

Guided Participation in ICT-education for Seniors: Motivation and Social Support

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Abstract – The Seniors’ Club (SC) is a computer club for elderly, aged 60-80 years. This paper describes the experience gained from starting, and development of the club in Eastern Finland from late 2005. The findings are supported by thematic interviews conducted with the participants in April 2009. The goal of the undertaking was to teach useful ICT-skills to the elderly, and to empower them to contribute to user-centered design. A guidance model based on guided participation and ideas of shared cognition has been applied to socially, motivationally and cognitively support our elderly participants. For the development of SC-concept, the grounding research methodology has been action research, supported by observation of the participants at work, questionnaires and group interviews. The results show that the elderly are capable of and enthusiastic in acquiring ICT-skills and of gaining knowledge. They are motivated by the younger generation in their circle of acquaintances, by the novelty of things and by staying the pace of development. They prefer things/skills, which are practical and applicable in real life, and they appreciate the social mode of learning, like peer-tutoring. In addition our seniors are willing to contribute to research, design, and development activities with students in our department.

Index Terms – Guided participation with seniors, Old age ICT-education, Seniors’ Club, Digital divide, Motivation.

INTRODUCTION AND BACKGROUND

In our current e-permeated world, digital literacy (e-literacy) as a basic skill is essential. On the one hand this requires both physical and emotional accessibility and on the other hand appropriate ICT-education [1]-[2]. In short this digital literacy requires adequate skills to carry out digital actions in real-life situations. Keeping up with one’s age and life-situation; this is a lifelong process of adaptation and learning – also in one’s late life [1],[3]. Nowadays the problem is that most of the education formally occurs during active working life, before retirement. Even the statistics of education in Finland cease at the age of 65. Furthermore, it is a fact that those who have a higher educational background, tend to participate more in continuing with their learning, as well (see e.g. [4]). We believe that it is

important to appreciate the need for informal education, and the search for alternative ways to meet the needs of late-life learning is important.

In addition, there still exists a digital divide between elderly and younger computer users, both in their number and skills [2],[5]-[6]. In Finland today, about 70% of households have a broadband Internet connection, and 80 % have a computer at home. On average 83 % of Finnish people have used Internet during the past 3 months, but only about 43 % of the users age 60-74 years have done the same. Persons over 74 years old are totally missing from statistics [5]. In the near future, the number of the elderly are expected to increase substantially in EU-27 area: where we now have about 16.7 % of people over 65 years old, in 2050 they will increase to 30 %. Proportionally the biggest increase will be in the class of oldest-old (80+) [6]. This poses new challenges for both ICT-education and usability design.

Authors view old age positively. Instead of focusing on what the elderly are lacking in physical, sensory and cognitive functionality, we wish to emphasize their strengths such as life experience and accumulated wisdom, and their social connectedness which may suffer at the late age, and where ICT can be of help, like in [7]-[9].

One important part of *successful aging* is engagement with life. This means that elderly people do have meaningful relationships with others, especially socio-emotional support, and that they can be involved in *productive activities* [10]. These productive activities consist of wide variety of tasks, not only paid jobs – and on this aspect we should invest more. This includes the reevaluation of old age and non-financial contributions. In case of elderly people especially the real-life connection, sociability of learning, adequate support and not foregrounding the technology are important constituents for IT-adaption and use [3],[9],[11]-[15].

This paper concentrates on our current elderly people aged 60-80 years of age, and focuses on proper ICT-education for them. They are not “average” users [16] but a diverse group of individuals, with varied motivations and backgrounds, who are eager to learn about new technology. In many sectors, they still lack the realization of possible benefits which new technology could provide [17]. We shall present one method and context we have tested with our

seniors, namely club-based activities. The goal of our practice is to teach ICT-skills to the elderly, from the aspects of their needs and motivation, and to empower them to contribute to the practices of user-centered design, like in [18]-[21]. Research in educational gerontology (teaching and learning for/by elderly) and gerontechnology (design and use of technology for/by elderly) has guided us in the development of real-world practises, supported by ethnographical methods (interviews, observations) used in the evaluation of the activities.

Next we shall review some successful examples of IT education and practical application for the elderly, focusing especially on the motivational factors. After that we shall introduce our club-based activities, the guidance model used in the Seniors' Club and the action research methodology behind the development of club's concept. Finally we shall discuss the motivational characteristics of club-based training, and the need for computer use at a later age, in general, focusing on the everyday life supporting nature of ICT.

