



Meeting Educational Needs of the Elderly in ICT: Two Exploratory Case Studies

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Introduction

While the advent of information technology in the form of PCs and the Internet has revolutionized the way people work, play, and interact, many elderly people are left behind [14]. They grew up without computers and therefore have more difficulty in perceiving the value and usefulness of ICT (information and communication technologies) in their daily activities than do young and middle-aged people. Luckily, there are many initiatives and research to educate and encourage the use of ICT among the elderly [6,7]. Even so, very little is known about the educational needs of elderly people in technology and the methods to meet them. In this report, we present two exploratory case studies that uncover some educational needs of elderly people in ICT based on their life experience, and explore the use of social Web technologies to satisfy them.

The results of this experience indicate that special consideration should be given to life experience and social relationships in elderly education in ICT. The reason is that the elderly have acquired a great amount of knowledge and experience during their lifetime, and these can be difficult to change or ignore as they continue to age.

This finding is bound to challenge traditional learning methodologies, which place more emphasis on the individual than on groups. The elderly have traditionally learned through human interaction rather than reading books or taking exams. This experience also shows that the social relationships established between the elderly and their social circles (namely, other adults, children, and grandchildren) play an important role in the motivations and perceptions of elderly people for learning to use ICT.

We employ digital literacy courses. These courses are likely to be most effective when ICT is used as the course material and educational media [21]. This approach will allow elderly students to be fully immersed in an ICT environment. In light of the importance of life experience and social relationships, we designed and evaluated two prototype courses based on social Web technologies including Yahoo! Flickr [23] and blogs.

The work presented here has been carried out within the framework of the APADIS project [2], an R&D project funded by IMSERSO intended to design and develop an online virtual learning environment that meets the educational needs of elderly people in both online and traditional learning. APADIS seeks to enhance the current version of the ABE Campus [1] (adult basic education) by taking the needs, interests, and opinions of both instructors and students into account. The ABE Campus is currently being used in a broad array of courses for adult and senior education at Ágora in the School of Adult People La Verneda-St. Martí located in Barcelona, Spain [18].

The remainder of this report is organized as follows: In the first section, we present some educational needs of elderly people in ICT. In the second section, we describe two scenarios in which our prototypes satisfy them. Finally, we show our research conclusions and future work.

Some Educational Needs of Elderly People in ICT

To understand the educational needs of elderly people in ICT, we conducted an ethnographical study which surveyed older and middle-aged people who have been enrolled at the school for two years. This fieldwork was conducted in a bottom-up fashion in order to uncover aspects that hinder the elderly from learning about ICT. The ethnographical notes were analyzed using well-known qualitative techniques, such as content analysis [5,9]. The data is further supplemented by a comprehensive literature review on ICT accessibility and the elderly, which is carried out within the context of our ongoing research [17].

We start off by giving an overview of the courses organized by Ágora. Afterwards, we present some results of our ethnographical research.

Overview of the Courses in ICT Organized by Ágora

Ágora is a member of the Omnia Network, a project launched by the local government of Catalonia that is intended to introduce adult and elderly people to ICT. Ágora offers a wide range of courses in ICT that cater to the members of more than 1000 associations. During our research, we have been involved

in several courses where the students (mostly elderly) are taught basic and advanced Web navigation, communicating via the Web, Web design, and document editing.

The course content and the media of delivery are usually overlapping. For example, the elderly learn about e-mail by using existing Web mail services. Moreover, most of the coursework involves group activities to encourage group learning. An example project is to create a Word document with images and textual descriptions of a country. These courses are very appealing and effective; in fact, afterward, some students advance to become instructors.

The Impact of Life Experience on Senior Education in ICT

Recent research has shown that one of the major differences between elderly and young students is that elderly people bring information and experience that their younger classmates do not have [3]. Consequently, there are obvious differences in motivations between the elderly and their younger counterparts. While young people are mainly interested in learning in order to find well-paid jobs, the elderly want to learn to improve their lives for self-actualization [7]. To design digital courses to help the elderly students, understanding this motivational gap is paramount.

