ONLINE MEDIA IN FAVOUR OF THE DIGITAL INCLUSION
A Case Study with Elderly People in Brazil

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Abstract: The popularization of Internet access in home context has been making elderly people and others with no computer literacy to become more motivated to learn and to use those services. This paper presents a case study elaborated to get information on how Brazilian elderly are becoming computer literate, what are their difficulties and challenges to adapt themselves to the use of popular technologies nowadays. The goals of this research are to identify educational difficulties still faced by elderly in the learning process of home computer technologies, as well as to identify which main topics in the technology design are working as limiting factors for that process. We discuss the results, and describe a futuristic scenario to illustrate new paradigms of interaction built over the same previous concepts. We believe that keeping elderly motivated to learn could possibly contribute to increase the digital inclusion.

1 INTRODUCTION

Some researchers are concerned about decreasing the digital divide, which means, firstly people that have access to computer technologies and/or are computer literate and secondly those that have neither access nor computer literacy. Undoubtedly, the popular technologies have been playing an important role on daily people's life, by adding new habits and new forms of communication through Internet. This Internet popularization in family/home context has been making elderly people to become more motivated to learn and to use those services.

From this point of view, the focus of the present research will be on analyzing information on how Brazilian elderly people are becoming computer literate, what are their main difficulties and challenges, and what has been their effort in order to adapt themselves to those popular technologies.

This approach derives from two points: elderly people constitutes a group of the digital exclusion; and second, added to the feeling of becoming digitally included, they are changing their habits to become computer literate, in order to communicate with remote relatives. They are specially becoming users of Instant Messaging and others online media, fact that changes the classical user profile of this technology, broadly considered for youth.

The elderly participants of the present study are mostly computer novices. They provided information in one of the two following forms: by answering a questionnaire, in where they could report their daily experiences, challenges and difficulties in learning; or by an interview, when the personal contact was possible. Some questionnaires were applied at elderly home, via a younger relative that had received it by email. This option opened the possibility to involve in the experiment, people from different cultural and social backgrounds, located in different regions of the country.

The goal of this research is to identify educational difficulties faced by elderly in the learning process of home computer technologies, as well as to identify which main topics in the technology design are still working as limiting factors for that process, according to the group declarations.

After discussing the results, we describe a futuristic scenario that supports new paradigms of interaction built over the same previous concepts, aiming to illustrate the importance of those concepts aggregated to the learning process.

We believe that keeping elderly motivated to learn could possibly contribute to decrease the digital divide, and, in addition, to improve their social well-being.

2 BACKGROUND

Research for elderly has mostly focused on health care and surveillance (Morandell et Al., 2008; Gamberini et Al., 2006; Ramos et Al. 2005), what is quite positive.

The digital divide has been a factor of discussions, aiming at improving the social inclusion for elderly and others with no computer literacy (Millward, 2003; Jackson et Al, 2004; Wynne and Cooper, 2007).

Other works, more dedicated to computer developments for elderly and interface issues, approach aspects such as entertainment, social life and daily use related to the technology design, as the ones introduced below.

Van de Watering (2005) argued that some age-related changes in people are important to consider when designing technologies for elderly. Those changes are mainly grouped as sensory and motor changes, cognitive changes, and social changes. Vision, hearing and motor changes are the most dominants ones related to computers use. He states that the cognitive, physical and sensory aspects have received most attention in research. However, computer technology can influence significantly the social life of the elderly.

"*The most significant impact of computer technology on the social life of elderly people is that of computer-based communication, the Internet being the foremost example*" (Van de Watering, 2005).

In what concerns to the use of Instant Messaging (IM) by elderly, Prior and Al. (2008) investigated if the lack of adoption of IM by elderly people is due to interface design, and proposed an alternative interface metaphor. Their experiment analyzed two different interfaces operating over the same IM program.

In result, the participants could perform messaging tasks more successfully and quickly with the alternative metaphor interface, and presented a more exploratory behaviour. Discussions with participants pointed that traditional IM interfaces are not ideal for the older user in synchronous communication. The authors suggested that an alternative metaphor could be valuable when designing user interfaces for older, less experienced and unconfident users. Prior and Al. (2008) concluded that the use of technology specially designed for older and less experienced people could help them to improve their abilities in learning technologies, such as IM, for example.