MOTIVATIONS FOR TECHNOLOGY USE & LEARNING AMONG ELDERLY

Elderly people of today are not lazy, stupid, indifferent, or poor, and above all do not want to be stigmatized or categorized using those attributes [21],[22]. In addition, they are eager to learn new technology and keep up with the development, see e.g. [9],[11],[15],[23],[24]. Because use of current technology necessarily requires learning, the motivations for learning and use for technology are now coupled (being aware that there is critical threshold for how much effort we are willing to investing in learning vs. the gained/expected utility of technology use in general). In addition, technology could be much simpler if the software engineering did not stick to the traditional engineer interface models.

In general, relating back to one's prior experience and knowledge is a powerful tool for learning new things – both in education and using software or hardware. It takes time and requires an attitudinal and conceptual change by our “digital emigrants” [25] to learn how to use and navigate our modern technology without getting lost or feeling oneself overtly stupid (see e.g. [26]). One good example is a UK-based study [14] where researchers used telephone conference to support sociability of the elderly living alone. Instead of introducing new technology they relied on old, well-known means and based their design on recreational (not work-related) use. Further, there was no need to start using some stigmatizing tracking device or security wristband. Technology was just a tool, a social artifact, to be used under normal everyday conditions. The motivational categories that rise from their study were based on *uses and gratifications* model, and included components of 1) *instrumental* (gaining information) 2), *intrinsic* (social relation management) 3) *reassurance* (potential for support), and 4) *entertainment* (fun & play). The model caters alike, both to the sociological and psychological interests at the

level of the individual and society, and also provides a nice framework to think Seniors' Club (later in this paper).

We may also deduce the learning needs/willingness from the reasons of use and non-use (of technology). In another UK-based study [17] the researchers found a strong link between the interest and perceived usefulness of the technology. For encouragement, they suggested more proper information about technology, the correction of widely held misconceptions, and showing the real benefits within the framework of the life of elderly people. The motivators of communication and social aspects are also important in introducing technology and in its uptake. In addition, on doing a survey of about 500 people aged 55+, they also interviewed the trainers in a company that provides self-study computer training via local colleges, supported by experienced staff. About 10 % of course attendants were elderly. According to the instructors the main motivator to attend was communication with family and the plain curiosity to learn something new. For many, additionally, the training sessions were also meaningful social gatherings, as such. [17]. Same family push was also noticed in our computer courses held in the city of Pieksämäki, where every participant told that his or her children or grandchildren had encouraged them to attend the course [11].

The most common reasons for non-use of computer technology, were “lack of interest”, feeling too old or not having access (Internet, computer) at home. They also found out that elderly prefer information seeking and using e-mail, and the younger old (55-64 years old) were engaged in a wider range of activities from banking, shopping to downloading music [17]. In Finland, the majority – over 79% – of 50-74 -year old internet users use it for e-mailing, banking and searching product related information, while using instant messaging, p2p networks, downloading and listening to music (via computer), and playing online games were much less practiced compared to younger population. [5]

Adequate learning support also enhances the uptake of technology into continuous use by the elderly. The support can be that already presented socio-emotional- and instrumental supports [10], or social- and classroom support (emotional and assistance during the learning respectively) [9]. Social support, thus, in addition to the nature of collaborative and peer-supported learning, can originate from outside push, like in Hong Kong where staff at local social centre encouraged the elderly novice users to take the course in a first place [9], or like in East-Harlem, New York, where community based organizations taught the elderly to search and utilize health-related information in the form of consumer health classes [23]. There, too, it appeared that the need for teaching basic skills was required, even though preliminary knowledge of some sort was expected. They also found out that the culture in the organization (knowing it) plays an important role, as well as the age friendly pedagogy. There is also a strong need for flexible adjustment.

GUIDED PARTICIPATION AND RESEARCH METHODOLOGY
IN SENIORS' CLUB*Grounding ideas & research methods*

Ng's [9] grounded model for evolving motivation for learning is based on affordances (or constraints as their counterpart) and situational model (context dependent). The motivational scaffolds like norms and values of society, support from family, peer learners & tutors, and an enabling environment all contributed to owning ones learning and finding a personal meaning for it. Additionally it contributed to improved self-image (skills, value) of the participants, like in case of other Chinese-based computer club [24].

