Motivation and needs for technology use in old age

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C. Oppenauer. Motivation and needs for technology use in old age. Gerontechnology 2009; 8(2):82-87; doi: 10.4017/gt.2009.08.02.006.00. Technology use in old age is influenced by a variety of factors such as technology generation, education, socioeconomic status, cognitive abilities and attitudes. Furthermore, motivation to use technology in later life is an important issue for a better understanding of technology acceptance. A prevalent approach to explain technology use is the Technology Acceptance Model (TAM). Limitations of TAM appear when transferring earlier results to old age, as shown in the short review of the literature. An extended TAM version with health and psychological needs and motivation strategies is presented.

Key words: technology acceptance, old age, needs, motivation, psychology

National and international projects dealing with technology for older people are popular. The current Ambient Assisted Living Joint Programme, financed by the European Community, has about € 700,000,000 available for the time period 2008-2013[1]. A large variety of systems and products exist from different technology disciplines yielding different impacts[2,3]. Decreasing governmental health care financing demands new technological solutions to promote independent living for older adults. This manuscript describes the motivation and needs which support the use of these new technologies by older adults.

Influencing factors

Technology can make a significant contribution to quality of life in old age[3,4]. Yet older people have more problems than younger persons in dealing with new technology. Technology adoption is a complex issue involving a variety of influencing factors. As a consequence, older adults are less able to benefit from innovations in technology, which negatively impacts the quality of their daily lives[5].

Beside generational differences[6], factors such as education, socioeconomic status, attitudes towards technology, access to and costs of technology have an effect on technology use and acceptance[5]. The Pew Internet and American Life Project showed that lesser use of computer and Internet is related to higher age, lower education and socioeconomic status, minorities and people with disabilities[7]. Broady, Chan and Caputi[8] conclude, however, that similarities are more prevalent than differences in computer use between younger and older adults. They hypothesize that older people would perform as well as younger persons if they receive adequate training and given enough time to master new skills. In another study computer performance differences were absent if the level of computer experience was similar within the age group[9]. Thus, the level of experience and training of new skills seems to have more influence on computer performance than age and age related attitudes.

Cognitive abilities such as attention, memory, speed of processing and problem solving are highly relevant to the successful use of technology[10,11]. A Japanese study showed a correlation between computer attitudes, cognitive abilities and technology use among older adults: higher cognitive abilities were related to the use of products

whose usage ratio was high (e.g. computer, copier, facsimile and video recorder). But positive attitudes also played a major role[12]. The European MOBILATE survey confirmed the correlation between technology use and cognitive functioning[13]. Since cognitive training appears to be effective for at least a short-term period[14-17], training of specific skills may enhance use and acceptance of technology.

Attitudes and self-efficacy have also been found to influence technology use in old age. Ellis and Allaire[18] found a negative correlation between age and computer knowledge and computer interest, and a positive correlation between age and computer anxiety. Since some of the age related variance in computer interest was unexplained by computer knowledge and computer anxiety, the authors argued that self-efficacy could be a mediator variable.

The perceived benefit of technology has an impact on the likelihood of its use for tasks such as working on the Internet. Perceived benefit of the medium depended on its purpose of use, in particular the goal of enhancing communication, the prevalence of the technology in the social environment and on user characteristics such as Internet experience and appreciation[19,20]. The importance of perceived benefit in the context of early user involvement could also be illustrated: interviews with older people in focus groups showed that awareness of benefits of the technology was more important than the know-how required using the technology[21].

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) by Davis[22] and later modified by Venkatesh[23] is well known for explaining technology use especially in the workplace. TAM follows the Theory of Reasoned Action[24] and the extended Theory of Planned Behavior[25] which assert that attitudes towards an action, normative beliefs (subjective norm) and motivation to comply influence individual behavioural intention and finally actual behaviour. According to the theory, people evaluate behaviour positively if they think their peers appreciate it. Thus, motivation to perform certain actions or show certain behaviours is strongly influenced by subjective attitudes of significant others, such as relatives or friends. TAM reasoned that two main factors were necessary for technology acceptance: perceived usefulness (PU) and perceived ease of use (PEOU). PU is defined as the extent to which a person believes using a system will enhance (job) performance. PEOU explains the person's estimation if using a technol-