According to our ongoing research, life experience has a considerable impact on several layers of senior education in ICT. The elderly population is generally characterized by their low level of education [7,13]. They were brought up in a traditional education system, and therefore may not realize the potential of ICT education in their lives. For instance, unlike elderly students, younger students tend to read the written material from the courses when they need to carry out a task or find information. Elderly people in this case would often ask their classmates, without resorting to the class material. We thus believe that typical activities carried out in traditional learning methodologies are not natural for the elderly in ICT learning, whereas they are for younger students.

Historically, elderly people in Spain or in other countries such as the U.K. learned mostly by interacting with people rather than taking exams. Many can argue that elderly people do take exams in their primary or secondary school. However, the length of their life experience eclipses their school experience (if any). As a consequence, learning activities within most traditional and common methodologies are probably unfitting for senior education in ICT. For instance, when elderly students were asked about the possibility of taking exams in digital literacy courses, they reacted negatively. The following quote, taken from our ethnographical notes, illustrates this:

Exams will act as a deterrent for us to take these courses. All of us are more interested in learning how

to use a computer in an atmosphere which fosters learning than in obtaining official certificates; indeed, we do not need them.

While there are elderly people with a certain level of experience or familiarity with ICT who tend to be more individual or independent than those without experience, this is not the rule. Most elderly people show a strong preference towards learning in a group setting. We have found that this is not only perceived as a natural way of socialization, but also as a natural way of learning. Working in groups enables them to discover new things (motivation) by sharing their knowledge with peers (socialization).

Another impact of life experience on seniors is the effect of positive and negative social relationships established between the elderly people and their social circles on the motivation and perception of usefulness of ICT. Even though social relationships play both positive and negative roles in aging, in studies into ICT and the older population they tend to play a more positive role [19].

For instance, grandchildren tend to be an encouraging element for the elderly to go online, as they relish being very close to them. Nevertheless, we have found that negative social relationships established between adult children and their parents turn out to be an essential component to understanding some educational needs of elderly people in ICT in more detail.

We believe that elderly people fear using computers because their adult children forbid their parents from using computers in fear of them breaking. This is particularly important in light of the striking changes in family units in Spain, where young and middle-aged people tend to live longer with their old relatives than some years ago. Within this context, it is difficult to imagine an elderly person learning to use a computer freely at home. Learning in groups helps them overcome these fears.

We have found that when they gain knowledge in using computers, the elderly are eager to demonstrate their ability to use computers properly to their adult children. The elderly are also very keen on using the Web, which, as our ongoing research shows, is one of the most relevant indicators of digital literacy amongst the social circles of elderly people.

We have not identified this necessity amongst middle-aged people, who do not generally need to prove that they can use computers properly. It is worth noting that educational approaches based on group learning have also been proposed in studies with ethnic minorities [11,21].

Meeting Educational Needs of Elderly People in ICT

In this section, we describe the two prototypes that have been designed to both meet the educational

needs of elderly people in ICT and be integrated into the current version of the ABE Campus. We start by outlining each of the two scenarios, which were identified during our ethnographical research, and then we discuss the design and development of the prototypes. Afterwards, we give an overview of the user-centered design process followed in the development of the prototypes along with technical details of their implementation.

Scenarios Where These Needs are Realized

As stated in [4], the defining property of a scenario is that it projects a concrete description of an activity that the user engages in when performing a specific task, a description sufficiently detailed so that design implications can be inferred and reasoned about.

Scenario 1: Sharing and Browsing Pictures Online

A typical activity carried out by the participants in these digital courses is to download online pictures of the town where they were born or a country they would like to visit and use it in their projects, e.g., a Word document or an e-mail. While this is an individual activity, there is much interest in changing it into a social task by working with pictures downloaded by other participants and accessing them using the ABE Campus either at home or at school.

Scenario 2: Writing Reports Online with Other Participants

A typical activity carried out by the participants in these courses is to write documents about a place, e.g., city, town, national garden, they would like to visit. In this forum they socialize and learn from others; however, the current version of the ABE Campus does not allow online collaboration. We attempted to solve this need by e-mail, but our ethnographical study notes indicated that this is an awkward practice because the participants relish using the ABE Campus, which was designed to be used in the courses at the school.

