motor, and cognitive levels. Demand levels of electronic products are multidimensional, for electronic products are often set by the attributes of interface features (Solid user interface and Graphical user interface). Based on this knowledge, the capability-demand framework provides a useful starting point for training consideration, that is, to start from focusing on ways to relate product demands to the range of user capabilities [7,8].

3. Approach

The goal of this proposal is to provide some basic ideals and the "best application" for training older adults. As discussed in the introduction session, older adults' product interaction behaviors changed according to their declined abilities and life-experience. These changes may influence the manner and performance when they learn a new technological product and thus have implications for the design of training programs. Due to various product interaction behaviors, understanding the fundamentals of older adults' capabilities provides a basis for knowing what training strategies are most effective and for understanding training guidelines that present best approaches. This thesis aims at developing applicable electronic product training programs for older adults. Based on older adults' capabilities, the study consisted of three case studies examined the effects of electronic product trainings under a wide range of product training situation including tutorial, type of feedback, amount of practice, training of schedule, and training media contents, that have not been well-explored for older adults.

3.1 Case Study 1-Developing a training program based on motor capability and product demand

The world is increasingly full of small, handheld, yet complex electronic products with modern interfaces, e.g. digital cameras and personal organizers. Most small electronic products can be rather puzzling and difficult for older adults to manage, particularly if they have difficulties with fine motor skills of hand use. Age-related changes in fine hand function appear in forms of decreases in strength, dexterity, and range. Hand grip strength and endurance degenerate with age. The average sixty-five-year-old users have only 75% of maximal strength. Reduced fine hand use may affect older adults' abilities to press on a tiny button control a mini-joystick, or assemble some accessories (battery, memory card, and USB slot exchange). Underlying causes of these restrictions may include finger dexterity, fine motions of the wrist, and hand coordination ability.

While previous research on electronic products had a main focus on usability improvement of hardware design, it was argued in the present study that the impact of hand operation training demonstrated a further important dimension for small electronic products manipulation. In order to better understand how a training program of small electronic products should be designed to gain better performance, the researchers conducted a series of programs by finger sports equipment from four activities with the digital camera, including index point, power grip, precision grip, and stretch grip. Ten older adults participated in this training program. The benefit of providing finger sports during training was that they allowed older adults to utilize and apply existing and

familiar activities to understand components of the task being used in the training process. The empirical results, both objective and subjective, revealed that with the finger training programs, older adults performed better than before on tasks that highly demanded on hand dexterity. The training outcome exhibited decrease of numerous errors and problems when electronic products were used by older adults. Considered older users' capabilities discussed in this research, the researchers retrieved small digital product implications for hand requirements and discovered that these could be used easily by hand operation training.

3.2 Case Study 2- Developing a training program based on sensory capability and product demand

Small touch screens are widely used in different products such as bank ATMs, point-of-sale terminals, ticket vending machines, mobile phones, and home multimedia in daily life. These devices are intuition-oriented and easy to operate. The performance of small touch screens can be affected by several elements. One of the essential parts is icon feedback. However, in order to achieve beautiful icon feedback appearance and create interesting interaction experience, many interface designers often neglect the real user needs. It is critical for designers to trade off the icon feedback type according to different users' needs in the touch interaction. Therefore, it requires particular concern from designers to put older adults' limited sensory capability into serious consideration. This research described a pilot study, which identified factors that were determinants of icon feedback training on small touch screens in four older adult visual attention groups. Forty-five elder participants were participated. Each subject was asked to complete a battery of visual attention tests and divided into four groups. In addition, each subject was requested to perform a set of 'continuous touch practice' training tutorials (with and without clue information) on mobile phones and provide comments on open-ended questions. Research results were discussed with respect to visual attention factors that influenced older adults in the practice of an icon feedback training program on small touch screens. The results also showed significant correlations between icon feedback training performance and factors of attention as well as concentration. Older participants were more sensitive and required shorter period of time to adapt to high-detailed icon feedback after training. The study indicated that with appropriate training methods, each older adult visual attention group successfully learned and well understood how to touch a mobile phone icon. These results were discussed and recommendations in terms of icon feedback training strategies were provided for interface designers and trainers.

3.3 Case Study 3- Developing a training program based on cognitive capability and product demand

This case study was grounded in the concept of representative working memory model as suggested by Baddeley. This study was conducted with a series of interface training programs to investigate the effects on interface mode performance related to working memory attributes, cognitive ability levels, and training methods. Eighty older adults participated and were asked to complete a single cognitive function test and were later divided into four groups with different working memory attributes and cognitive ability levels (higher/lower Digit Span and Spatial Span attribute groups) based on the test results. Each group was trained continuously with two training methods in order to examine the performance on the interface mode tasks. The findings revealed that training methods has primary effects on different multimedia interface mode operations in subjects with different working memory attributes and cognitive ability levels. The major findings were as follows: (1) There was a significant effect of training methods on direct interface mode. Follow-up analyses of task time revealed that the benefit of procedural training method was significant for the spatial span attribute older adults, and the

declarative training method had significant effects on the digit span attribute older adults. (2) For groups with the same cognitive ability level, the higher digit span attribute trainees performed better than the higher spatial span attribute trainees when performing hierarchical interface mode tasks during declarative training. Furthermore, the lower spatial span attribute trainees performed better than the lower digit span attribute ones with the procedural training method. (3) For higher digit span attribute older adults, the benefits of the declarative training method were superior to the procedural training method. On the contrary, for lower digit span attribute older adults, the benefits of the procedural training method were superior to the declarative training method. This study has shown evident relationships of performance as a result of the declarative training method versus the procedural training method in older adults with different cognitive attributes and ability levels.

4. Conclusions

The present proposal explored how to develop a training program of electronic products older adults and clearly illustrated its benefits from three case studies. The researcher's overall goal is to provide effective electronic product trainings for practical applications that are also beneficial for older adults to learn to use and adopt into their daily lives. It also recommended that researchers should incorporate these types of electronic product training concepts into a training program in the future work. How can we, as gerontology designers and trainers, prepare older adults to learn to interact effectively with new electronic products? It requires a thorough understanding of older adults' capabilities, product demands, task features, and training methodologies. The whole process must evaluate older adults' capabilities, specify the ultimate task goals, identify relevant product components, understand how they are interrelated, and provide a means to examine older adult's capabilities in a way that not only challenges him or her to process and relate the information, but also provides support for him or her during training.

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