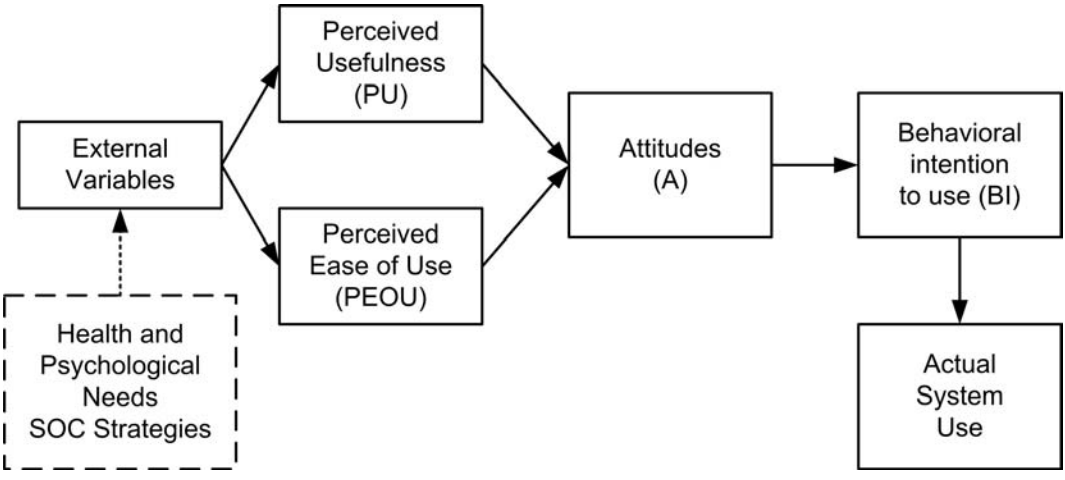

Figure 1. The original Technology Acceptance Model (TAM)[22,23] enriched with health and psychological needs and SOC (Selection, Optimization and Compensation) strategies[47]

ogy is related to effort or not. The original TAM assumes that PU is also influenced by external variables such as subjective norm or the image of technology (*Figure 1*).

Although TAM is consulted for technology use in old age, few empirical studies exist supporting its use[26-28]. A meta-analysis conducted by Schepers and Wetzels[28], including 63 articles, revealed that the majority of studies focused on employees and managers in companies, professionals or students. Moreover moderating effects exist on the relationships between the factors in the model due to group characteristics (namely student groups) and type of technology. The meta-analysis supports the significance of PU and PEOU for attitudes and behaviour. King and He[26] concluded TAM correlations showed considerable variability; and presumed a significant influence of moderator variables, such as the experience level of users, and the type of technology. Internet study results were different from job task applications, general use and office application.

Since the TAM accounts for slightly more than 40% of variance, other variables need examination for their contribution[27]. TAM has been revised several times, but empirical studies with older adults are still rare or lack methodological significance[29,30]. Therefore an extension of the TAM by considering psychological variables is proposed.

Motivation

Two theories of motivation are common in gerontology. Carstensen et al.[31,32] suggest that social contacts play a major role in old age: subjective perception of limited future time motivates older people to aim primary for maintenance of social contacts in order to maximize social and emotional gains. Motivation for knowledge and information acquisition decreases, and older persons are less willing to spend their time with goals connected to negative emotions. Social relatedness is a significant factor in later life.

The theory of Selection, Optimization and Compensation (SOC) by Baltes and Baltes[33-35] assumes that each phase of life is defined by gains and losses. People aim for a balance of gains and losses, but due to a variety of changes and losses in old age this balance is at risk. In order to manage gains and losses throughout the lifespan flexibility and management of resources are necessary. Successful management minimizing losses is characterized by three components: (i) selection of activities and related aims, (ii) optimization by activating resources to achieve the selected aims, and (iii) compensation in selected areas if resources are limited. Selection, optimization and compensation are seen as life management strategies that have a high impact on personal development and well-being.

Melenhorst et al.[19,20] suggested that the SOC model could partly explain technology adoption in older persons, as has also been shown for computer use by older disabled persons[36]. Broady et al.[8] discuss one impact of the SOC model on computer use in later life. Compared with younger adults, older adults tend to avoid making errors by limiting the amount of performance tasks they engage in[37]. Similarly, Rosseau and Rogers[38] found that older university faculty staff members use selectively fewer software applications.

Needs

User needs are highly linked to motivation and technology adoption in the gerontechnology literature[21,39]. Physical and mental health problems in later life are relevant risk factors for limiting autonomy and independent living. Thus, health needs and health related quality of life in later life provide information for technology use options[40]. The WHO distinguishes four domains for quality of life: physical health, psychological/bodily image and appearance, social relationships and environment[41]. In the WHO QOL-Old module six further aspects were investigated: sensory abilities, autonomy, past,

present and future activities, social participation, death and dying, and intimacy[42].

In addition to health needs, psychological needs determine human motivation and behaviour. The Self-Determination Theory by Deci and Ryan[43] distinguishes between intrinsic and extrinsic motivation. Intrinsic motivation includes behaviour that seeks autonomy, competence and relatedness, and is not connected to an external reward system. If a person behaves in a certain way due to the expected consequences s/he is extrinsically motivated. Intrinsic and extrinsic motivation are both connected to mental health and subjective well-being. Therefore, satisfaction of needs for competence and autonomy are relevant conditions for psychological well-being[44,45].

Hagger et al.[46] linked the concept of psychological needs with the theory of planned behaviour, resulting in significant total effects of psychological need satisfaction on intentions and behaviour.

Outlook and conclusion

The models mentioned above still lack sufficient empirical support. Studies focusing on older adults and technology use that are explained by the TAM are rare or have methodological restrictions. To fill this gap, TAM has been enriched with SOC and physical and psychological needs variables (Figure 1). This hypothesis is currently under evaluation at the University of Vienna in an online survey investigating Internet use among German language 60+ yrs adults[47]. The questionnaire is linked at senior web pages and forums in Austria, Germany and Switzerland. Results of this study are expected by the end of 2009.

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