

Online Seniors: Survey analysis of the appropriation of touch-based mobile devices in different learning settings

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Abstract— This study presents itself as an opportunity to encourage a more effective participation of senior individuals in the digital society, through the use of touch-based mobile devices. Infoexclusion is a crucial issue across Europe, pressing the creation of initiatives that help the elderly interact with digital technologies and understand their benefits. Several studies refer that seniors show greater disposition to use touch-based mobile devices (smartphones and tablets), when compared to traditional computers, due to their distinct features. In this research, we study the appropriation of touch-based mobile devices (namely, tablets and smartphones) by seniors in different learning settings, in the areas of communication and socialization, health and well-being, in tasks related with acquiring goods and services online. This was the basis for the design of a training model prototype that can answer to their interests, needs and learning.

Keywords—*seniors; touch-based mobile devices; digital infoexclusion; ict*

I. INTRODUCTION

Population aging represents one of the most important challenges for XXI century societies, from social, political and economic points of view. According to data from the European Commission, by 2025, over 20% of Europeans will be over 65 years old, and an increase in adults over 80 years old is expected. Similarly, international and national reports identify older citizens as part of the info-excluded group [18]. Around 30% of Europeans has never used the internet, the majority of which between 65 and 74 years old [37] [14], as this is the age range with the smaller online presence [44] [11] [35] [14]. Thus, they are devoid of content that, otherwise, would allow them to overcome barriers in their social interactions, reinforce their social support network [50] [38], fight loneliness and depression [48], improve their cognitive abilities, autonomy, well-being [44] [15] and physical domain. Given this phenomenon, it is essential to reflect on measures that can lead older adults to become increasingly info-included citizens [18]. European Union has recognized the importance of information and communication technologies (ICT) in finding answers to the challenges and opportunities that population aging present [14]. Recently, the use of mobile devices (namely the use of

tablets and other touch-based devices) is increasing rapidly across Europe, with price, mobility and usability issues the main reasons for their acquisition [20]. Studies point to senior preference of tablets over computers due, among other factors, to their natural and intuitive interface, easy navigation and touch-based screen [42]. As a way of promoting digital competencies, mobile devices can assume an important role in new knowledge acquisition and daily activities performance [18].

II. THEORETICAL BACKGROUND

A. Active aging and the use of ICT

According to the World Health Organization (WHO), active aging consists of a “*process of optimization of the opportunities for health, participation and security, to improve the quality of life of aging people*”, that may be promoted individually or collectively []. Therefore, aging should not be seen as something limitative, as older people may contribute in significant ways to society, making it fundamental to provide them with learning experiences and rich and stimulating environments [28]. Some studies reveal that internet use leads to a decrease of isolation in old age [26] [39] [45] [50], stimulates seniors to active aging [32] [39] [46], leads to positive effects from social, social capital and well-being points of view [3] [25] [35] [40], improves cognitive functions [4] [49] and quality of living in general [27] [32].

Digital inclusion of seniors is increasingly relevant and challenging, and it can contribute to significantly change their life, strengthening self-esteem, identity, the development of capabilities, of autonomy and the overcoming of problems either physical, emotional, social, of digital inclusion [43] [17] [5] [12] [2].

B. Studies about mobile device use

According to some studies, tablets may have an important role in ageing, since they may support seniors either with visual, hearing, motor and sensorial disabilities, or with arthritis

related problems in their wrists and/or fingers [20]. The fact that tablets do not demand the installation of plugins and other technical specifications makes their use/navigation easier for this type of users [20].

Research supports the idea that seniors are better able to use mobile devices rather than computers [42] [19] and also that touch-based interface may facilitate their learning [21]. A study aiming at comparing the use of tablets with traditional computers or notebooks, shows that devices facilitate the acquisition of digital competencies by senior individuals, namely: simplicity; mobility; ease of use; ap (p) titude; touch screens were also highly motivating for this type of individuals, facilitating technology interaction [20].

In Portugal, a study [35] showed that the majority of seniors have and have had mobile phones, despite not using the personal computers, nor the internet, due to their low level of education (schooling), lack of knowledge, lack of access to devices, affordability, among other barriers. According to some authors [8] despite a high percentage of elderly people owning mobile devices such as phones, they just use them to send messages and/or to make phone calls, thus making a limited use of these.

Tablets are often used for personal issues. There are studies pointing to its use in educational contexts, for example [7], in the area of health and elderly well-being [34], in cognition [6], on a social level, through social network use [19] [47] [23], and as support to personal organization [16].

Though mobile devices have the benefit of being intuitive, there are studies identifying some barriers to use, such as the absence of the tactile feedback from common keyboards, alongside with the loss of physical stability in old age [36] [30] [41]; the accessibility of devices, the lack of knowledge about their benefits [51] [33] [30]; content inadequacy to this population, and the difficulty in understanding internet interaction paradigms, due to issues of usability and interfaces [52].

A study about senior motivation [33] demonstrates that the major barriers are not usability, but ignorance of their benefits. In this same line of thought, [16] refers the importance of adequate monitoring, so seniors can perform tasks in mobile devices in order to improve their satisfaction, and allowing for greater receptivity to the technology. According to the authors, mobile devices may be useful in improving elder social inclusion, if they feel familiar, self-assured with technology, and understand their usefulness. Taking into account the studies of [5] [1] [10], seniors' routines should be investigated, in order to meet their interests, needs and motivations. Jones and Bayen quoted by Kachar (s/d) [35] *"point out the need of planning methodological proposals directed towards the elder population, paying attention to their cognitive processes, rhythm – which is slower -, resources – that become limited – and aging typical sensorial restrictions"* (p.17).

