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“LISA, LISA, THE MACHINE SAYS I HAVE PERFORMED AN ILLEGAL ACTION. SHOULD I TELL THE POLICE...?” A SURVEY AND OBSERVATIONS OF INEXPERIENCED ELDERLY INTERNET USERS

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ABSTRACT

The number of older people is growing rapidly in all the industrialized countries. This paper seeks understanding of how older people who are inexperienced Internet users really make use of the Internet. This is tackled through a survey and observations on 42 Internet courses with 328 participants. Quite surprisingly, the most common use was found to be e-banking transactions rather than Web browsing or e-mailing. In general, elderly users focused on the benefit to be reaped from the Internet. Those 65 years or over had more trouble with the font sizes on Web sites than those aged 55-64 years, and the latter found the Internet even more valuable for carrying out transactions. Interestingly, no other statistically significant differences were found over the two groups.

Keywords

Computer-human interaction, human factors, Internet, Web-based services, information society, accessibility, elderly

INTRODUCTION

A rapid demographic change is currently taking place in industrialized countries: the population is getting older. At the same time, business is being conducted more and more often through computer networks. Current internet services are mostly designed for and targeted at young urban professionals. However, the older people are becoming a very important group of Internet users. There are many people, especially among the elderly, who have never had a chance to learn to use the Internet either at school or in their work. These people may experience a number of barriers to using it initially.

The growth in the proportion of the older age groups among the adult population has given rise to a need for strategies for achieving better Internet accessibility (Fairweather et al., 2002). Accessibility is closely linked with the issue of usability (Hanson, 2004; Sullivan and Matson, 2000), so that some researchers define accessibility as comprising both technical and usable accessibility (Paddison and Englefield, 2002). Universal accessibility means accessibility for all or most people (Newell and Gregor, 2000). The needs of the older age groups are often overlooked in matters of information technology (Heller et al., 2001; Milne, 2003), although various sets of planning and accessibility instructions have been developed (ISO DTS 16071, 2000; IEEE Std 2001-1999, 2001; Gregor et al., 2002; Brewer, 2004), including for blind people (Takagi et al., 2004). It is important to note that older people do not necessarily request specifically-designed “Internet services for the elderly;” rather, they expect to learn Internet skills so that they can utilize the available content and technology.

According to Heller et al. (2001), persons aged 60 years or over mainly use the Internet to find health information, plan journeys, or write e-mails. A more recent study by Oinas-Kukkonen and Hakala (2006) suggests that the most common uses are electronic banking transactions and sending e-mails to relatives. The recognized problems in Internet use by the elderly include the fact that Web pages tend to provide far too much information at one glance to digest, that the basic concepts and metaphorical terms associated with the user interface are by no means obvious, and that the illogical solutions in the information services can easily discourage from using them (Oinas-Kukkonen and Hakala, 2006). In addition to the complexity of Web sites, the technical barriers experienced by senior citizens include colored Web site backgrounds, the smallness of the lettering, the use of the mouse, especially double-clicking, and psychological barriers, such as perceived uncertainty, fears, and poor foreign language skills (Mäensivu, 2002).

The main question to be addressed in this paper is how inexperienced elderly Internet users really make use of the Internet. The paper is structured as follows: First we will describe the research approach, including the methods used. Secondly, we will describe the results of the survey, and the results of the observations. Finally, we will discuss the results and draw the conclusions.

METHODOLOGY

This research uses a combination of qualitative and quantitative approaches, in which the methods are a survey and participatory observation. Observations can help to sharpen the picture obtained from a survey by comparing what people say they do with what they really do (Järvinen and Järvinen, 2000). This paper adopts the view that an older user is anyone over 55 years of age. Admittedly, this is a low age. It is based on the fact that many banks that offer Internet services for financial transactions define an elderly user in this way.