Research conducted in the suburbs of St. Louis, USA, investigated the reasons for computer use and non-use among elderly people living the "naturally occurring retirement community" (area rich in elderly people) [27]. There elderly people used computers for social contacts, and also to perform practical tasks of various sorts. What was distinctive was the fact that elderly people seldom took advantage of wide-ranging functions that computer could provide. As a framework they used diffusion theory of technological innovations. Barriers found for use were three-fold: 1) contextual characters of user (income, health, education), 2) personal beliefs about technology (complexity, hard to learn), and 3) perceptions of need of technology (what use/advantage it is for me?). One weapon to fight against the situation includes dissemination of information and provision of knowledge by an adequate, age-friendly means.

From the educational aspect, support for both, an individual learner and a group are needed at the level of encouragement, emphasis, point of reference to others, and scaffolding the activities with peer support, nature of tasks & instruction. What course-based education mostly misses is the stronger peer-support and ideas of shared cognition. Also, guided participation can be better brought to use in clubs, where the activity is usually not fixed in time period (of couple of hours) but more long-term activity (after initial bug-bite). There are, naturally, different contexts and methods by which to provide education. Courses can provide a good initial boost and may adequately serve some seniors. Home-teaching, too, is one option, especially for those who do not have opportunity to leave the house, or related problems [12]. Still, for community outreach, and to motivate a wider range of elderly participants to part-take of activities, we recommend volunteer based clubs.

Next we shall introduce the guidance method used in the Seniors' Club, and how the club-concept has been developed, adhering to action research methodology. After that we describe the activities we are engaged in, in the SC, and how our activities have evolved since 2005 [28]. The data is supported by individual, about 1-1.5 hour, thematic interviews conducted in April 2009, mostly at the homes of participants. The questions related to Seniors' club were transcribed and analyzed using Atlas.ti 5.0-software during early May, 2009.

The Seniors' club is a technology club for the elderly aged 60-80 years old, living in their third age [28]-[30]. The average age of the participant is 68. The backgrounds of the participants are varied and the gender distribution is quite equal (with slight female domination). The learning method in use is collaborative, and ideas of guided participation and shared cognition have been applied to support the learning [31],[32]. The emphasis is on the activity of the learners, a structured and meaningful process, and peer- and tutor-facilitation. For that, we have student tutors to provide guidance, and term-based, jointly planned content for activities. Each participant can affect the content-framework, which is not fixed, but suggestive, and on many occasions created on the fly during the term, when something new is encountered and is found to be of particular use or interest – such as social media at the moment. As an information channel, discussion arena and repository for learning materials we use WordPress-blog.

Even if guided participation originally is linked to adult-child interaction, it may well be applied to the elderly, for the learning of totally new things. Guided participation utilizes ethnographic methods (observations, interviews) and is one form of social interaction. In this apprenticeship model, just by taking part in guided activities, learning takes place. Both partaking and guidance are reciprocal activities, which are shared among participants. These activities also involve continuous references to existing knowledge and new knowledge needed by participants. Successful negotiation enables the linkage of prior knowledge to new, and "stretching of skills" [31]. The roof-topic of shared cognition helps us in understanding the interaction, environment, and the overall flow of events – also when people learn together with technology [32].

In the Seniors' Club, the guide/tutor brings structure and aids into problem solving, but at the same time understands the movement of responsibility to elderly, as their skills develop (do not over-scaffold). Also the everyday conversation without the didactic background is an important part of the process – especially in the case of elderly people, as also the joint decision-making. During our two-hour weekly meetings, we have a coffee break where many more ICT-related concerns or the review of last week classical concert is discussed [29]. Based on similar foundations, another computer club for the elderly was established in the city of Pieksämäki, Finland, and modified to meet the local requirements (see [12],[13]).

The basic research methodology in use, while developing the concept and working methods for Seniors' Club is *action research* (to study complex social processes by introducing change into these processes and then observing their effects) [33],[34]. *Design research*, for one, might have been another viable option, but as our focus is more on collaboration with, and for seniors, it might have

been too technical an approach (to apply knowledge of tasks or situations to create effective artifacts, in this case SC being the artifact). However, the ideas behind both are pragmatic: to solve problems, either by changing the current ways of doing things or introducing new tools for doing them in proactive ways. We cannot evaluate and study the artifacts in traditional (natural science) means before they exist. Thus, the design process itself is under scrutiny, and the focus is on systematic ways of doing this kind of design science. [35],[36].

