K-60 – Access to ICT granted but not taken for granted

Minnamari Naumanen & Markku Tukiainen
Department of Computer Science and Statistics
P.O.Box 111, 80101 Joensuu
{mnauma, mtuki}@cs.joensuu.fi

Abstract: A challenge is posed by the rapid demographic change – in case of the increasing elderly population – accompanied in concert with the transfer of public services and communication into the web-based activities. Especially elderly people need to have access to these new services – both having requisite skills and willingness – to use the equipment needed and understand the information offered. This paper tackles how to guide, motivate and introduce ICTs to elderly people from their own needs on. Focus is in informal learning: computer clubs and home education. The data is gathered from two senior citizens' computer clubs in the cities of Joensuu and Pieksämäki, Finland, in years 2007 – 2008, and from a teaching experiment that took place in four households in March 2008. The results indicate that elderly people are eager and capable of learning computer skills, they appreciate individualized f2f-teaching and have a need to "staying in touch with the modern-day".

Introduction

The demographic change towards aged and aging people in the developed countries like Finland will add on pressure to better meet the needs and requirements of this growing population segment in the near future. The proportion of the elderly people in Finland is 16 % today, and it is estimated to peak in 2030 at 26 %. The demographic dependence ratio is also expected to grow from current 50 per cent upto nearly 75 % (Statistics Finland 2007a). In this process the ICTs play a crucial role, e.g. by offering people more self-service opportunities and information. As more governmental- (social security, tax, retirement and other official information), health- (self-care, information on medication, tele-care, etc), and various kinds of leisure related services (timetables, maps, games, booking flights, etc.) are appearing and/or already exist in the Internet, it is vital that also elderly people wish to, and are able to access it.

In the year 2007, about four out of five Finns aged 15-74 used the Internet regularly. As almost all those aged 40 and under used the Internet at least once a week, the proportion of active users in the older generation (those over 60 years of age) was only 40 per cent (Statistics Finland 2007b). The European Union has strong principles to improve the inclusion of the elderly into the information society, e.g. in case of independent living and "active aging" (Placencia-Porrero, 2007). These active elderly people also constitute a powerful consumer group with their varied needs and greater means. At the end of 90's it was estimated that people over 55 years old will make more than half of all purchase decisions in the beginning of 21st century in Europe (Alalääkkölä, cited in Vuori & Holmlund-Rytkönen, 2005). Even if e-commerce is not – yet – much practiced among the elderly, the average amount they spend while doing online shopping is relatively high, as Vuori's & Holmlund-Rytkönen's study shows (being 100 € for a single purchase). Thus there is still a need for both teaching the basic skills in computer and Internet use, and in demonstrating its potentials to this population segment.

There are many guidelines on how to effectively teach elderly people the basics of computer and Internet usage (Chaffin & Harlow, 2005; Dickinson et al., 2005; Jones & Bayen, 1998; Mayhorn et al., 2004; Naumanen & Tukiainen, 2007b). This more formal learning usually happens in the form of computer courses, which are good starting points for the journey, but are not enough as such. To preserve and improve the skills learnt, active usage and further education is needed. To maintain the motivation for learning, e.g. computer clubs are a good means. They provide peer to peer support, more personalized tutoring and better tailoring of content according to the real needs of the participants. Xie (2003, 2007a,b) and Naumanen & Tukiainen (2007a) provide some examples of successful group activities amongst elderly computer club members. Research on more informal learning – learning that takes place in individual homes and/or in clubs – has not been attempted that often, and this article is expanding this aspect.

The benefits that computer and Internet usage may bring are many. Some studies have indicated the increases in well-being of the elderly, e.g in form of increased affection, happiness, sense of control, self-confidence and personal growth (Xie, 2007b). In Xie's (2007b) study the participants felt that using Internet with a peer group gave their life new purpose and also improved other people's view of them. According to Osman et al. (2005), the quality of life may improve as access to both relevant and useful information, as well as possibilities for social interaction are offered; this computer based communication has also many other potential advantages (Dickinson, 2005). With appropriate design of systems and training, the elderly can and do learn, as demonstrated as early as 1992 by Morris. Some systems are designed to compensate age related losses and can thus allow the elderly to stay more independent and keep them intellectually active. E.g. reminiscence systems made by Alm et al. (2001) are good example of such systems by providing stimulus for demented elderly to healthy and active ones. Also Bouma et al. (2004) and Karavidas et al. (2005) emphasize the potential of technology to enhance the lives of elderly people by augmenting their ability to access information, remain connected to family and friends and remain productive. Anyhow, we need to know the reasons and motivations behind the usage. One also needs to be careful when making generalizations and pay attention to what is the direction of causality. Dickinson & Gregor (2006) analyzed a set of papers in order to find evidence on the claim that computer and Internet usage had some positive evidence on well-being of older people. In fact, they did not find the evidence; most of the times it was secondary literature that had mispresented the results. It may be so that the training itself, learning new things in general, had the positive effect on well-being, not computers or Internet, *per se*.