Some researchers approach the accessibility for elderly, especially on topics related to the web accessibility (Hanson, V. L., 2001). Others intend to improve the interaction and inclusion process under the topic of inclusive design (Langdon, 2010).

On the Microsoft Accessibility website, there are guides to make easier and more comfortable the use of computers by elderly. In addition, they made available some tutorials and accessibility features to specific software, as for example, Office 2010, Internet Explorer 8, and Windows7 (Microsoft, 2010).

Pertinently, works concerned the elderly learning are to contribute to the improvement of this process and to help this group to keep interested in this challenging task (Kantner and Rosenbaum, 2003; Chi-hung, 2002; Naumanen and Tukiainen, 2007).

The next section will present a case study approaching Brazilian elderly in the learning process of home computer technologies, and will highlight which main topics in the technology design are still working as limiting factors for that learning process. Furthermore, this study will emphasize the social and wellbeing aspects of the elderly life that are connected to the learning process.

3 CASE STUDY FOR ELDERLY

The present study analyzed a group of Brazilian elderly computer novices.

3.1 Focus of the Study

This case study has the following goals:

- to get a feedback from the elderly about their needs and expectations in learning computers;
- what are their remarks and experiences with the current teaching;
- to understand the limitations imposed by the current technology, including computer hardware;
- to give an overview on how the learning process and the use of online media can influence the social aspects of their lives.

3.2 Sample Group Profile

Eighteen users were interviewed, 65% females and 35% males, ages ranging from 60 to 89 years old. The group age distribution appears in Figure 1. The majority, 85%, of the interviewed people are computer novices.
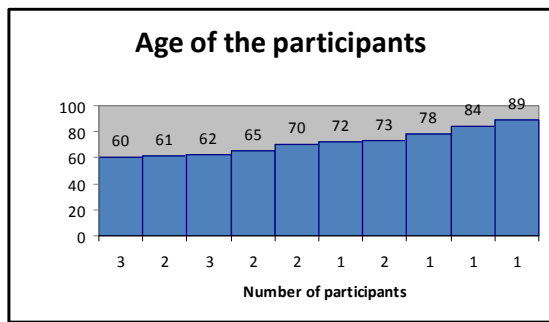
Figure 1: Number of participants versus Age.

3.3 Questionnaire

The questionnaire application proceeded in two ways: by directly interviewing the participant, when the personal contact was possible; by applying the questionnaire at elderly home, via a younger relative that had received it by email. This option opened the possibility to involve people from different cultural and social backgrounds in the experiment.

The questionnaire collected information related to the following topics:

- users' experience with computer;
- the goals with computers;
- motivation to learn;
- learning process;
- use of applications and experience with online media;
- difficulties and challenges;
- what they would like to change.

The following sections present the participants' report related to the topics listed above.

3.4 Motivation to Learn

100% of the respondents consider that having computer knowledge is positive. They would like to overcome the difficulties though.

One important reason the elderly pointed as motivation to learn computers is that they like to feel socially included.

"*Before getting retired, I started learning computers because everybody knew it at my work. I did not like to be the one that did not know it*" (woman, 62yo).

"*Computers today are necessary, and I want to learn it to not feel me apart neither old*" (man, 89 yo).

The computer use also appears as a mean for entertainment when alone, as well as to have contact with people through internet.

In this group, the more skilled ones told they

enjoy playing games on computers. The novices expressed they would like to play games as well.

One practical motivation to learn comes from the necessity to talk to family members that live apart, especially to sons and daughters. Kantner and Rosenbaum (2003) had reported this motivation as the primary reason to learn. Seven years later, our group confirmed this motivation as the first reason to become interested in learning computers.

"*I like to learn computers to talk to my daughter and grandson. Also, I would like to have some leisure and fun to occupy my free time*" (woman, 83 yo).

