

Chapter 12

Low Usage of Intelligent Technologies by the Aged: New Initiatives to Bridge the Digital Divide

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ABSTRACT

Contrary to expectations, assistive technology (AT) usage by the elderly has not increased in proportion to availability and ease of access. This is despite a belief that technology can contribute significantly towards improving their quality-of-life. Our Rehabilitation Mechatronics research group at NTU Singapore is developing a “unified neuro-physio platform”, taking a cue from Eastern philosophies which emphasize that the “internal environment” of the users strongly affects how they interact with the “external environment.” This chapter highlights the need to bridge these two environments meaningfully through “sensitive” technologies which address the mindsets and learning mechanisms of users. The technology platform we propose helps the elderly to understand and enhance their internal environment in order to interact at various levels with AT in their external environment. It provides a fresh approach to understanding and minimizing the persistent “digital divide” between the elderly and high technology.

INTRODUCTION

The Internal Environment and its Relation to Health

Human beings exist simultaneously in two environments, internal and external. The internal environment relates to perceptions, self image, emotions and motivation levels. The external

environment is the physical body and the world around it. These two environments constantly interact with and affect each other. The development of assistive technology (AT) has focused primarily on helping the elderly to cope with physical tasks, activities of daily living, accessing entertainment and using communication tools to exchange information. Hence the approach has so far been to enable interaction with what we refer to as the “external environment”. In spite of impressive advances in technology, the usage

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of such devices among the elderly has not shown the rise that may have been expected. Studies show that in general, those using simple devices feel more self-sufficient and are less likely to use formal care, whereas those using complex devices are more likely to feel the need for formal care (Agree & Freedman, 2000). Does this mean that elderly populations are more comfortable and confident using a technology which is simple and usable, even though the device may have a low level of intelligence? If so, one wonders how high technology can meaningfully contribute to raising their quality of life.

One of the potential ways for increasing AT uptake would be to successfully tap the “internal environment” of the user, and link it to the user’s external environment. The brain interacts within itself far more than it interacts with the external world (Harris, 1998; Taylor, 2009). The neuronal connections are constantly being reinforced or reworked, even when we sleep. This enables the development and maintenance of memory, motor function, audio sensitivity, cognition, mobility, and so on. Research in medicine, neuroscience and physiology has shown that it is possible, at least partially, to recover or maintain these faculties in the elderly, which may have deteriorated due to disuse or damage. (Clark & Stump, 1998; Hofgren, Bjorkdahl, Esbjornsson & Stibrant-Sunnerhagen, 2007; Williams, Ramaswamy & Oulhaji, 2006). The internal environment also includes the perceptions, self-image and motivation levels of the person. We know from the self-determination theory that humans who are naturally motivated tend to incorporate an internal regulation strategy for all important activities (Deci, Eghrari, Patrick & Leone, 1994). Several studies have also shown that attention, motivation and repetitive task practice are essential factors in the reorganization of the brain (Bach-y-Rita, 2001; Berthoz, 1996; Robertson & Murre, 1999) and this reorganization can take place well into old age.

The major factors affecting this recovery or maintenance depend on the high level of en-

gagement of the individual with the task at hand. Studies in psychology and accelerated learning demonstrate that such high levels of engagement occur when there is an “emotional connect” for the individual to the task and when all sensory pathways - visual, auditory and kinesthetic - are brought into play. This can happen in an active, collaborative environment (Loureiro, Johnson & Harwin, 2006). A notable example of the effectiveness of engaging the internal environment can be seen with the success of pet therapy for elders in Japan using artificial pets such as “Paro the seal” (Inoue, Wada & Ito, 2008). This highlights the importance of managing both the external and the internal environments. Perhaps it makes sense to develop technologies that help maintain abilities in the internal environment as an important complement to devices which help the elderly in everyday physical tasks.

BACKGROUND

The Traditional Approach to AT

The “raison d’être” of AT is the improvement of quality of life (QoL). Technologists have believed so far that a better QoL means an easier way of executing activities of daily living (ADLs) and certain other tasks related to personal physical comfort, transport, communication and health monitoring.

Traditionally, AT started as devices to help accomplish simple tasks. Hence early devices such as walking aids and spectacles were strictly functional. A simple device such as a remote was created to establish control over a reasonably smart device such as a television set. Although the remote controls a wide array of features, most of them are not regularly accessed by the elderly. They still use the remote for the basic functions: to switch on/off, surf channels, and adjust volume. The same cannot be said, though, for mobile phones. Some features such as text messaging and

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