The survey and observations were conducted in conjunction with a total of 42 Internet courses for older people given by one of the authors. The courses were advertised in local magazines as well as in the Web site and in the study guide of the educational institution. Although these courses, "Getting to know your computer" and "The elderly on the Internet," were intended for older people, no actual age limit was set. Most of the participants had retired on the grounds of age, but an average of two to three unemployed persons per course also participated. The participants were quite unaccustomed to using a computer or the Internet. Courses of the first type lasted 20-24 hours each (total duration of all courses 466 hours), and those of the second type 10-16 hours (total combined duration 272 hours). Thus, a total of 738 hours were spent on the courses, which were held in Finnish at Raahe-opisto in Raahe, Finland, between spring 2002 and autumn 2004.¹

The survey questionnaire contained two background questions (gender, year of birth); three general questions about the participants' Internet use (location of the typical computer use, location of the typical Internet use, the frequency of use); 10 questions about use/non-use of specific types of Web-based services (such as e-banking, e-mailing, or Web browsing); and five questions on whether they had experienced difficulties with the mouse, keyboard, screen, or ergonomics in Internet use. Finally, the questionnaire contained 24 questions about how participants perceived their Internet use, answered on a 5-point Likert scale from "Completely disagree" to "Completely agree" with the choice "I don't know" in the middle. These questions addressed perceptions of such qualities as system usefulness, strength of personal computer skills, and perceived uncertainty in the Internet use, for instance.

The questionnaire was sent by mail in December 2004 to all of the 328 participants of the courses, of whom 157 responded. 15 responses had to be deleted from the data set as only a few questions or none at all were answered. Of the remaining 142 respondents, 31 were less than 55 years old. These were formed into a comparison group for the elderly cases. Thus, the final data set consisted of 111 responses from older persons, and 31 reference responses.

The observations were made by one of the authors, who was the instructor of the courses and who kept a diary of what went wrong and why, and what should be changed in future courses. Discussions were also held from time to time during the courses to find out why certain things caused difficulties, and all the comments made on these occasions were also recorded in the diary. The resulting personal observations covered 180 hours of course time.

A limitation in the adopted approach is that the people attending the courses did not represent a typical cross-section of the older population. The fact that they had entered themselves for the course suggests that they had an interest in the Internet, and many of them actually owned a computer or were thinking of buying one. Moreover, Selwyn et al. (2003) have suggested that computer use amongst older adults is highly stratified by gender, age, marital status, and educational background. This survey did not address the issues of marital status or educational background.

SURVEY

Of the 111 elderly respondents, 40 were males and 71 were females. Their ages varied between 55 and 80 years, the average age being 64.8 years (standard deviation 5.06). There were 60 participants in the age group between 55 and 64 years and 51 participants who were aged 65 years or older. 95.5% of the respondents had used a computer (86.4% mainly at home), and 89.2% had used the Internet after participating in the course (80.2% mainly at home).

59.0% of the elderly used the Internet more than once a week. Quite surprisingly, *the most common use of the Internet was e-bank transactions*, 80.0% (n=76), while 66.3% (n=63) had used it for e-mailing relatives and friends, 51.6% (n=49) for finding general information on the Web, and 45.3% (n=43) for browsing the Web. 22.1% (n=21) of the older users had used the Internet to buy products or services, 8.1% (n=9) of people had used it for e-mailing government officials, and 2.7% (n=3) had used Internet chat sites. See Table 1.

¹ Finland is one of the countries where the aging of the population is especially rapid. By the year 2030 the proportion of older people in the population is expected to be one of the highest in Europe (SeniorWatch, 2002). On the other hand, the use of computers and the Internet is much more common among the elderly people in Finland than in other European Union countries on average (SeniorWatch, 2002).

E-bank transactions (80.0%)
E-mailing (66.3%)
Finding information from the Web (51.6%)
Browsing the Web (45.3%)
Buying products or services (22.1%)
E-mailing government officials (8.1%)
Internet chatting (2.7%)

Table 1. The use of Internet features by inexperienced elderly users.