Few participants mentioned they had started learning because of their work in past, but the percentage was not significant. Figure 2 represents the distribution of the main motivations pointed by our participants.
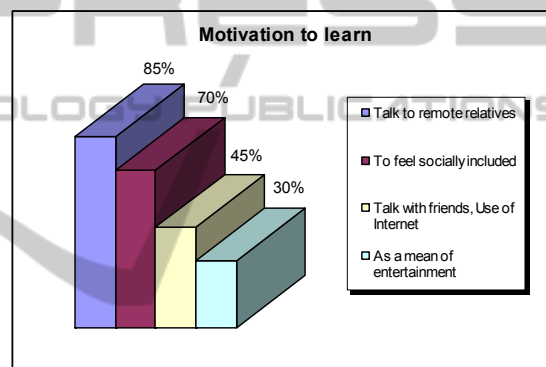

Figure 2: Main motivations to Learn.

To the ones that have relatives living away, the intention of talking with friends, navigating on Internet and searching for information appeared as secondary activities.

3.5 The Learning Process

Some participants declared they went for an informatics course. Normally, they look for courses that offer classes for elderly.

60% of the respondents had started to attend a course, and among this group, 75% gave up the course.

Although the courses were announced as a course for elderly, the inadequacy of the teaching method was pointed as the first reason to them to give up the course. Some reported that teacher keeps explaining theories, especially about the hardware, when they want practice and facilities.

The minority, the 25% remaining, that followed the course told they had attended a course when they

had a job, and at that time, it was possible to practice during the work.

The 75% that gave up the course had imagined that during the classes they could get the knowledge and practice they needed. Their expectation was that the course did not require home tasks, since most of them do not have computer in home.

The home tasks influenced their decision for not following the course, and it was pointed as the second reason to give up the course.

One male participant, 89 years old, had already attended a course for two months without having a computer in home. He gave up the course because of the amount of home tasks. He was not able to follow the classes, having to go to a cyber café so often. Afterwards, he intends to buy a computer in order to go back to learn it better.

Another reason against home tasks is that when they will try to repeat what they suppose to have learned in class, most of the times they do not succeed. This brings frustration and the feeling of inability.

As an alternative way, they learn computers with family members, like sons/daughters, grandsons, or with friends. For the ones that do not have computer in home, they practice when they go to visit the relatives.

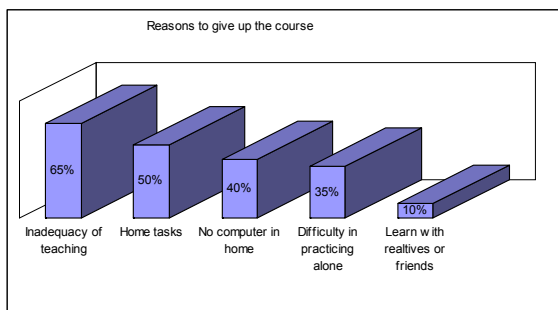Figure 3 illustrates the main reasons to give up the course, according to our group reports.

Figure 3: The most frequent reasons to give up a course.

One great positive aspect reported about learning is that this process influences their social life positively. By going to a course, they can meet new people and make friends. They can also talk to other friends about and through computers. This knowledge opens the possibility to interact with remote relatives through computers, which is one very important motivation to learn. As consequence of those facts, they feel more active, more self-confident, and more engaged.

3.5.1 The use of Online Media

This section will approach the main applications often used, or mentioned as of interest by elderly.

Instant Messaging

According to the respondents' declarations, the main motivation to use Instant Messaging comes from the necessity of talking and feeling close to sons or daughters that are distant. These reports corroborate the results obtained by Albuquerque (2008).

Elderly declared to face all difficulties, and take actions like buying webcams, registering for IM accounts, ask help to other family members, all in order to have close contact with their "kids".

"*I talk on MSN to my relatives that live far away, but my daughter-in-law prepares all to me, I just type and read. I have no idea on how to access it by myself*" (woman, 70 yo).

Almost 100% of the interviewed people do use of Instant Messaging guided by a co-located family member. This causes a feeling of dependence that they express as not good to them. Sometimes they would like to have privacy when talking with the remote relative.

Internet and Search Engines

Elderly are very curious about Internet and show interest in using it. Most of them do not understand well how it works, neither of where those information come from.

Indeed, they sound enthusiastic with the possibility of having access to all kind of information they would like to know. For some of them, it sounds like, by learning this technology, they can have the opportunity to learn all of what they would like and was not possible until now in their lives.

