Designing learning material for Digital Inclusion to elderly People

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Abstract: This paper is about the development of learning material concerning the use of computers, basic software tools and internet services specially designed for third age people. The project, called Infocenter for the third age, has involved 12 elderly people, who participated voluntarily with suggestions for the contents in the first version of the material. The main goal in the project was promoting the digital inclusion of the elderly population, but, for such, it was necessary to have a basis in pedagogical approaches and teaching strategies that were adequate to this research’s context, especially considering the functional transformations that come with age. To observe the validation and evaluation process, we used the empirical technique of interaction workshops, which demands the direct participation from the people involved in real interactions. In the learning material’s evaluation participated 55 elderly Infocenter computer workshop’s participants, with an age average of 65.3 years and heterogeneous education.

Keywords: Elderly, learning material elaboration, pedagogical approaches.

1. Introduction

National and international research in the areas of computer knowledge, human-computer interaction, special education and gerontechnology reveal that more and more elderly people have been interacting with computers and their communication and information tools. This interaction might increase the ability for autonomy, self-esteem and social interaction, by knowing and participating in the computer world. The studies also present the difficulties and some solutions for elderly users in handling the technological apparatus that dominate the current world.
The population’s aging process in Brazil faces preoccupying issues: What has been thought of to promote and protect the aged in our country? How will be the future advanced age as to social and health aspects? The Institute for Research and Applied Statistics (IPEA, 2002) warns that the elderly population is the population segment that grows most in the worlds. Estimates suggest that, in 2050, the life expectation will be of 87.5 years for men and 92.5 years for women in developed countries, and 82 for men and 86 for women in developing countries.

The Law 8.842/1994, which disposes on the elderly national policy, establishes that “family, society and government must assure to the elderly all the citizenship rights, guaranteeing their participation in the community, defending their dignity, well-being and right to life” (BRAZIL, 1994). The same Law assumes governmental actions in different areas. In the education field, it assumes the development of educational programs through teaching models adequate to the elderly conditions, besides the support to create a third age open university.

The Elderly Statute, Law 10.741/2003, Chapter 5, defines the elderly have the right “to education, culture, sports, leisure, entertainment, shows, products and services that respect their peculiar age condition” (BRAZIL, 2003). The article 21 adduces, further, that “the public power will create opportunities for the elderly to access education, suitting curricula, methodologies and learning materials for the educational programs destined to them” (BRAZIL, 2003).

Facing the exposed facts and the need to encourage permanent education for the elderly, this article’s goal is to present the results of a research on digital inclusion on the third age that involves the development of learning material with computer contents for this target population.

For such, it was necessary to identify, through empirical research, and have theoretical foundations on educational issues observed during the activities in the “Computer workshops for the third age”, carried on from March 2003 to June 2007.

In the past years, in the Third Age Studies Center (NETI for short in Portuguese) of the Federal University of Santa Catarina (UFSC for short in Portuguese ), approximately 150 elderly people registered as interested in learning computer skills. We also verified that some of the elderly people, who took computer classes not attached to the NETI, complained about the rhythm and heterogeneity of the classes, varying from the young to the elderly. Consequently, some of them could not keep up with the group in which they were, making the situation embarrassing and leading them to abandon the classes.

Seeing this difficulty, in March 2003 started the “Internet workshops for the third age” project. These workshops took place in the Infocenter for the third age, located on the Computer Science and Statistics Department (INE), in a partnership with NETI, both in UFSC.
2. Learning Approaches for the Elderly

Educational theories for adults are based on the conception that they have specific learning characteristics different from children.

The interest in adult learning began in 1926, with Liderman approaching some characteristics of adult education: curricula turned to the student interest; the relevance of the student’s experience; no to directive and authoritarian teaching; a dynamic concept of intelligence; theory-practice relation; needs and interests; life situations; self-direction and differentiated in learning (Knowles, 1977).

These characteristics gives the background to the approach that shows a way of thinking about adult learning. We propose, in this article, to name two of the characteristics used in adult education as categories to guide a look on elderly people’s learning: learner’s experience relevance and needs and interests.