The Independent Samples T-test results suggest that factors linked with first adopting the Internet seemed to be learning to use the mouse, and learning to use the Web. Those who started to use the Internet managed double-clicking well ($t=3.941$, $p<0.001$) and perceived that the mouse was easy to use ($t=3.306$, $p=0.001$), and easy to learn to use ($t=3.178$, $p=0.008^*$). These people preferred to use the mouse rather than the keyboard ($t=-3.019$, $p=0.003$). They also regarded Web-based services ($t=4.500$, $p<0.001^*$) and the Internet in general ($t=3.685$, $p=0.002^*$) as easy to use, and after learning they thought that the Internet made transactions easier and faster ($t=2.520$, $p=0.031^*$).

Those who had learned to use the mouse quickly had readily adopted e-banking services ($t=2.809$, $p=0.006$). Those who had been introduced to the Internet but ended up not adopting it into use may well have done this due to problems with their eyesight ($t=-3.254$, $p=0.004^*$), or the small screen that they were using ($t=-2.863$, $p=0.005$).

The One-Way ANOVA results suggest that those who used the Internet frequently used e-mail for keeping in touch with their family and friends ($F=6.323$, $p<0.001$), and regarded the Web-based services as pleasantly challenging ($F=4.829$, $p=0.001$).

It may have been through becoming more knowledgeable about e-mail that these people also became more aware of information security risks ($F=3.191$, $p=0.017$), and this awareness made them feel uncertain in their use ($F=4.297$, $p=0.003$).

The Independent Samples T-test results suggest that the main place for Internet use for those who used it frequently was at home. To some extent, they also visited foreign Web sites more often than those who did not use the Internet at home so much ($t=-2.522$, $p=0.013$). None of the elderly who used the Internet mainly elsewhere than at home stated that they really “browse” the Web, but half of those who used it mainly at home did (49.4%, $n=43$). The elderly users did not seem to put as much emphasis on general information seeking and Web browsing as other Internet users may do. This finding is partially supported by the differences between the older users and the comparison group found through cross-tabulations in information seeking ($\chi^2=5.876$, $p=0.015$) and browsing ($\chi^2=4.178$, $p=0.041$).

In addition, some other differences, mainly linked with fluent computer use, were found through Independent Samples T-tests between the comparison group and the elderly subjects. They included the comparison group’s perception of possessing good personal skills at using the Web ($t=-3.948$, $p<0.001^*$), as well as the perception of the Internet ($t=-3.634$, $p=0.001^*$) and the Web ($t=-3.097$, $p=0.003^*$) as easy to use. They also included the navigation ($t=-3.266$, $p=0.001$) and use of Web-based services ($t=-2.797$, $p=0.007^*$) to be perceived as enjoyable.

Those who sought general information from the Web perceived the Internet as interesting ($t=-3.401$, $p=0.001^*$), and they perceived the Web-based services as easy to use ($F=2.905$, $p=0.005$). According to Mann-Whitney U-test results, these users often ended up buying something via the Internet (Mann-Whitney $U=881.500$, $Z=-2.544$, $p=0.011$).

29.8% ($n=31$) of the older users encountered some problems with using either the mouse/keyboard/screen or had other problems with the computer environment or ergonomics. According to the Independent Samples T-test results, this implied a lower level of learning to use the Internet ($t=3.788$, $p<0.001^*$), perception of the use of mouse as easy ($t=2.987$, $p=0.004$), and perception of lower personal skills in using the Web ($t=2.728$, $p=0.008$). To some extent, these problems also resulted in a feeling of uncertainty in using the Web ($t=-2.621$, $p=0.011^*$), and in getting lost on the Internet more easily ($t=-2.409$, $p=0.018$).

According to the Independent Samples T-test results, those who were aged 65 years or over had more trouble with the font sizes on Web sites than those aged 55-64 years ($t=2.284$, $p=0.024$). The latter also found the Internet to some extent more valuable for transactions than the older subjects ($t=-2.191$, $p=0.031$). Quite interestingly, no other statistically significant

* Equal variances not assumed.

differences were found between those who were aged 55-64 years and those aged 65 years or over. In terms of gender, not surprisingly, there was a significant difference in buying behavior between the men and women. According to the Mann-Whitney U-test results, the elderly women used the Web to acquire services or goods, such as clothes, books or records, much more than the elderly men did (Mann-Whitney $U=779.000$, $Z=-3.020$, $p=0.003$).