This paper will address some issues in case of informal learning of the elderly: their motivations, the organization of the learning and some observed benefits of such endeavours in case of Digital cottage (computer club for elderly) and home teaching experiment (individual teaching for the elderly) and then review some implications for further research. First, however, we need to know some accessibility issues and learning inducing motivations of our target group.

Aging and Accessibility

Accessibility and age-related cognitive impairments

Sharp et al. (2007) define *accessibility* – or the wide area it touches – to "the degree to which an interactive product is usable by people with disabilities". As old age as such is not a disability, there are many age related impairments that accompany natural aging, and thus aged people are often included in this group. *Usability*, for one, comprises of factors like learnability, efficiency, memorability, and pleasantness of the system (Nielsen, 1993). How socially acceptable and what utility the system provides, plays an important role in its acceptance. In this paper we shall focus especially on motivational and pleasantness factors for learning as applied to elderly people. Zajicek's (2007) adds on physical accessibility issues of inclusion and acceptability. E.g. if web 2.0 applications were to be accessible to elderly people, they also need to want to use them and see the real benefits of the usage. The software, thus, needs to be desirable. Inclusivity comes partly from the design issues: if the elderly are the targeted user group, and partly from their own interests: if the elderly can relate to the content and service provided. Also Dickinson & Dewsbury (2006) insist on it, that the wishes and desires of the elderly be taken in account – to "fit in to people's lives". To actualize this fitting, we need to know our target group: their capacity, weaknesses and expectations.

Normal aging affects especially the learning and memory abilities of the elderly. According to Graik and Bosman (1994) the biggest loss occurs in the working memory (duration and fresh information) and in case of long term memory both in episodic -, semantic - and prospective memory (free recall, context/source, names). What is retained, however, is procedural memory: the skills learnt (biking, playing a violin, brushing one's teeth.). It is also good to remember that semantic memory – the experience – may even increase as people get old; this is what Csaja & Lee (2007) call *crystallized intelligence*. Fluid intelligence, in its part, is weakened. Thus problems in reasoning, understanding of conversation, drawing conclusions, retention and learning new things occur more often than in younger adults. (Jones & Bayen, 1998). As a result of this cognitive slowing, elderly people need more time for training and task completion and a structurized – short enough – procedures to perform (Mayhorn et al., 2004); also the appropriate interaction style, based on the factors mentioned, needs to be thought out carefully (Milne, 2003) as well as the type and content of instructions (Morrell et al., 2000; Syme et al., 2003). There are also changes in perceptual abilities, e.g. in form of presbyopia (ability to focus on objects that are very nearby) and also increased sensitivity to glare, in motor function (that slows down) and in spatial abilities (mental manipulation of images and patterns) (Mayhorn et al., 2004). For more effects that aging have on learning, see e.g. Xie, 2007a.

Motivations for computer and Internet use/learning

Everybody needs to feel him/herself useful in society, and so do the seniors. Their interests, for example, may differ from those of younger ones. By knowing those – and thus our elderly – it is also easier to tempt them into the pool of new computer users. Elderly people as a heterogeneous group have varied motivations for learning. These may be based e.g. on benefits, personal reasons and necessity (Aula, 2005). Kim & Merriam (2004) found out that cognitive interest and social contact were most influential factors; the desire to know, expand one's mind, personal growth, meeting different people, and making new friends were among issues mentioned in their sample. The same as previous came also up in the study of Mayhorn et al. (2004). Their elderly participants' motivations for learning could be grouped as follows: 1) enhanced communication, 2) information search, 3) remaining active and 4) learning for pleasure. The desire to get new information e.g. on medication, weather, sports and genealogy came up in the focus group interviews held in rural Iowa, USA (Saunders, 2004), and belonging to a community that cares provided main motivation for the users of SeniorNet (Ito et. al, 2001).

Those who are most willing to learn computers and Internet, also have more positive attitudes towards computer technologies (Morris, 1992). The educational level also has the impact on computer interest, higher education correlating positively on the interest (Karavidas et al., 2005; Vuori & Holmlund-Rytkönen, 2005). Attitudes have also something to say in learning motivation, especially amongst elderly people, who usually have fears of using, breaking or not-knowing about ICTs (see e.g. Saunders, 2004). Technology acceptance models provide one means to investigate the reasons why elderly people are more reluctant to act with new technologies (Zajicek, 2007). The perceived usefulness (the belief that particular system would enhance the performance of the user) and perceived ease-of-use (effort free usage) are used as acceptance criteria. In case of the elderly people, however, it is good to remember that novices hardly know anything about the computers, and thus also the benefits are cloaked in secrecy. Therefore it is important to motivate the elderly by showing them the potentials of ICTs from their needs and interests. To design an appropriate course for the elderly, the emphasis on motivational issues must be ensured. One way of doing this is to use a system's approach, as presented by Mayhorn et al. (2004). There the person, environment and technologies used are taken into the account at different levels, in an iterative way. By doing analysis of the target audience and the tasks, we can better accommodate the courses to the real needs and motivations for the elderly.