The andragogy approach was adopted as a guideline, as were the theoretical presuppositions of Freire (1996), who talks about the aspects linked to the learner’s reality, autonomy and the use of generating subjects. We adopt teaching by subjects as a teaching strategy for the elderly, since it helps the students to have a better proximity to their reality and interest.

When one speaks of teaching-learning process for the elderly, it is necessary to contemplate and favor some premises already developed for the adult public, as it is with andragogy. Thus, the authors, since Liderman (1926), propose that, to succeed in developing learning materials for the elderly, one must contemplate the following premises: experience, needs and interests. This way, the elderly can perceive the systemic organization of the process and the value of their participation. Besides, it is imperative that, when planning learning materials for this public, one considers the cognitive, emotional and physical alterations that come with age, specificities, needs, desires and expectations.

3. Ergonomic approach: User-centered design and Accessibility

In this study, we adopted an ergonomic approach for the activities of development and evaluation of learning materials when handled and used by the elderly in the computer workshops. One of the basic principles of the ergonomic approach is knowing before modifying a work reality, be it computerized or not. That implies an analysis of the real situations as a way to identify the users’ needs. This analysis is done through interviews and observations (Cybis, 2006).

For such, we used the empirical technique (interaction workshops1), chosen because it demands direct participation from the users in real or simulated

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1 Workshop as an interaction observation technique, different from interaction rehearsals for their informality and the number of participating users. In the interaction rehearsal, only one user can participate, while in the workshop there can be several users.
interactions, in which the carrying of a set of specific tasks is observed (SALES, 2002).

One of the stages of user-centered design is knowing the product’s “operator”, the potential users, and one must consider their age, cultural level, education, physical limitations and capacities, since the goal in cognitive ergonomics is to make tasks easier, more effective and satisfactory in their execution, and safer for the users (Medina, 2007).

In this work, we adopt the definition of accessibility used by the United Nations (UN). Accessibility is the process of achieving equal opportunities in all spheres of society.

4. Developing Learning Material for the Elderly

This research is based especially on the procedure orientations of research-action, which has a method of joining several social research techniques, with which it establishes a collective, participative and active structure in the information capture level, requiring, thus, the involvement of people with the investigated problem (Thiollent, 1998).

We verified, previously, through questionnaires, interviews and observations collected at the workshops carried on from 2003 to 2005 that, considering all the studies done by worldwide researchers on computer use and the third age, there is a scarcity of learning materials accessible for the elderly. We noticed, during this study, that some indicatives pointed to the elderly people’s predilection for communication and information tools available on the Web, such as electronic mail, chats and research websites. Thus, in February 2006 started the process of building the first draft of the learning material, with the participation of ten elderly people who attended the workshops in previous years.

The technical team that followed the interaction workshops was made of an ergonomist and a collaborator. To register problems and difficulties encountered by the elderly people during the workshops, or observed by the technical team, we used: video camera, photo camera, manual notes and questionnaires with open and closed questions. All of those instruments were allowed by the participants, made formal through the Term of Free and Clarified Consent, properly signed, according to the Resolution 196/CNS.

To build the first draft of the learning material, ten elderly people (three men and seven women) were invited, with heterogeneous educational level (from elementary school to college) and ages between 56 and 68 years old, who participated voluntarily in two workshops, each lasting two hours, in the Infocenter for the third age in UFSC. During the workshops, we asked the elderly people what they would like to change, add or remove from the existing learning material, which they had already used during the computer workshops. All the suggestions and observations made by them were registered for posterior analysis.
From these workshops and the collected observations, we went for the elaboration of the first draft of the learning material. After two months, we finished the first prototype of the material. The material had eight activities divided into workshops. Each workshop’s topic constitutes a tutorial of a certain content, with various proposed activities, such as:

**Activity 1** – Discovering the computer – This activity has the goal of pointing some basic components and resources of the computer, as well as presenting the elements that allow the exchange of data between the user and the computer.

**Activity 2** – Drawing – This activity’s goal is helping the elderly user to interact with the mouse and, simultaneously, orienting them to look at the pointer on the screen. As they drew or doodled, they worked their psycho-motor skills. Handling the mouse on the desk and synchronizing the eyes on the computer screen requires ability and coordination, since the “looking focus” is in a different level than the hand, and it requires training. This activity aims at fixing contents and is divided into two workshops.