Overview of the Design and Evaluation Process

To solve both scenarios, we selected two prototypes based on Flickr and blogs. Both prototypes were designed by taking a critical communicative approach [8]. This methodology aims to facilitate the end-users' participation in the research on egalitarian terms, promote creation of meaning through interactions, and focus on processes in which egalitarian dialogue and transformation of the context prevail by nurturing dialogic relations based on reflection, self-reflection (critical),

Requirements Gathering and Design Criteria

Within the framework of a user-centered design process [15], identifying the needs of the end-users by asking and observing them allows us to get an in-depth insight into how they carry out their daily activities. The ethnographical research allowed us to acquire this knowledge.

In addition to the users' needs, we needed to understand and consider ABE Campus' technical details for better integration. From our technical analysis, two noteworthy aspects came to light:

- The ABE Campus has been developed using open source technologies such as PHP, JavaScript, and MySQL.
- The ABE Campus users are students, volunteers, and teachers. They might not be experts on computers.

Both the ethnographical research and the technical analysis of the Campus enabled us to identify a number of design criteria, which will be contemplated throughout the design and development of the prototypes. Two of the most important criteria are listed below:

In order to satisfy the requirement of integration, not only must the prototypes use similar technologies such as PHP and MySQL, but also look similar to ABE Campus' interface, especially because the school's teachers, volunteers, and students are familiar with it. The main objective of this project is to improve the current version of the Campus, not develop a new solution from scratch. With respect to the students, the prototypes must cater to their educational and special needs with the latter being derived from age-related changes in functional abilities [10]. With regard to the teachers and volunteers, the prototypes must be easy to use, install, and maintain on a daily basis.

Iterative and Participatory Design

With the aim of taking the needs and interests of elderly people into account and in compliance with the critical communication methodology defined by the CREA-UB, the APADIS project organizes monthly commissions with project members and elderly students in order to guarantee that their needs and interests are considered throughout the project in a communicative and inclusive manner. These meetings are often organized at La Verneda, the main facility where the prototypes will be used during the project. In order to guarantee a certain level of validity, the minutes are read aloud before the end of each meeting.

The prototypes were designed in an iterative and participatory way. In the early stages of design, major ideas behind each prototype were presented to a group of 10 end-users. This presentation mainly consisted of associating prototypes' functionalities with the educational needs of the elderly, such as browsing pictures online and working collaboratively on common projects online. Overall, the minutes of this meeting indicated that all participants showed significant interest in the prototypes.

Nevertheless, more stable versions of the prototypes were required in order for the participants to ascertain whether these technologies truly lived up to their expectations. Finally, after the stable prototypes were released, there was a follow-up meeting, in which the prototypes were formally presented. The participants were encouraged to use them and discuss the tools' worst and best aspects. In general the prototypes were on the right track, and the participants looked forward to using them.

Usability Evaluation

In order to gauge the usability of the early prototypes, we conducted two focus groups. Naturally the interviews were conducted at La Vernela, where the elderly students had previous exposure to ABE Campus software. Using our prior experience in running focus groups with the elderly [16], we set up two groups totaling 10 elderly people who were enrolled in courses at La Vernela. The overall agenda is outlined as follows:

- A brief overview of the prototypes was given prior to each usability session.
- A number of representative tasks were conducted using the prototypes by the evaluation monitor and the participants were encouraged to give their feedback.
- The participants were asked to interact with the prototypes by thinking aloud in a group setting. This activity fosters discussion and provides the most qualitative feedback.
- At the end of each session, a summary of the problems that were identified was read aloud, and the participants were asked to agree (or disagree) to guarantee validity.

Overall, the results are encouraging. All of the participants regarded the prototypes as valuable solutions to meet their educational needs. Some of the comments gathered during the sessions included, "Can my grandchildren see the pictures we use in the courses? That's great!", "This is the kind of thing that we need in the courses," and "I have immediate feedback and I can write a document with another participant, either at home or school."

The major usability pitfalls were related to the terminology used on the prototypes' interfaces and lack of extra functionalities. The participants felt that some words were difficult to understand, even if the terms are common in software interfaces. For instance, the standard label *examine*, which is displayed

on open file dialogs, was associated with medical checkups rather than searching for a file.

More importantly, some students felt that the prototypes lack some common functionalities such as providing options to delete or update files online. This hinders some students from using the prototypes efficiently.