Participatory Design of elderly ICT instruction

Accessibility of ICT technologies for elder users is addressed from two perspectives: either improving the usability of software and physical interfaces, or improving age-appropriate training instructions and materials. For improvement in training, there are different approaches and environments to teach the elderly the basics in computer and Internet usage. In our approach, the seniors are partners in cooperation, in the design & evaluation of the club's content. Participatory design – one usability method – is used to develop a working concept for club and other kind of (home teaching, training at institutional care, etc.) services for elderly & ICTs (Grønbæk et al., 1993). The aim is to find working ways for interaction between the elderly and ICTs, as well between elderly and the instructors in this process. The focus is also set on what and how to guide elderly so that the elderly themselves had greater opportunities to affect both the content and the guidance given. To reach these goals we need to test different kinds of environments where learning/usage of ICTs take place. Here, age-appropriate training in computer clubs and in home settings is covered and discussed.

Computer clubs especially targeted for the elderly are good places to learn and socialize with help of ICT and to get rid of the technophobia in a supportive and informal atmosphere. In Shanghai, China, a group of elderly people are gathering together to learn new tricks in using computers (OldKids). Here the power of peer support excels and many elderly feel that they are useful again – both for themselves and the others around. (Xie, 2007a, b). Similar kinds of group-based activities have taken place in the university of Joensuu, where a group of active seniors meet and familiarize themselves with the ICTs (at Seniors' Club, SC) (Naumanen & Tukiainen, 2007a,b; Eronen et al., 2006). There the elderly learners, together with the student tutors, learn to survive in the digital jungle of today. At the same time, the participants provide the researchers with important information on old age usability. We have made some small scale experiments by using the elderly as test persons. The best thing in the SC is the free and supportive atmosphere: nobody needs to command anything and humor is an essential element. Even if the learning itself could not be measured in the club, it has been a great pleasure as an instructor to notice that some of the members are starting to teach me, being more in touch with the on-going events of ICTs. As themes touched are

tailored according to the real needs of the participants, they usually are very content. Also in the Southern Savolax province in Finland, a computer club for the local elderly meets once a week.

Digital Cottage (DC) was founded as a part of the project "ICT to support the abilities of the aging people". The motivation was to improve the skills and motivation of the local elderly people in using the current ICTs. There were approximately 15 participants in the club activities. At the end of the activities, in spring 2008, we conducted a WWW-questionnaire. Issues under which the questions fell were 1) the content of the teaching, 2) computer usage, 3) things learnt during the year at DC, 4) analysis of the things learnt and motivation, and 5) expectations vs. reality & future. Nine out of 15 seniors (60%) answered to this feedback questionnaire. Summary of the feedback is presented under the categories stated in the next section. In case of DC also observation of activities and focus group interviews were used, the outcomes of which were reported or actualized in blog-writings and in club's theme-based schedule.

Previously, e.g. Osman et al. (2005) have brought guidance into the homes of the elderly (Care OnLine-project). The participants gained more confidence in using the computers and Internet and were pleased to get the teaching at their homes, without need to go to get the service. Also Chaffin & Harlow (2005) describe an association (Senior Cyber Net) that helps homebound older adults to use Internet. The participants in their experiment are having different motor- and physical impairments that make it hard for them to leave the house. Now, with help of the instruction and improved computer skills, they can access a completely new world, create and maintain social relationships and access the vast information pool of Internet. As an experiment, we also gave *home teaching* to 4 local elderly people at their own homes; those were who did not have the possibility to join the club either a schedule or personal impairment. In the beginning of the first session, the seniors were interviewed shortly or asked to fill in the pre-questionnaire about their attitude, experience and desire to learn. In addition, instructors kept a teaching diary during the dynamic teaching sessions. Participants filled in the informed consent. As the sample size is small, the data has no statistical value. The data collected during the activities is handled with qualitative methods and using manual sampling/grouping.

Informal education for the elderly people: computer clubs and home teaching

Computer club – case Digital cottage of Pieksämäki

Digital Cottage (DC) is a computer club for the elderly people that has now been operating roughly for a year. There is a 2-hour meeting held on weekly basis at the computer class of a local University of Applied Science, Diak Itä. The participants consist of both elderly males and females, all together around 8-15 per meeting. Most of the participants are in their 60's, the oldest being in their 70's and youngest in their late 50's. The educational background is very varied as well as motivation for learning.