**Activity 3** – Editing and formatting text – This activity provides some basic resources for making texts. For this activity there were six workshops, in which some of the actions developed at the previous workshop were repeated, and another action was added, gradually. Three fixation exercises were part of this activity. These exercises were of investigative character, to know if the elderly learner was understanding what he/she was doing, and exploratory since they should retrieve information from the previous workshops to answer the questions in this activity.

**Activity 4** – Internet: Consulting and Searching – From this activity, the elderly learner could know some information and communication tools used on the Web. This activity uses two fixation exercises and is divided into two workshops.

**Activity 5** – Teaching Project I – The main goal in this activity is to join all the contents from the previous activities. For such, the learner-student should put together their first project, using the tools and the knowledge learned during the activities 1, 2, 3 and 4 of the learning material. All was done intending to repeat what was seen before, but also so the elderly learner could see the applications and/or to see what each tool did. To conclude the Teaching Project I two or three workshops are necessary, depending on the class rhythm.

In this first project it was necessary to propose a common theme for all the learners, since many of them had been out of the school context for many years, and showed difficulty in idealizing or finding a theme to develop in their project. Thus, those who thought it was necessary could ask or receive support/help from other peers in the workshop. A step-by-step routine to be put together was provided, aiming at supporting the learners, which was based on the project pedagogy approach.

**Activity 6** – E-mail/Electronic Mail – For this activity, there were four workshops that approached the main actions to open, read, forward, compose, delete and send an e-mail. Three fixation exercises are part of this activity.
Activity 7 – Talking on the Internet – This exercise shows in a concise way how to use an instant message/chat program. It has fixation activities and is divided into two workshops.

Activity 8 – Teaching Project II – In this activity, the learner-student elaborated a free-themed project, that is, a theme that they had the curiosity or interest in studying. The dynamics for the development of this activity is oriented by a script, similar to the one existing in Activity 5. The difference in this activity comes from the fact that it induces a certain autonomy from the elderly user, since they are more at ease with their peers, the workshops and the learning material, and consequently more secure and confident to develop the project. This activity, similarly to the Teaching Project I, will need two to three workshops for the elderly users to put together the project, depending on the class rhythm.

Allied to the content, we must provide special attention to the texts, colors, font type, font size, images, figures and indications (signaling through arrows) to facilitate comprehension, indications and assimilation of content at the workshops. This care must be taken in order to meet the particularities presented by the elderly users, such as, sometimes, difficulties in focusing and retaining new information. With the same intention of improving the readability of the learning material, its printing should be done in color to facilitate the association of the printed content to the activity presented on the computer screen. Another care to be taken refers to spiral binding, in order to facilitate its handling by the elderly user in front of the computer.

It is important to highlight that the learning material also contains passages of the authors (narrator) dialogs with the learner, with the purpose of encouraging/motivating and guiding them during the use of the material.

5. Validation of the Learning Material

After the first draft was elaborated, we invited the same ten elderly users that attended the workshops to elaborate the second draft of the learning material. They were invited to participate, voluntarily, of a six-workshop cycle, of two hours each, to make an evaluation of the material prototype developed. The goal was to observe the performance and reduce the number of mistakes during the use of the contents or the handling of the learning material in performing a certain task on the computer and with its communication and information tools.

The dynamics for evaluating the materials started with the elderly users first reading each activity, and then carrying out the exercises proposed on each workshop. All complaints and difficulties found were registered by the evaluation team for future analysis and modification in the material.
6. Results and Discussion

Some difficulties or complaints observed and registered during the evaluation were related to the font size, font type, font color and words in English. The students made suggestions to include explanation notes and exclude some contents. The readability of figures and images in color screens, as well as the signals made with arrows in the material were praised by the students. This resource was used due to empirical observations collected during the workshops, in which we noticed the elderly users have difficulty in locating and/or following the mouse pointer, identifying icons and manipulating graphic objects.