There are about 12 different forms of action research, and the one we apply is that of *canonical action research (CAR)*, where the collaboration, iterative development process and structured set of stages and activities are carried out. Our main goals are first to develop a functioning model for old-age computer-club and secondly to inform the research in educational gerontology and gerontechnology. They represent the aspects of social organizational development and that of scientific knowledge. [37]

CAR involves five principles and surrounding criteria for its evaluation (of rigor and relevance). The first is the *researcher-client agreement on collaboration*, roles and expectations with the client (in our case seniors and the Department of Computer Science). The second principle is built on *cyclical 5-stage process model* (of diagnosing, planning, intervention, evaluation, and reflection), followed by *implications for theory and change through action*, leading finally to *learning through reflection*. [34]. This learning, however, should not be mixed with the learning in the club, as such, but seen only the vehicle for further development of the club concept, where the learning outcome is definitely one point of assessment and possible induction to change (see later).

The role of researcher is to be part of his or her study (*participatory observer*). In CAR a collaborative means, though in practice different involvement roles are often needed (taken *expert involvement* and *facilitative involvement* into account, as well). [37]. In practice both seniors and researches has power to affect the development of the club (forms and content of activities), though in reality – at the organizational level – e.g. the monetary facilitation and authentic interest in activities are some risk factors for the continuity. These can, however, to some extent, be prevented by the intrinsic collaboration (of CAR) between stakeholders. In the club – at the practical level – the problems to be solved mainly constitute appropriate learning methods, use of materials, tools & software, motivational issues, and the like.

To collect data and analyze the development of the concept, we have used qualitative research methods like focus group discussions, group-interviews and questionnaires, supported by individual tools and methods of researchers (blogs, observations). The development is further reported in the form of descriptive papers concentrating on different but supporting aspects to the overall study. We do not, however, use rigorous metrics in analysis of learning, for example. It is more important that

our elderly like learning new and see technology (some part of that) as useful for their activities, rather than measure how fast something can be done, or whether one can rote learn list of things and then reflect it back when asked.

Club activities for seniors and research

Activities that we have engaged with seniors vary from practicing use of different software (Word, Picasa), getting to know the basics in digital photography, how to use scanners, what to do with external memory storage, and how to clean up computer, search (and find) information on the Internet, and what the new social media actually is, etc. In addition, we have carried out a successful game-design workshop with the seniors, after which we had 3 different city-based games ready both on paper and digitalized versions [38]. External amateur programmer did the digitalizing; In addition this was also the first time for seniors to experience the flavor of participatory design. During the workshop we made sure that the tasks for current session were clear and provided the necessary technical help if and when required. All the ideas, for one, came from seniors. During the course of activities they also learnt to use technological tools, e.g. scanners, Photoshop, memory sticks. Games were designed in small groups and the collaboration went smoothly different skills supporting each other.

Now, after 3 years of activity, we are having a core group of about 10 seniors in the club - both those who started at the beginning, as well as some newcomers. Among our activities, we try to visit some public institution or service provider once in every term. We have made excursions to the city library (using their library system), national archive at university campus (learn about genealogy and IT-aids for that), and received visitors to our club to inform on our activities (Digital cottage group of seniors), tell us about mobile phones, and broadband (mobile phone company), and to teach us about digitalizing old 8mm films (local film-makers).

An appealing aspect of our club, and one which provides on with societal motivation, is its connection to our institution (University), and its research activities. In addition to guiding them into the use of new technology and into the understanding this new e-culture, we – researchers – have gained new insights into the lives (practices, ideas, desires, abilities, personalities) of the elderly, and got authentic elderly users to do usability tests conducted by our CS majors of usability and software engineering. In the field of usability, we have assessed the use of one governmental web-site called KELA, and navigation and object manipulation in the case of digital museum site, compared input methods for controlling a d-TV, and tested how to play Sudoku by using one's eyes. For these, the eye-tracking expertise found in our research group has been utilized. In addition, in software development, we have created some simplified versions of common software (Skype and Firefox-browser) by utilizing our knowledge of

novice elderly users. Our experiments are collectively presented in Table 1, augmented by the methods used.