The DC started its activities at a small and cozy room, on the outskirts of the city from the initiative of a local enterprise and a local bank. The local telephone company offered a free wireless broadband connection for the purpose. The activities were led by peer instructors and there was no pre-thought focus on the issues under learning. The peer instructors, too, thought that they need more teaching to be able to better guide their peers. When our ICT-project entered the picture in spring 2007, some changes were introduced; among them was a change of location, which provided every senior with an own PC to work on, and more space and guidance. In the beginning of DC we had a small focus group discussion with the seniors about their interests and what they would like to learn during the year. Based on their wishes, a schedule was devised and put into the web-site of the DC. On the same site we kept a diary of the doings, and provided links to senior relevant information, as well. Seniors themselves, however, did not produce much content and according to our questionnaires, most of them were not even interested in that. The guidance was given by student tutors of local student co-op *Tukeva* in the computer class of the University of Applied Science of Diak, guided and occasionally given by the first author. In the fall term 2007 some vocational school DfA-line students were used as assistant tutors. Usually there had been one leading instructor assisted by 1-3 tutors. This enabled hands-on support and more personalized guiding, when it is needed.

During the fall 2007 and spring 2008 the issues covered at DC included e.g. usage of mouse and keyboard, services of web, humor (web-games, joke sites), information search and usage of browser, the structure of computer, image- and word processing, e-mailing, digital music/voice, movies & net-TV. The evaluation of the club related activities in five categories will be presented next. The numbers represent the number of answers of 9 in total and are grouped manually into similar groups by the author. Single answers received no numbers.

Content of teaching

Things were dealt in a suitable manner (pace and issues covered) (3/9) or pretty suitable ways (sometimes too widely and fast pace) (4/9). According to some (2/9) issues were dealt with in too complicated ways or themes touched, covered too wide area of topics. The very basics of computer use should have been covered more thoroughly (information search, e-mail, things connecting to everyday life, surfing) (5/9), as well as technical issues (storage media, installation and download of software, data security, etc.) were mentioned in case of this question (4/9). The issues that could have been covered less included e.g. technical structure of the computer (2/9), image processing and using too complex software – (4/9) did not have opinion about this or they were content with the content. Most of the participants felt that their voice had been heard in case of the content and they get their questions through (6/9); Some (3/9) did not want or felt incapable of affecting the content. Overall this cooperative design and activity seemed to succeed pretty well.

Computer Usage

Five out of nine participants told to use computer and Internet on daily basis or nearly on daily basis, while the rest of the respondents use it from 3-5 times a week (2/9) or less (2/9). The computer is mostly used on surfing the net (information search, reading newspapers) (7/9) and e-mailing (7/9). Club-members are also active online-bankers, while every respondent answered to pay bills online (9/9). Internet shopping/trading was practiced by two respondents, as well as gaming respectively. One also said to use computer for graphics. When asked about their capabilities to act as a peer-instructor, seven respondents reported to be able to teach some basics to their peers, mostly and naturally on issues they already commanded themselves (7/9). Two explicitly mentioned that they could not teach others in computer usage. The respondents mostly preferred using computer alone (7/9), though it is good to have some external support available, if needed, e.g. in case of language (English) or new and strange peripheral devices. Two respondents liked to use computers with the help of somebody (2/9) or with his/her partner.

Things learnt during the year at DC

Many club-members have gained more confidence in using the computer and Internet (4/9). Small issues do not pose a great and insuperable barrier and they know that there are many different means to do a single thing. Learnt little "tricks" have aided in managing the computer better. Things connected to e-mailing (attachments, contact list, general confidense) were mentioned by five respondents (5/9) and four respondents had got a new stimulus for the information search (4/9). Other things learnt were skills in net-business (booking hotels online, net-banking, usage of timetables and net-TV (4/9). The usefulness of the things learnt was considered strong or relatively strong by six respondents (6/9). They justified their answers e.g. by stating the necessity of brain-exercise, strong will to learn new and strengthening the computer skills in general regardless of their blinkered memory abilities (few references to that were made). Three respondents did not have clear or secure opinions about the usefulness of the learnt things (3/9); it was then about the "feeling" or the computers was regarded only as a hobby among others and not the top of their priority list.

Analysis of learning and motivation

Eight out of nine respondents said to learn best with the trial and error –method, i.e. learning by doing and experimentation, most favorable with their own computer (8/9). Dead-ends can be best treated with group, facilitated to peer or other instructor (2/9). One bewailed to be "blockheaded" and one emphasized the relevance of (slow) pace in case of his/her learning. When asked to describe the learning at DC, the respondents fell into those who thought the teaching was too difficult, technical, or could not say (3/9), and to those who emphasized the good esprit de corp and the significance of peer support and were content with the pace of the teaching and the atmosphere that favored free question asking (4/9). Keeping up with the current developments, in touch with today, was the important motivator for many respondents (5/9). Also the desire for knowledge was associated with this keeping up phenomenon, which in case of one respondent was a self-feeding motivator. Four respondents found that the computer is a useful tool (eases life, helps to stay in touch with others and stimulates the brain), which motivated them in its use (4/9). Other, single motivations mentioned included e.g. good company and friendliness. One said that his/her motivation was pretty low (due to the too complex issues covered and thus a bad use experiences with certain software). All confirmed that the group is an important factor in learning new skills (9/9). The advantages which the group brings is stimulation and encouragement; the group also helps in understanding that one is not alone in whistling in the wind and it facilitates both the exchange and comparison of experience and knowledge. Most of the respondents also thought that computer based communication can be considered as a social event (6/9), while the rest of them either did not have opinion or kept it on top as a good substitute for that (3/9).