OBSERVATIONS

The older people were quite enthusiastic about the computers and the Web, although somewhat uncertain. They often expressed fears of various kinds, in particular that they would not be able to learn, that the computer would ‘go wrong’ or do something unexpected, or that they would get into an unmanageable situation.

It became very clear that older people’s acquisition of computers skills and knowledge was motivated above all by *practical everyday needs*. Information technology, the Web, and software were not of any intrinsic significance for them, but rather the important thing was what they could do and how they could contribute to everyday life. In addition, information technology and the Internet could possess a certain symbolic significance for this group. They wished to remain up-to-date and have a real-time stake in the information society, and they wanted to keep up with technological developments in the community at large. It would seem, in fact, that older people used the Internet surprisingly actively, but they used it only for short periods at a time or for carrying out certain speedy transactions. Another potential explanation for this limited use is, however, that they do not really know where to begin looking for information and services.

On the other hand, many people were lacking in English skills to make full use of the Internet, or had once had those skills but had allowed them to rust. It became obvious during the courses, for example, that many people reacted to the instruction “Press Any Key” by looking for a key marked “Any.” This language problem was accentuated further in error situations. All in all, our observations suggest that older people in general do not have any technical appreciation of how the Internet works. It becomes extremely important that they do not get the idea that they have done something wrong when the fault can quite easily lie in the server or computer. The older people would have greatly appreciated instructions in their mother tongue for using their computer.

Many of the participants had difficulties in comprehending the whole of a Web page at one time, especially if it was packed too full of material, and/or they were unable to perceive where they were located on it. Adjacent narrow columns and other small elements placed close together often caused them anxiety. On the other hand, this is not an age-specific problem; many people in addition to the elderly also need some effective means of orientation with respect to the content of Web pages.

We found that a hyperlink as such was a fairly distinct concept for the elderly, but that it was more difficult for them to fully understand the target of the link: does it lead to another point in the same Website or does it go “out” of these pages? In the latter case, the users often became confused, especially if a new browser opened up on the screen. It would seem that older people distinguish links from other parts of the wording mainly on the basis of the difference in appearance (color and underlining), or by the change in the cursor from an arrow to a pointing finger. Inconsistently produced links often led to a situation in which the user indiscriminately clicked anything that stood out from the ordinary text, causing frustration and a sense of not knowing how to use the Web.

The opening of a new browser was usually difficult to comprehend, and this led to another problem: Often, the button for backtracking to the previous page no longer worked on a new window. Most of the older users did not realize without guidance that they could close the new browser, and when they did learn this they sometimes ended up closing the original browser by accident. Pop-up windows that suddenly appeared on the screen “out of nowhere” were also a source of confusion for some users, especially if they were in English, as the user did not necessarily know whether they contained advice or a warning.

One common problem with e-mail was that most friends and acquaintances of the same age did not have even a computer, let alone an e-mail address. E-mail was used only with children, grandchildren, and other younger relatives. It may be valuable, however, for communication with children and relatives who are living abroad, and less expensive than the telephone. In general, the users observed here looked favorably on the services provided via the Internet and were eagerly looking out for new ones.

One of the most serious difficulties was the coordination between the screen and the use of keyboard and/or mouse. Their use called for a fair amount of accuracy and coordination in motor functions, and some users found it difficult or impossible to double-click the mouse because of the stiffness of their joints. Also, they tended to run out of table space when moving the mouse (being unable to grasp the idea of lifting the mouse up and continuing from the middle of the pad). The most common problems concerned controlling the movements of the mouse and the cursor. Precise movements of the mouse were difficult

for many users to execute, as was the pressing of more than one key at a time. A large proportion of these problems can be avoided if Web pages can be made to operate without having to click very small fields with the mouse.

According to our detailed observations, the problem with the mouse was controlling the cursor movement and moving the mouse quickly. It was difficult to hit a link when one pressed the mouse button hard, or simply if the hand slipped. Two buttons on a mouse also caused some confusion, as users did easily forget which one to press. There was a tendency at first to look at the mouse when pressing it, which resulted in failing to see what was happening on the screen at the same time.