The ones that already have experience with search engines expressed a certain feeling of independence in finding what they like. By the other hand, they miss the necessary knowledge to find information fast on internet.

"*I would like to not spend so much time sit before the computer. Just to find a recipe on internet it takes me lots of time*" (woman, 60 yo).

Tools like Google map or Earth, for example, is something they admire but are not able to handle. Their use of Internet is still very limited.

Others expressed interest in learning how to make their own website, taking this as a big challenge.

None of the participants declared to have knowledge of the accessibility features already available for websites.

Text Editor and File Management

The use of text editor is limited to basic features, as an old type machine. They only know to open a file, type, and save it, although they expressed difficulties to save and retrieve the files.

Our respondents declared not have control of the file manager. They are not able to organize their files neither choose locations to save them.

Emails

Most elderly do not know how to send email. They reported it needs a relative to help with opening it and to reply.

Knowing the existence of virus and spam also generates insecurity to use the email tool. They feel vulnerable without the required knowledge to feel protected.

Photo Sharing

They often associate the use of email with sending and receiving photos, because it is a frequent action performed with family contacts.

The concept of saving a file locally or remotely is not clear to them. Therefore, the actions of downloading and uploading photos and attachments sound confusing.

Consequently, the use of specific software for performing photo-sharing tasks sounds difficult to understand, especially if it requires downloading the application browser.

3.6 Challenges and Limitations

From first sight, elderly consider that difficulties come from the lack of practice, which they believe they can overcome.

"*It could be easier, but I guess it is a matter of practice*" (woman, 73 yo).

40% of the participants do not have computer in home, what they consider a strong limitation to their development and learning process.

They like to learn first, and after getting some knowledge, then to buy a computer. This position reflects their need of feeling in control of the technology. They want to be sure that they will be able to handle the technology. This result is in accordance with the work of Karahasanovic et Al. (2008) about the elderly, when the authors stated -

"*their need to feel in control of the technology is linked with the need to feel safe and secure*".

Elderly declared to be afraid of causing damages to the machine, by doing wrong actions. One important related factor is that they easily feel guilty about the error messages. They often interpret those messages as a warning for having done something harmful to the computer.

The amount of technical terminology they need to learn and understand works as a considerable limiting factor, added to the fact that most words are in English.
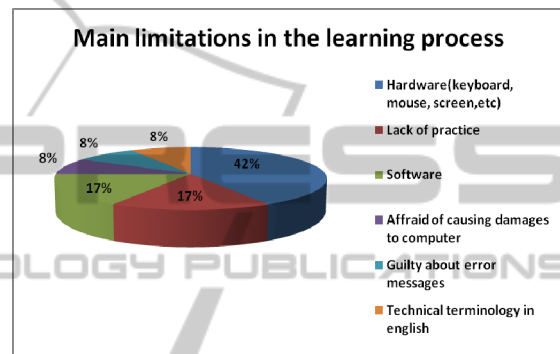
Those main topics are summarized in Figure 4.

Figure 4: Reported limitations in learning.

The following sections describe some difficulties pointed by the respondents, concerned to the use of computer hardware and some tools.

3.6.1 Hardware Constraints

Those reports show evidence that some features and devices are still not adequate to elderly.

Keyboard

Among the participants, those who had previous experience with the old typing machines during their working life pointed typing as quite easy and not really a problem for them.

However, typing appeared as one of the main difficulties for those who ever had contact with computers, neither a previous typing training in their lives. They say that is not easy to find where the letters are on the keyboard.

The following declaration refers to the special keys around the letters on keyboard:

"*I think there are too many keys on this keyboard that I don't think I need that. I have no idea for what they can be, just would like it was simple*" (man, 78yo).

Most of them spend lots of time to type, and this make them not feel comfortable with the technology.

The lack of ability to type fast gives to elderly a negative feeling of limitation, and inhibits them from using online media like Instant Messaging, for example. They feel under pressure to reply fast, as the same time they feel shame of not being able to do it "in time". To overcome this situation, those who have access to microphone and webcam appreciated well its use in IM communications.