Expectations vs. Reality & Future

Most of the respondents had come to the club from pure curiosity (place, people, own learning abilities) or without any greater pre-expectations (5/9). Those who had some expectations (e.g. learning e-mail and assimilate better into the computer world), these goals seemed to be fulfilled (4/9). A single mention things reported that DC has brought new friends, entertainment & stimulation and broadened his/her views about the uses of computers and Internet. In the future they would like to have more computer courses for the elderly, also some working on attitude (that still, according to them, is a bit technofobic), more information and clubs were needed. According to the respondents, teaching should be at a slow tempo, include lots of repetition and focus on small thematic entities at a time – to list a few issues mentioned. In the future, they would like to recap things learnt and learn more about graphics, Skype, and some other programs, as well as about more versatile use of Internet and its services. The DC will continue its operation at the outskirts of the city of Pieksämäki, in Naarajärvi, as a peer-guided club from April 1st 2008 onwards, and after the summer break there will be new plans to guarantee the follow-up of this computer club for the elderly.

Teaching at homes

Background

The home teaching experiment took part during the March 2008 at four local homes in (town of Pieksämäki in Finland). The participants were recruited on the basis of recommendations received from the participants of Digital Cottage (2 participants) and by using bulleting board messages at a local supermarket and cultural centre (2 participants). Originally we also had one elderly gentleman in the test group, but he did not see any purpose for learning new tricks at his age (of over 80 years old) and after having done some experiments with the mouse in the first meeting he preferred to spend his time on skiing and doing other more meaningful things. During the teaching experiment, each participant was visited once a week, during 4 weeks. Each session took about 2 hours. The teaching was tailored according to the needs, skills and interests of the partakers. The data was collected via pre-interviews or questionnaire. The guidance was given by the first author (to 2 elderly) and by a local social work student (2 elderly).

Participants

There were 4 elderly citizens from the town of Pieksämäki taking part in the teaching experiment. The average age of the participants was that of 66 years (59-72) and everybody had some experience on using the computers and the Internet, though mostly it was outdated; none of the participants used much of a computer (or they could not provide exact amounts in hours). They had taken some computer courses and one of them had self-studied things with manuals or had been given some guidance from his partner. This basic info can be read in the (Tab. 1).

All the participants were using Windows XP operational system (OS). In case of H3 the OS was in English that provided an extra cognitive load while surfing and using the computer. The English skills of elderly Finnish people are not good, e.g. a study of elderly Internet users found out that only 10 % of the respondents understood English (Vuori & Holmlund-Rytkönen, 2005).

	Sex	Age	Computer usage	Primary use	Acquisition of computer skills
H1	F	66	On weekly basis; first encounter in 1987	Word processing	Independently in 80's with computer and manuals; a course in 90's
H2	F	59	5 h/week, have been using computer about 4 years	Internet and a special program (Wood Leader)	Labor organization's course; couple of other courses by "työväenopisto"
H3	F	72	Has owned a computer nearly a decade and Internet about a year, uses less than 1 h/w	Plays solitaire, Tetris etc.	Beginner's course for decades ago, did not use computer at work, however
H4	M	68	Has owned a computer and Internet about 3-5 years, hardly never uses it	Hardly never uses	Computer course while at university; partner have instructed a bit

Table 1: Background info and computer experience of the participants in the home teaching

Only one participant had a hearing impairment that made it difficult for him/her to attend the group-based teaching. They also had different professional backgrounds and situations if life. E.g. H3 had been in charge of

audio-visual equipment, so for her the computer was only one device among others, though she did not use it. She also relaxed playing the games like Tetris, Solitaire and Alien Force. H4, for one, had used only special work related software while working as a prominent state official. Even if he had taken a basic computer course during his university studies, the skills to cope with the current information society needed thorough updating. His was a quick learner but his motivation was quite weak, as in his opinion the traditional media (newspapers, TV) are enough for coping. However, he was an eager fisher- and huntsman, so we found some useful information for him later on, as well.

By choice the participants would liked to be guided e.g. by attending courses (H2), in "rooming-in", i.e. through personal training (H1, H3 and H4) as well as in groups/clubs (H4, H2). H3 and H4 did not find the knowledge on using computers and Internet as a very important issue. According to them the world had become so complex and they preferred more the traditional media (newspapers, TV, radio). The motivation to participate in this experiment came either from wife (H4) or a friend (H3) and it was not as high as in case of participants H1 and H2. They, for one, had more intrinsic motivations for learning: a desire to learn new and recap old things and maintain the skills learnt at work. Also the possibility of personal guidance acted as a motivator for them. H1 and H2 also saw that commanding computers and Internet is an important issue, as society develops and via Internet one can get lots of information and more and more services, too.