Technical Description of the Two Prototypes

Sharing and Browsing Photos and Pictures

There are numerous systems that allow us to share photos on the Web, such as ImageEvent and AOL You've Got Pictures. We selected Yahoo! Flickr, an online photo sharing system, because it meets the educational needs of elderly students in ICT, and it integrates well into ABE Campus. This Web 2.0 service takes advantage of social tagging [23]. It allows users to organize and share photos using commonly defined tags. Flickr also has a large number of open source APIs, suitable for integration into the current version of ABE Campus. Finally, many other initiatives and projects use Flickr [23]. This indicates that this service is well-supported, which is a noteworthy aspect in the development of open source systems.

The main functionality of this prototype is to allow students to upload their course pictures and images to Flickr using the ABE Campus. The students should also be able to browse their pictures using Flickr. This way, one can store and browse previously downloaded photos to share with friends and relatives (Figure 1).

Taking the requirement of integration into account, the prototype has been developed by using both the Flickr! PHP library [25] and a simple MySQL database. The PHP library allows us to establish a connection with the Flickr server and upload the pictures selected by the users to an account in Flickr. The database acts as an internal repository of pictures, which are organized into several categories corresponding to the school's courses.

Escola de Persones Adultes de la Verneda de St. Martí

Inici > FORMACIÓ > Grups de treball (Grup de Flors (Botànica)) Materials > Edició proposata

Dimecres 14 de Febrer del 2007

Més gran Més petita Desconnectar Administració del campus

Edició de la proposta

Nombre

Descripción

Palabras clave (Lista de palabras que describan la imagen separadas por comas)

Categoría

General

Imagen: (Formato de la imagen: jpeg con tamaño máximo 3 MB)

¿ Necesitas [AYUDA](#) ?

Febrero 2007

14
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28

Març 2007

1
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Figure 1: The main screen of the prototype, an online form with which the end-user can upload a picture to Flickr!.



Edició de la proposta

Galería del AbeCampus

Selecciona la galería que quieras ver, del menú desplegable :

General

Si quieres subir una fotografía, apreta el siguiente botón

¿ Necesitas [AYUDA](#) ?

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Figure 2: The Virtual Gallery allows the end-users to work with the images downloaded by other participants.



Edició de la proposta

Siquieres ver todas las fotografías apreta sobre "Siguientes". [Siguientes](#)

<p>Nombre archivo: Árbol de limón Tipo galería: general Descripción:lee la descripción ...</p> 	<p>Nombre archivo: Árbol en primavera Tipo galería: general Descripción:lee la descripción ...</p> 
<p>Nombre archivo: árbol de naranjo Tipo galería: general Descripción:lee la descripción ...</p> 	<p>Nombre archivo: Naranjo Tipo galería: general Descripción:lee la descripción ...</p> 

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Figure 3: Pictures within the Virtual Gallery.

To better integrate the prototype with the ABE Campus, its user interface must be consistent with the ABE Campus. We have sought to meet this requirement by using the same online form that the students use in the courses to upload their reports to the campus. We added an option to this form to upload photos to Flickr. As shown in Figure 1, the end-users can select whether to upload the picture to Flickr or not. All of the technical details are invisible to them, which is a desirable trait for a system used by nonexperts.

Apart from uploading pictures to Flickr, the prototype can store photos in the ABE Campus's database. This functionality was implemented with the aim of allowing instructors to reuse the photos in other educational activities, such as open events. Of course, the students have privacy control over their own pictures.

To share photos internally, we developed a simple virtual gallery (see Figures 2 and 3). This gallery

allows students and teachers to browse their pictures using the ABE Campus (Figure 1). The gallery is written in PHP and MySQL to satisfy the integration requirement. With respect to the user interface, we took special needs of elderly students into consideration by carefully selecting the language and terminology such that they are much easier to understand. Our design adheres to guidelines for Web accessibility for the elderly [12]. The user interface has one screen per functionality, displaying information that is necessary to conduct a specific task.

Writing Documents Online with Other Participants

Wikis and blogs allow us to write online documents collaboratively. We did not believe that a wiki could meet our requirements because of the difficulty of installation and maintenance by nonexperts. Blogs are more attractive because there are existing versions maintained by elderly adults in SeniorNet [27]. Furthermore, there are SeniorNet organizations that use blogs as the platform to create a significant component of their home pages, e.g., SeniorNet Dallas [24]. We decided to use blogs in the APADIS project to meet the scenario requirements.