Web-based services often entailed moving the cursor to a text field, clicking it with the mouse, and then writing something in it. This was something for which more help was needed, as many older users began writing as soon as they had opened the required page and wondered why their words failed to appear on the screen. Clicking a very small area was particularly awkward, and moving the scrollbar up and down also frequently caused trouble, as it called for a smooth, steady movement of the mouse. The use of a traditional, non-optical mouse or the arrow keys for scrolling pages up and down succeeded fairly well after a little practice. However, scrolling through long Web pages or using drop-down menus with a mouse were often more difficult.

We observed that many older users found the text in Web sites too small to read comfortably. Most of them had either reading glasses or bifocals, and the latter in particular caused difficulties in adjusting the position of the screen to the right distance. Vision problems can also affect the user's sitting posture and give rise to loads on the neck and shoulders, the arms, and the back. Many older users complained of pains in their shoulders and neck after a lesson. It should be remembered, too, that external factors of this kind can affect cognitive functions. A non-ergonomic sitting position can interfere with concentration and thus reduce the learning performance. Similarly, noise or disturbances in the surroundings can detract from cognitive abilities.

DISCUSSION

What is needed above all in the modern information society, and in the presence of a surfeit of information, is the ability to manage whole units of information. To support this, the internal structure and manner of navigation in a Website should be consistent throughout the site and all the links should be indicated in the same manner. The most serious challenge for an unaccustomed user, however, is that of forming a big picture of the pages and hyperlinks making up the Website's structure and of where one is in relation to the whole site. It would be worthwhile to minimize the amount of information on the screen at one time, or at least eliminate anything that is superfluous. Older users may be particularly aggravated by moving text or text that scrolls by itself (cf. Hanson, 2001). At the same time, error notices should be quite clear, so that users can readily understand how and where the error occurred and what can be done to recover from it.

The fonts can have a considerable impact on readability, and it is worth choosing the clearest possible font, usually of a relatively plain style, as more decorative lettering can easily make the script difficult to read. In practice, a Sans Serif type is fairly good for older people. According to Zhao (2001), the ordinary body of a text should be in 12-14-point lettering and titles in 18-24-point, but individuals with especially poor eyesight may require 16-point type for the body of the text.

As very old users are more limited in their movements than the younger ones, the main control functions of the Web sites and computer should be situated so that only small physical movements are required for using these, although still sufficiently large movements so that they can not be activated by accident (Czaja, 1997). Proper use of the mouse calls for accuracy and coordination, and difficulties can arise from poor mouse-cursor coordination, for example. Most of these problems can be solved by avoiding very precise targeting of small areas with the cursor (Hanson, 2001).

CONCLUSIONS

More than half of the inexperienced elderly users used the Internet at least once a week after taking the course. The most common use of the Internet was for e-banking transactions. Those who had quickly learned to use the mouse and the Web, adopted e-banking services quickly into use. The older people were motivated above all by the practical usefulness of the Internet, whereas information technology had no intrinsic significance for them.

Elderly users seem to be surprisingly active in using the Internet. They use it for a short time per occasion, often in order to quickly perform a transaction. Those who regarded the Web-based services as interesting and easy to use also sought for information at the Web. However, the elderly did not put as much emphasis on information seeking and Web browsing as other Internet users generally do. Even if they used e-mail, scarcely any of their friends and acquaintances of the same age had a computer or an e-mail address. Their activities were directed almost exclusively towards their children, grandchildren, or other younger relatives. It seems to be that through becoming more knowledgeable about e-mail, the elderly users also became more aware of information security risks, and this awareness made them feel more uncertain in their Internet use.

Those who were 65 years or more had some more difficulties with their eyesight when using the Web than those who were under 65, and the latter group perceived the Internet even more useful than previous one. Not surprisingly, elderly women used the Web to acquire services or goods much more than elderly men did. Finally, it should be remembered that elderly users do not form a homogeneous group other than by virtue of their early date of birth. For this reason, future end-user surveys should employ more sophisticated constructs to measure the levels of computer and Internet skills.

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