What was done during the dynamic teaching sessions was recorded in the teaching diaries of two instructors. As the level of description and observations vary, only the issues touched on during the sessions are presented here. They are picked from the teaching notes, and the issues covered reflected the interests and needs which the participants had wished for in the pre-interview/questionnaire. This list of things is not detailed by the participants, but is provided to give a reader an overview what this special sample wanted to learn.

- Skype and internet-banking
- E-mail + attachments and Word-processing (Works/Word)
- Internet (senior sites, housing sites, traveling, map-sites, basics of browser use, services of library, information search, Wikipedia, net-TV (Finnish Broadcasting Company's Arena), recipes, fishing licenses, genealogy, adding bookmarks/favorites)
- Burning cd-rom & most common quick-commands

Observations

No serious problems in using the computer or Internet occurred. For H4 using the mouse was very laborious and using quick commands with him provided better interaction e.g. in case of Word processing. H3 could not completely concentrate on teaching due to her hard work on taking care of her husband. It was hard for her to learn the basic structure of the WWW (what is a link, how do I get back, is adding a page to Favourites different than accessing the page from that list, etc.). However, she never complained that things were too hard and she acquinted the skill of paying bills online. After the teaching she still felt insecure whether she could perform the same task alone. She was, however, happy with the teaching she got, and was very willing to partake in such things again. She now became – besides a gamer – a new user of Skype. H4 may write his plays written years ago into digital format. His use of computers and Internet will continue, but may not outperform that of his wife. If he needs something to be done by computer, he will manage with that, as shown how after a short introduction to Gmail he was able to use it (send and receive messages, attach files and manage the Contact Information). H1 and H2 were more motivated and had more experience in computer usage. According to the teaching diaries, at the end of the experiment, the usage was more natural in case of H1 and with H2 the tutor herself had needed to learn new things, e.g. burning a cd-rom. The seniors who partook in the experiment were appreciative at the end and hoped for more similar opportunities to learn in the future. From the observations point of view it became evident that better guidance in reporting needs to be given.

Discussion

In the future, even if ICT literacy (computer skills) among elderly people will increase, there are still age related impairments in certain cognitive and sensory-motor abilities that remain. The increase in the language skills of the generations to come, is also making it easier for coming generations to access the Internet and use the software that has not been localized. There may also be then, let's say after 20 years from now, more meaningful web-based communities and learning systems/sites for the elderly on the Internet. The clubs and online-

communities, on their side, could alleviate some negative effects that retired people may have, and give seniors a feeling of peer-support, a platform to ask questions and get answers, and lead meaningful conversations, as in the study of Lammi et al., 2007. At present, however, the critical mass, and word of mouth, has not yet drawn the elderly that much for using those sites and there is still a need to learn the basic skills in computer and Internet usage.

Who trains and how, as well as the type of interaction (method, style) and content exist, has its impact. This paper dealt with informal training of elderly into the usage of computers and Internet and provided two cases for that: clubs and home teaching. The benefits that computer clubs and home teaching can bring are many. Computer courses, naturally, if well designed and implemented, are good sources for getting age-relevant training, but not enough as such (Xie, 2007b; Naumanen & Tukiainen, 2007a,b). Even if the structure of the course is clear, if it has certain goals, and teaching is given by (usually) pedagogically qualified instructors using traditional means (teacher tells /shows you how to do things), there are some more appealing features in clubs and home teaching. The teaching can be better tailored, is more free in form and peer-support in the clubs is important. Clubs also favor asking of questions, sharing information, knowledge & opinions amongst its members, as there is no distinct teacher. Participants can affect the content of the club: things taught and even on the way in which they would like to be guided. Different skills, levels of experiences and needs can be better accommodated and actually it is this diversity of experience, and the seniors themselves in peer guiding groups that provides the scaffolding for the teaching. If a course lasts one term or two weeks, a club can operate for years and create a real community. As familiarity and small groups facilitate learning (Hawthorn, 2006) they may learn better. In case of home teaching, it may catch those who are among the oldest (over 80 years) and those who have some limitations to participate computer courses or clubs. There the teaching is entirely individualized and hands-on. This approach, thus, may also work with those who live permanently in old-age homes or long-term care facilities. Naturally cultural differences exist in case of all three guiding forms presented, and needs further research.

Assessment of learning may be easier in case of computer courses. As the content is rigid, there are certain things to be learnt and same tools used. Still, evaluating learning only quantitatively – at skills level – is inadequate. There is no need for every senior to learn e.g. image processing, file structure, burn cd-roms or all the issues covered during the computer courses. Interaction style and devices may need revising: usage of gaze and more touch screen interfaces may benefit the elderly population. If the file structure seems to be a hard issue to learn and understand by the elderly, why are we not offering solutions that hide this extra feature? It is more important, especially in later life, to feel comfortable and happy with what one is doing than to be able to do some tricks for their own sake. Naturally, this is hard to measure (scientifically). Qualitative feedback is best achieved by using semi-structured interviews (Goodman et al., 2003) or observing: doing field-work with the seniors (Hawthorn, 2006). The representativeness of the elderly in the surveys is another issue: they seldom reach those elderly who live alone and are not active 3rd agers. In addition, participants usually have better socio-economical status and educational levels.