TABLE I

USER TESTS AND SOFTWARE DESIGN WITH AND FOR SENIORS

Experiment	Focus	Methods
KELA www-site	Usability and navigation	Eye-tracking with 6 seniors, analysis of gaze-protocol
Digital collections of local museum	Navigation on the site and manipulation of QT-movies	Usability test in a museum settings with 10 seniors
Digital-TV input	Testing of physical remote control and virtual one manipulated by gaze	Eye-tracking with 4 seniors at CogLab
Games	Testing different control methods for game-playing (mouse vs. gaze)	Eye-tracking experiment at CogLab with students and some seniors
Skype-SUI	Simplified interface for Skype-net phone	Introduction of software and focus group discussion at Seniors' Club
Senior theme for Firefox	Simplified interface for Firefox-browser	Literacy survey, no testing

What is currently under development and where our seniors can be of help is a detection method for age-degenerated macular disease (AMD) and the development of new means of interaction: direct manipulation in form of interactive table. The first would provide an important diagnosis tool for medicine, while the other one is aimed to design something "cool", as a first to seniors, and thereby reversing the old pattern of designing for young, fit & witty experts. The preliminary results of the design experiment were successful, and what is more important, our seniors were thrilled.

According to the interviews, our seniors have a positive, occasionally even enthusiastic view, to collaborate with students and for doing usability testing. The perception is that they learn something new in the process (6/10), see what is the status quo of the field (of computer science and new technology) (3/10), and think that the collaboration adds color to the activities (3/10). It is also an opportunity to work with young people (3/10), and some enjoy being able to be of some help/benefit (2/10). When taking part in tests, it is vital to emphasize the fact, that it is not the seniors we are testing. As many as 4 out of ten seniors said that they were happy to take part in tests, if they were able to do so. It is important to be of some benefit and to know the aim of tests or research (6/10). Six out of ten would also like to get some feedback about the results.

Seniors viewpoint

Doing research and keeping in touch with developments, served as the main motivation for our seniors to participate in the club (5/10). Three out of ten added that of learning new things, having an interest in new developments, and that the social event of club meetings, motivates them to attend the meetings. For some it has become a custom or routine (3/10). Support and praises from children and

grandchildren motivates a few, as does the factual content in the club (2/10).

When asked about the strengths of the club, hands-on personal guiding was mentioned most often (5/10). There is also a free and relaxed atmosphere in the club (all dare to participate) (4/10). It is a social gathering, where peer-support is strong and liked (4/10). The fact that one learns new things and keeps up with developments, was raised in this particular question, as well (3/10). The attitude and experience of tutors, and pre-planned content framework, were also regarded as strengths (2/10).

When it came to weaknesses of the club, no direct issues were mentioned. There could however, be more recap of issues (3/10), tutors ought to speak slower and occasionally louder (2/10), and we could use more resources of computers and software (2/10). It was suggested that we could meet more often, or possibly one session could last longer. Instead of concentrating on tools and methods, it might be better to take on bigger projects, for the benefit of the community, and by doing, one learns and purposefully applies the same tools and methods.

What our seniors have learnt during the meetings included tweaks to ease computer use and operating issues in programs (5/10). Some explicitly said that they had learnt the things we have had in the schedule, like using Picasa, RSS-feeds etc. (4/10). Two out of ten also said that they have gained more courage to explore computer related activities (2/10). A few learn, when they do, by hands-on (2/10). One said that she is not learning everything, but on the other hand, she does not mind. This reflects the replies for the question about what attracts our seniors to learn new things, namely if one can utilize the things learnt in practice and if they are useful (5/10). Learning itself was regarded as one enchanting issue behind (3/10), like keeping in touch with life and development (3/10) and novelty of things (3/10).

Peer-support (helping others and getting help, for all equally) was seen as a strength, when asked about the significance of the group (7/10). The group was seen as a nice group, where everybody feels to be welcome, nobody downplays the skills of others, and with whom it is nice to learn and do things mutually (7/10). It serves as social intercourse, which additionally motivates the use of computers (5/10).

DISCUSSION

In this paper we have presented the development of Seniors' Club and its activities in relation to elderly people and to research. Thus, our contribution is many-fold. Firstly, on a wider level, we want to empower elderly people's everyday lives, in activities, which often include various types of technology. Secondly, we have informed the research community in educational gerontology how to guide elderly people taken motivation, life-connectivity and different methods into account. Thirdly, the paper adds on to the methodological discussion by presenting an example of canonical action research (CAR) which was used in the

development of the Seniors' Club (SC)-concept. We cannot evaluate and study the artifacts like SC in traditional means before they exist. One needs to test different contexts and methods, to determine whether they are applicable in the case of the elderly or not, and thus improve the situation from the information gained. The design process itself is scrutinized, and guides the development. The CAR, as applied, includes all the phases of normal research from diagnosis to reflection. It emphasizes the aspects of the researcher-client agreement on collaboration, and practical changes are introduced to the product, based on knowledge gained. Even though CAR is practical, it is relevant to the formation of theory and development. In the SC every participant has signed an informed consent and volunteers to participate in usability testing. The department, for its side, promised and provides support for the club in the form of training, space, equipment and aid for research.