Our analysis indicates that there are two types of blogs. One type can be installed onto a local server, e.g., WordPress [26] and Simple PHP Blog [28]. This type of blog allows us to control the presentation and content. The drawback is that a server becomes necessary. The other type of blogs are hosted at external hosts. These eliminate the need to install the application on a local server, but our control becomes very limited. After carefully weighing both approaches, we selected the first type, inasmuch as teachers and staff of an adult school need to take as much control as possible over the material and information available at the school's Web site.

Among the blogs that are installable to a local server, we chose WordPress because it is written in PHP and MySQL for easier integration with the ABE Campus. Additionally, we had prior experience with WordPress from a European Project on eLearning [20]. We found that (1) its installation process does not involve many technical aspects, (2) the administration user interface renders almost all the technical details invisible, and (3) it is very simple to use for nonexpert users. WordPress has some advantages over other similar blogs, such as Simple PHP Blog and Blog LiveCMS:

- The WordPress user interface is completely customizable.
- WordPress is widely used by large companies in Spain, such as Telefónica (<http://www.creamoselfuturo.com>).



Inicio

Comisión del mes de mayo

Archivado en: Reuniones — admin at 5:13 pm on Lunes, Mayo 21, 2007 Editar

A continuación se va a presentar el acta del resumen de la comisión mixta que se ha realizado el 18 de mayo en la escuela La Verna.

Acta Comisión APADIS

Esta reunión ha estado centrada en el trabajo de campo.

Comentarios (0)

Grupos de trabajo:

Bienvenida

Neo

Alfa

Certi

Pueblos del mundo

Informática inicial

Informática avanzada

Reuniones

Meses:

Figure 4: A blog entry.

The blog, as shown in Figure 4, is divided into several sections that correspond to the courses and activities in adult and basic education at Ágora. The list of courses is displayed on the right column of the figure. This blog allows students to create reports online while remaining in a group setting. The students receive immediate feedback because all updates such as edits and insertions are reflected almost instantaneously. They can immediately see comments on their posts or reports. Furthermore, all reports can be accessed by using a Web browser, which allows students to show their reports to their friends and relatives using the Web.

Conclusions and Future Work

With respect to the educational needs of elderly people in ICT, the exploratory case studies indicate that special consideration should be given to life experience. Elderly people *draw firmly* on the

knowledge and experience gained during their lifetime, and it is very difficult to change it. eliminate later in life. The results of our ongoing work strongly recommend learning from their past to design effective learning solutions for the elderly. A striking implication of this suggestion, which warrants much more research, is that traditional learning methodologies are bound to not fit in senior education in ICT because they do not consider details in life experience. For instance, the elderly have traditionally learned by communicating with other people rather than reading books or sitting for exams. To be successful, one has to consider this reality when designing learning materials and methodologies. In this report, the impact has been on using social Web technologies, which foster group activities and strengthen specific social relationships.

In addition to some educational needs of the elderly in ICT, this paper has uncovered some requirements for designing accessible user interfaces. Although aspects such as age-related changes in vision and cognition play an important role in designing for the elderly, we have found that using easy-to-understand language should not be overlooked. This finding is also tied to the importance of life experience, since the elderly expect to communicate with an application by using familiar language and not computer jargon. Apart from this, technologies for supporting the special educational needs of the elderly in ICT should be designed by considering that the instructors or learning providers who will use them are not necessarily experts in using computers.

The results presented in this paper should be understood within the context that senior education in ICT is a very fertile research area and there are many unanswered questions. The educational value of the prototypes described in this report has not been evaluated in detail. The first series of usability and technical evaluations initially confirm that the prototypes meet their educational needs. Nevertheless, the prototypes should be evaluated in a follow-up study in order to assess their educational values and confirm the hypothesis that traditional learning methodologies are not suitable for senior education in ICT. In addition to this, the elderly are a very heterogeneous group and much more user input is needed to draw significant conclusions as to the impact of life experience on the educational needs of the elderly in ICT.

In the future, we expect to overcome these limitations. We aim to shed some light on the blurred area of senior education in ICT by using an inclusive approach and multidisciplinary combination of research methods in order to form a better understanding of the educational needs and interests of the elderly in traditional and online learning.

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