In addition to just physical and skill-level access to electronic devices, software and services, the motivation, needs and desires play an important role in the usage and utilization of ICTs. Both skills and desire for accomplishments can be aided by proper training and design of software, content and devices from the real needs of the elderly. Needs & desires and skills & abilities should guide the production of content (courses, web-sites) and design of ICTs (software, devices) (see Fig. 1).
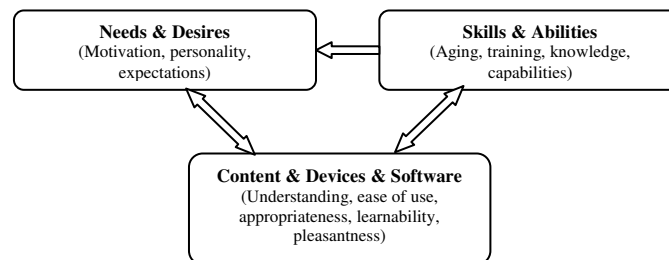

Figure 1: Basis for design activities

Seeing elderly people solely on targets of design and information, as users, lefts much of the "gray-potential" unused. In addition to training, they could create contents (knowledge production) and be valuable

informants in design (design partners). The vast experience and knowledge accumulated during the years should be used more. Elderly people do have ideas, even innovative ones, as in case mobile phones use (Leikas, 2007). On the other hand, it is also difficult to get information on things/technologies that are not known or could not be imagined (Dickinson & Dewsbury, 2006). In case of Participatory design with elderly, as their ICT-literacy will increase, this is surely to become easier.

References

Alm, N. , Arnott, J.L., Dobinson, L., Massia, P., & Hewines, I. (2001). Cognitive prostheses for elderly people. *Systems, Man, and Cybernetics IEEE International Conference on, 2001*, Volume 2, IEEE. 806-810.

Antikainen, M. & Mittilä, T. (2007). Seniorit verkkoyhteisöissä .Mitkä tekijät verkkoyhteisöissä vetävät senioreita puoleensa? In M. Lammi, R. Järvinen & J. Leskinen (eds): *Kuluttajat kehittäjinä. Miten asiakkaat vaikuttavat palvelumarkkinoilla*. Hakapaino Oy, Helsinki, Finland, 178-190 (Seniors in web-based communities. What factors in web-based communities attract seniors? In Consumers as developers)

Aula, A. (2004). Learning to use computers at a later age. *Proceedings of BCS HCI 2004 - HCI and the Older Population*, 2004, BCS, Leeds, UK. 3-4.

Bouma, H., Czaja, S., Umemuro, H., Rogers, W.A., Schulz, R. & Kurniawan, S.H. (2004). Technology: A means for enhancing the independence and connectivity of older people. *Computer and Human Interaction (CHI), 2004*, ACM, Vienna, Austria. 1580-1581.

Chaffin, A.J., & Harlow, S.D. (2005). Cognitive learning applied to older adult learners and technology. *Educational Gerontology*, 31 (4), 301-329.

Craik, F.I.M. & Bosman, E.A., (1994). Age related changes in memory and learning. In *Course Book on Gerontechnology: Normal and Pathological Ageing and the Impact of Technology*, S.L. Kivelä , K. Koski ja J. Rietsema (Eds.). COST A5 Series: Ageing and Technology. Eindhoven University of Technology. Netherlands. 42-55.

Czaja, S. J. & Lee, C.C. (2007). The impact of aging on access to technology. *Universal Access in the Information Society*, 5 (4), 341-349.

Dickinson, A. (2005). Communication and the elderly. *HCI and the Older Population - British HCI, 2005,* Edinburgh, UK. 1-2.

Dickinson, A., Eisma, R., Gregor, P. & Syme, A. (2005). Strategies for teaching older people to use the World Wide Web. *Universal Access in the Information Society*, 4 (1), 3-15.

Dickinson, A. & Dewsbury, G. (2006). Designing computer technologies with older people. *Gerontechnology*, 5 (1), 1-3.

Dickinson, A. & Gregor, P. (2006). Computer use has no demonstrated impact on the well-being of older adults. *International Journal of Human-Computer Studies*, 64 (8), 744-753.

Eronen, P.J., Keränen, J., Sutinen, E. & Tukiainen, M. (2006). Senior's Club – Technology Club and Research Laboratory. *Frontiers in Education, 2006*, IEEE, San Diego, CA, USA. S3H-7 – S3H-8 (cd-rom). URL: http://fie.engrng.pitt.edu/fie2006/

Goodman, J., Syme, A. & Eisma, R. (2003). Age-old question(naire)s. *Include 2003 – Inclusive design for the whole population*, 2003, Springer-Verlag UK, London, UK. (9 pages)

Grønbæk, K., Grudin, J., Bødker, & Bannon, L. (1993). Achieving Cooperative System Design: Shifting from a product to a process focus. In *Participatory Design: Principles and Practises*, D. Schuler and A. Namioka (eds). Hillsdale, NJ: Lawrence Erlbaum Associates.