The color material proved to be a positive resource to be used in learning materials focused on the elderly. We also noticed, along the workshops, that the use of figures and images of screens, buttons, indication arrows in colors lead the elderly to a better performance in associating what was in the learning material with what was presented on the computer screen. The use of more concise sentences also favored comprehension, since it reduced the information density.

After two cycles of re-elaboration and reviews with the ten users, we came to the third version of the learning material.

Intending to verify the accessibility of this learning material, we repeated the same process in a fourth valuation carried out with other 55 elderly users, being 22 participants from the workshops in the second semester of 2006 and the other 33 in the first semester of 2007, with an age average of 65 and heterogeneous educational level (from high school to post-graduates). All of the workshop participants attended the Infocenter for the third age during four months and had around 24 workshops. The meetings took place twice a week per class, coming to a total of 240 hours of learning material use by the elderly students.

Evaluations of each activity contained in the learning material were done with the elderly. Those evaluations were obtained through multiple choice questions that varied as very good, good, poor and very poor, and were collected during the computer workshops with the elderly users in the second semester of 2006 and the first semester of 2007.

The activities 1 and 2 were the lowest ranked in the material evaluation. We observed, in Activity 1, that some of the elderly users had a resistance/indisposition to read, an action highly demanded in this activity, around 30 minutes to conclude the reading for those with more resistance and difficulty.

Because one of the activities aimed at introducing the computer and its peripherals, some elderly users did not have patience. That was clear from the fact these people preferred asking “What am I supposed to do?” and “How do I do it?”. These questions were made during the moment reserved for the reading demanded in this activity.

In Activity 2, the great villain was the mouse, since this activity has the goal to work motor skills and coordination, a fact already verified in several researches. Another difficulty related to mouse manipulation was associating the movement to the pointer on the computer screen. As already observed by (SALES, 2002), the thin shape of the cursor on the video screen may it more difficult to find on the
screen. Another complaint, very common in the workshops, was about the simple and double clicks on the mouse. The elderly users were confused about when they should use one or the other. That happens because of the decrease in the ability to hold attention (especially in divided situations) and alterations in focus, memorization, reading or perception in some of the elderly.

7. Final Considerations

Teaching computer skills for the elderly nowadays is a reality in the Federal University of Santa Catarina. The Infocenter for the third age (LSC/UFSC) meets a repressed demand of elderly people who try to keep up to date as to computers and to prepare for new challenges.

The practical experience has been stimulating, since the results achieved show us how much the elderly person can interact with the computer and with the digital media, expanding their possibility and relationship horizon. For such, we must simply believe in their potential and offer them methodologies and strategies that fulfill their needs and interests.

The andragogical approach based on the theoretical suppositions of (FREIRE, 1996), as to the learner’s reality, autonomy and the use of generating subjects, as well as the project teaching strategy proved to be efficient, attractive and accessible, allowing the elderly people to break away from fears and barriers the fast technological evolution might impose on them. The result was clear on the development of the teaching projects done by the elderly students that concluded the workshops. They were also ratified by the interviews and questionnaires answered by the elderly during the workshops, since the methodology allowed the learners to have a greater proximity to their reality and interest, thus helping the elderly user, who, with a more effective learning, could notice the “virtual” become “real”.

All the precautions pointed out in this paper referring to the learning material were taken to reduce the elderly workload during their learning process in the computer workshops. We observed that it made them less stressed and less embarrassed in front of the computer and its communication and information tools. Also, we noticed a new situation of security and autonomy in this interaction, made possible through the easy access and use of the learning material.

The study presented here tried to meet the Laws 8.842/1994 and 10.741/2003 mentioned before, referring to the development of educational programs focused on the elderly, since it gave the opportunity to some accessibility premises to develop learning material adequate to the elderly conditions.

The elderly have interest and possibility of achieving a certain autonomy with the computer, and the contact with computers might propitiate some benefits, such as better social interaction and mental stimulus. However, promoting the inclusion of the elderly in the digital world context demands, above all, consider their
language, their life stories, their cognitive, emotional and physical alterations, among others.

In sum, the study presented here is inserted in a doctoral thesis about, among other subjects, the approach of teaching strategies in elaborating learning materials for the third age.

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