Mouse

80% of the interviewed people mentioned difficulties with mouse manipulation. Tasks like pointing, selecting and drag were reported as very difficult.

It is important to remark that those functions - "*pointing*", "*click*", "*select*" - work attached in the mouse device. This coupling increases the limitation for the ones with reduced motor ability or less experience. After positioning the mouse over the desired position, the action of clicking with a tremulous touch just moves the pointer away from the right position; as consequence, the person does not perform the expected action. This fact can make a simple task of opening a link to become a hard task to be performed by an elderly computer novice. Because they do not understand the reason for the unsuccessful task, they attribute the fact to their lack of ability only.

Users from different ages, ranging from 60 to 83 yo, reported to have difficulties with the mouse handling.

Screen

Users reported that they have headache after long time exposure of the eyes to the computer screen. Having to bring the eyes closer to the screen and the neck position also appear as factors of discomfort.

Other Devices

Devices like charger (in case of laptops), modem, cable, memory stick, which are to be connected to computers, were pointed as difficulties. To understand its functioning and management, it requires more knowledge from them.

A woman of 83 yo declared with disappointment that she had imagined by just opening the laptop she would be there on internet and connected with relatives. All those staff makes the use of computers much more complex to manage, and discourage the

learning process because it seems to have too much to learn.

They have difficult in understanding the concept of internet and connection, dissociated from electricity, especially for the wireless connections. They often associate the internet access with the electricity because most of the times, the computer is connected to the power. When the internet connection goes down, it is common to hear the elderly say that it needs to check out the electricity plug.

3.6.2 Navigation and Information Retrieval

The main difficulties reported in that topic are the following:

Scrolling on the Web Page

The limitation with the scrolling action has two aspects, the difficulty with the mouse itself, already reported above, and the concept that a page can have more to see than what is appearing on the screen. Under this point of view, this limitation is extendable to other applications.

Links

In general, they do not understand the hyperlink concept, and therefore, have difficulty in returning to the previous point, after navigating through a link.

Much Information on the Website

Normally, they do not perceive all information presented on the website, especially the ones with a considerable amount of links, pictures and texts.

Their visual focus keeps more at the central area of the page. *Could this behaviour been related to the reduction of peripheral vision in elderly*?

4 DISCUSSION

The concepts of Internet and related technologies did not exist during the active learning/working period of life to the majority of elderly. Those concepts are quite new, and its expansion is very dynamic.

According to the present study results, the learning process is still not adequate to users' needs and it has been one of the main causes of courses desistance. The difficult in understanding the concepts was expressed in previous studies as well.

The results found in the present case study are very similar to results found in works made in 2003,

for example, as the work of Kantner and Rosenbaum (2003). Therefore, it signals to the necessity of improving that process with simplification and adaptability.

Indeed, an important question is:

Could the many difficulties reported by elderly nowadays be solved or bypassed, by the mean of a more appropriate learning process?

The fact that the analyzed elderly group do not know about the accessibility features available, tells there is a failure in the learning process. Teaching the accessibility features to elderly would be a priority in their learning process. That could work to increase their self-confidence with computers, by giving to elderly the feeling that technology can be more adequate to them, instead of the opposite.

Often they do not successfully perform many tasks because they do not understand the concepts behind.

Furthermore, there is a considerable number of good websites dedicated to teach the elderly. Nevertheless, how can those novices, without the appropriate knowledge to have access to it, and take profit of those valuable means?

Based on the present results, our proposition is that *Accessibility*, *Usability* and *Education*, together as a trio, would work in favour of the elderly, aiming at reducing the main problems still faced by them in the learning process. This trio could change the actual picture that keeps repeating along the years.

For example, the teaching process could use the usability heuristics of Nielsen (2005), as a tool to give to elderly a simplified way of reasoning when performing tasks, besides been used as a tool to analyse performance.

5 FUTURE TECHNOLOGIES, BETTER LEARNING?

This section presents a futuristic scenario for remote interactivity between family members, since that is one of the main motivations for elderly to learn computers. The elaboration below intends to inspire the conception of future technologies that could be of popular access, considering some aspects of usability and accessibility inbuilt in it.