Hawthorn, D. (2006). Enhancing the contributions of older people to interface design. *Gerontechnology*, 5 (1), 4-15.

Ito, M., O'Day, V.L., Adler, A., Linde, C. & Mynatt, E.D. (2001). Making a place for seniors on the net: SeniorNet, senior identity, and the digital divide. *SIGCAS Comput. Soc.,* 31 (3), 15-21.

Johnson, R. & Kent, S. (2007). Designing universal access: web-applications for the elderly and disabled. *Cognition, Technology & Work,* 9 (4), 209-218.

Jones, B.D. & Bayen, U.J. (1998). Teaching older adults to use computers: recommendations based on cognitive aging research. *Educational Gerontology*, 24 (7), 675-689.

Karavidas. M., Lim, N.K., & Katsikas, S.L. (2005). The effects of computers on older adult users. *Computers in Human Behavior,* 21 (5), 697-711.

Kim, A. & Merriam, S.B (2004). Motivations for learning among older adults in a learning in retirement institute. *Educational Gerontology*, 30 (6), 441-455.

Leikas, J. (2007). Idea movement of aging citizens: Lessons-learnt from innovation workshops. *Lecture Notes in Computer Science* 4556, 923-931.

Mayhorn, C.B, Stronge, A.J., McLaughlin, A.C. & Rogers, W.A. (2004). Older adults, computer training, and the systems approach: A formula for success. *Educational Gerontology*, 30 (7), 573-585.

Milne, S. (2003) Taking back the interface for older people. *ACM SIGCAPH Newsletter, 75, January,* 15-16.

Morrell, R.W., Park, D.C., Mayhorn, C.B. & Kelley, C.L. (2000). Effects of age and instructions on teaching older adults to use ELDERCOMM, an electronic bulletin board system. *Educational Gerontology*, 26 (3), 221-235.

Morris, M. (1992). The effects of an introductory computer course on the attitudes of older adults towards computers. *ACM SIGCSE Bulletin,* 24 (1), 72-75.

Naumanen, M. & Tukiainen, M. (2007a). Seniors' Club – Learning and Blogging Together. *In Web Based Communities (WBC 2007)*. IADIS, Salamanca, Spain, 312-316.

Naumanen, M. & Tukiainen, M. (2007b). Guiding the elderly into the use of computers and Internet – Lessons taught and learnt. *Cognition and Exploratory Learning in Digital Age, 2007,* IADIS, Algarve, Portugal, 19-27.

Osman, Z, Poulson, D. & Nicolle, C. (2005). Introducing computers and the Internet to older users: findings from the Care OnLine project. *Universal Access in the Information Society*, 4 (1), 16-23.

Nielsen, J. (1993). *Usability Engineering*. San Diego, CA: Academic Press.

Placencia-Porrero, I. (2007). The information society in demographically changing Europe. *Gerontechnology*, 6 (3), 125-128.

Saunders, E.J. (2004). Maximizing computer use among the elderly in rural senior centers. *Educational Gerontology*, 31 (4), 301-329.

Sharp, H., Rogers, Y. & Preece, J. (2006). *Interaction Design: beyond human-computer interaction*. Hoboken, NJ: John Wiley & Sons Ltd.

Statistics Finland (2007a). Population projection 2007-2040. URL: http://www.tilastokeskus.fi/til/vaenn/2007/vaenn_2007_2007-05-31_tie_001_en.html (accessed: 22nd of April, 2008)

Statistics Finland (2007b). Internet used by 79 per cent of the population at the beginning of 2007. URL: http://www.tilastokeskus.fi/til/sutivi/2007/sutivi_2007_2007-09-28_tie_001_en.html (accessed: 22nd of April, 2008)

Syme, A., Dickinson, A., Eisma, R. & Gregor, P. (2003). Looking for help? Supporting Older Adults' use of computer systems. *Human - Computer Interaction, INTERACT, 2003,* Zürich, Switzerland. 924-927.

Vuori, S. & Holmlund-Rytkönen, M. (2005). 55+ people as internet users. *Marketing Intelligence & Planning*, 23 (1), 58-76.

Xie, B. (2003). Older adults, computers, and the Internet: Future directions. *Gerontechnology*, 2 (4), 289-305.

Xie, B. (2007a). Information technology education for older adults as a continuing peer-learning process: a chinese case study. *Educational Gerontology*, 33 (5), 429-450.

Xie, B. (2007b). Older Chinese, the Internet, and well-being. *Care Management Journal*, 8 (1), 33-38.

Zajicek, M. (2007). Web 2.0: Hype or Happiness? *International Cross-Disciplinary Conference on Web Accessibility, 2007,* ACM, Banff, Canada. 35-39.

Acknowledgement