Making the club emotionally appealing to the seniors (see e.g. [21]) is important. As determined by previous research, we have found out support methods to facilitate such socio-emotional appeal of the SC, and motivation of participants. The club-form itself is a well-known volunteer activity for the elderly. The SC, as such, is no different from any other club, whether for knitting or book discussion. It is the mutual active participation, in our case focusing on ICT. Then, the activities themselves can be one motivator, like in [14], the input of the social gathering as such, another, like in [17],[24]. We also believe in the greater community outreach power of such clubs. These issues may additionally attract those, unwilling to participate in formal education courses at folk high schools or other educational instances.

What further provides a good tool to evaluate both, activities and participation in the SC, is the use of motivational categories found out in uses and gratifications studies of mass media [14]. The dominating motivational category of SC is *instrumental*, where getting new information and skills for performing activities via computer are in focus. Additionally, the fun experience, while learning (*entertainment*), and potential for support (*reassurance*) are important. This support is actually built-in in the concept in the form of the concepts of guided participation and peer-support. Facilitation of social relationships (*intrinsic motivation*), as such, is not the purpose of the club activities, but is of great importance in members' lives in general, based on our basic need for social connectedness.

Figure 2 shows the motivational framework, which was modified according to the way the elderly use computers, into the need and desire-based diagram of technology use/adoption [27]. There is the dimension of solitary-social to describe the nature of activity, and another scale of obligatory-discretionary, to describe the degree of one's own interest in case of the task at hand. The diagram is only descriptive, and the purpose is not to devaluate e.g. everyday life running duties like shopping, paying bills, etc. At the origo, needs turn into desires, as more and more own interest is brought into activities/selections. When

desirability increases, the personal motivation will increase as well.

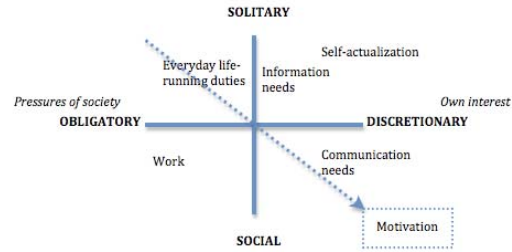


FIGURE 2

DIMENSIONS OF COMPUTER USE, NEEDS AND MOTIVATION (MODIFIED FROM [27])

In the case of SC, at the level of guidance and learning, we aim at the social-discretionary section of the diagram. In case of implications generally at societal and individual level, we aim to expand the ICT-knowledge and skills of our elderly participants (e-Literacy), and possibly making everyday life-running duties more effective to conduct and in many cases to introduce new ways of doing things via ICT. Our purpose is naturally also to learn from the elderly, and find for new age-appropriate ways (like clubs, new/revised technology) to improve performance of those duties or other activities, which the elderly perform in daily life, alone, and in collaboration with others, to strive for self-actualization, or keeping in touch with family & friends, at their own discretion. There may be a need to introduce all to information society. However, not everybody wants to be included, not even if the appropriate information and justification is provided, or even if guided support for learning and use, was included.

In the Seniors' Club the guided participation utilizes the apprenticeship model for old age ICT-training, supported by peers, tutors and technology in use. In the club, we do not measure or assess learning, as such, because use in context is important not how well, how fast or in what amount it can be done. Rather, it is aimed at what use seniors like to put the technology, and how they use it. We assume that if the senior is motivated, adequately supported with activities, the learning takes place anyway. Among the elderly, this learning does not need to cover the whole application from A to Z, but needs to be more of practical use, of cognitive exercise value, or purely for fun.

Involving students to the activities, both as tutors and as practicing developers, teaches the students to work with the elderly, how to guide them, and what aging brings along, as negative, but also positive issues like wisdom and experience. Thus we may improve, or at least affect the attitudes, the design and development of the user interfaces of tomorrow for the elderly, possibly together with them, and in fact, for ourselves in the not too distant future.

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