Scenario

"*When Bob arrives home he just hangs the keys on the back door. At the same moment, in his mother's home, the place where she hangs her keys lights. She knows now Bob is in home.*

She was watching TV, which works already connected to Internet. Then she activates a second window with the TV remote control, and sees the icon of Bob (identified by his photo), which opens just with a click on the remote control. The Bob space shows Icons for messages, camera, photos, etc.

Alternatively, she has a small handheld screen with the same image of the one on TV. She can choose to write a message by just putting the pen over the message icon and starts handwriting a message to Bob, or to record a voice message, using the microphone available either in pen or in the remote control.

At Bob's home, his computer screen turns on and emits a customized sound to tell him he got a new message from mom. Her mother can visualize in her panel that Bob still did not read the message, based on a Bob's mailbox icon on her screen, which will be open when Bob reads the message. While that, she keeps watching her movie on TV.

After finishing his shower, Bob goes to the kitchen for cooking dinner; he reads the message from mother. He activates the function of sending his image, by just pressing the camera icon with a light pen on the screen.

Her mother perceives the changing on her TV screen and does the same, so instantaneously they can see and talk to each other. They wave, say in a fast manner that they are fine.

He will cook his dinner now, and she puts her main attention back to the movie on TV, while the small window keeps showing the Bob image at the corner of the TV screen. They both keep their peripheral attention on each other, as if they were sharing the room while doing different activities. The connection and image of both keep online, until she blows him a kiss and goes to sleep, because for her it is already late".

This scenario shows improvements in the instant connectedness for remote communication, pointed by respondents as a relevant difficulty faced by them, and a great motivation to learn computers.

Those technologies described in this scenario intend to give comfort to the elderly, since they can write messages with a pen, have much more visual information, can be free of extra devices, with total mobility inside home.

With this scenario, we also would like to raise the question: *would those technologies make the learning process easier?*

The goal of this proposition is to illustrate a futuristic situation, and with it stimulate thoughts

about the future of education for elderly. Although the details on how to manipulate the technology itself seems much easier and adapted, in terms of accessibility and usability than the available ones nowadays, the basic concepts behind stay the same, added to other new ones involved.

Therefore, we call attention to the point that concepts are important issues to be taught to elderly in their learning process, with simplicity. That is our suggestion for computer courses. Otherwise, each time the paradigm of interfaces and interactivity changes, the learning process needs to re-start again.

6 CONCLUSIONS

The present study intended to discuss important aspects of the computer learning process for elderly, based on users' declarations.

The willingness of being digitally included is changing the elderly habits, and working as stimulus to them to become computer literate. In addition, they are specially becoming users of online media, such as Instant Messaging, in order to communicate with remote relatives. This fact has been changing the classical user profile of those popular technologies, broadly considered for youth. Furthermore, this changing in elderly behaviour can possibly contribute to increase the digital inclusion in this users' group.

The participants' declarations pointed that nowadays the learning process, as well as the simple technologies are still not adequate to this group, since the inadequacy of teaching was pointed as the main reason to give up the courses.

Furthermore, the obtained results remarked an important connection between learning computer and the social wellbeing in elderly lives.

As a general conclusion, and in accordance with respondents' feedback, the elderly people expressed their willingness to feel healthy, alive, and integrated in society by learning computers.

In addition, the paper discussed and proposed that *accessibility*, *usability* and *education* together could work as a trio to improve and support an adequate learning process for elderly.

Besides, a futuristic scenario was presented to illustrate one remote interaction between family members. This scenario takes in consideration some accessibility and usability aspects. This illustration wants to emphasize the suggestion of an education process for elderly, more based on concepts, in order to bring more sustainability to deal with the introduction of new paradigms. Otherwise, each time the paradigm of interfaces and interactivity changes, the learning process needs to re-start again.

For last considerations, nowadays, children learn computers, technologies, electronic games, as part of daily life, as a natural process of learning and growing. The next elderly generation possibly will have different needs related to other new technologies. Many people, that will enter the elderly group in 10 to 15 years from now, are highly skilled in computers today. Therefore, under those considerations, teaching computer technology to elderly in 50 years probably will not be the same of teaching today.

ACKNOWLEDGEMENTS

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