III. EMPIRICAL STUDY

This study is framed by a Design Based Research (DBR) methodology. It starts by analyzing real-world settings

problems to try to understand how seniors appropriate mobile devices. Based on this, it seeks to find innovating solutions that help them use mobile devices in their daily life, in an integrated and useful manner.

This study aims at investigating which is the appropriation of touch-based mobile devices (tablets and smartphones) made by individuals aged 60 years old or more, coming from two learning settings: the IPL 60+ program and seniors engaged in an activity promoted by a local council (Junta de Freguesia) in Portugal's Centro Region. To perform this study, touch-based mobile devices were used, and analysis concerned issues such as communication and socialization, health and well-being, and tasks related with the online acquisition of goods and services. The choice for these issues is supported by recent research [18] [8] [9] [20]; they are also considered important topics for the population at hand, and can contribute to an improvement of their quality of life.

The goal of this study is the development of a training model prototype, that can support seniors in the appropriation of mobile devices in their daily life, in the mentioned areas. This study points at answering the following research question:

"How do seniors appropriate touch-based devices (tablets and smartphones) in different learning settings in the areas of communication, socialization, health and well-being, in tasks related with the online acquisition of goods and services?"

IV. RESEARCH PHASES AND DATA GATHERING TECHNIQUES

This study has four different phases, of which the first two are already concluded. First of all, a questionnaire based survey was made with the aim of characterizing seniors profile, identifying the way they use and manage their time, characterizing the use they give to touch-based mobile devices, identifying the type of use given to the devices, characterizing the use they make of the computer and, at last, characterizing the type of use given to the computer.

In a second phase, we selected seniors with touch-based mobile devices and conducted four focus-group sessions with two groups of each institution, to investigate the importance afforded to touch-based mobile devices, the reasons of its use/lack thereof, conducted activities, areas of interest, activities they would like to learn how to perform, difficulties and barriers and ways to overcome them and, finally, to identify learning strategies for the effective use of touch-based mobile devices.

In a third and fourth moment of research, we will design and implement pilot training workshops, conceived for seniors to test and integrate touch-based mobile in the referred areas; their relevance and adequacy will be assessed through interviews. Finally, we will develop a training model prototype that contemplates specific pedagogical strategies for seniors using tablets and smartphones (seniors, expert seniors, caregivers and teachers working with this population), key-areas, useful apps fully tested by users, goals and activities.

V. RESULTS AND DISCUSSION (PHASE I)

A. Profile Characterization

This section presents the results obtained in the first phase of the study. Inquiries were made to 72 seniors, of which 58 women (81%) and 14 men (19%), ages between 60 and 81, averaging at 67,35 years old. Over 50% of this sample is married and their education level is mainly distributed as follows: “complete primary school” (31,94%), “higher education degree” (22,22%) and “incomplete primary school” (19,44%). Regarding their current work situation, over 50% of the sample is now retired and their work was related to “service staff” (<<peçoal dos serviços>> - 29,39%,) and “public administration higher board, and business and liberal workers” (<<quadro superior da administração pública, e empresas e profissões liberais>> - 23,61%).

B. Time management

Concerning time management, around 40,28% of our sample allocates 4 or more hours of their time to institutions and 2 hours (34,72%) to several activities, of which “physical activity”, “arts” and “languages” were pointed out as the most important. Concerning the way seniors occupy their time, activities cover several areas, from culture to sports, ludic/recreation, traveling, learning, media use, family and friends, home related tasks and, at last, professional.

About 80,56% of seniors uses their time to practice sports (walking, gymnastics, dance, swimming, hidrogymnastics, fishing, hunting...), 76,39% dedicates to family activities, 73,61% takes care of their home, talks to friends/neighbors and watches TV. Other activities stand out with less frequency, such as reading magazines, newspapers and books (62,50%), going on excursions/tours/visits (55,56%), using the computer (54,17%) and using touch-based mobile devices (50%).

C. Use of touch-based mobile devices

Concerning mobile devices, over half the seniors sample (59,72%) owns a device by personal decision (43,06%) and about 47,22% makes use of it every day. Relatively to its use in daily routines, data shows that half of the seniors carries the device when going out (50%) and uses it throughout the day (51,39%). When referring to its use by night, this percentage decreases to 33,33%.

Analysis does not reveal any relation between mobile device acquisition and genre or age. However, a significant associate is observed between seniors owning mobile devices and their education/schooling ($p=0,001$, that is $p\leq 0,05$). The data reveals that the higher the education level, the greater the disposition to acquire a mobile device. In regard to the work variable, we verified a minor association with the acquisition of mobile devices ($p=0,004$, that is $p\leq 0,05$).

In regard to seniors that do not own a mobile device (40,28%), only a minimum percentage rarely uses it through family (4,17%). When questioned about the reasons for not acquiring a mobile device, the answers range from “don’t

know how to use” (18,06%) and “it is very expensive” (11,11%).

D. Type of touch-based mobile device use

Concerning the type of use seniors make of mobile devices, it is important to emphasize that 36 situations were present in the sample, distributed by areas such as: communication and socialization, health and well-being, and tasks related with online acquisition of goods and services. The most frequent activities performed by seniors with/through mobile devices belong in the communication and socialization categories such as calls to family and friends (51,39%), organizing personal contacts (41,67%), taking pictures (36,11%), accessing social networks (34,72%) and viewing weather forecasts (31,94%). However, the majority of seniors does not use the mobile devices to perform tasks related to maintaining eating records (nutritional values) (63,89%), recording blood pressure/cholesterol/diabetes (62,50%), buying online at “Continente” (a popular hypermarket) (62,50%), recording their weight (61,11%) and buying books, clothes, shoes, home items (59,72%).

It also stands out that 58,33% of seniors do not use the mobile device to keep records of medicine taking and walks, 56,94% do not use the devices to make a doctors’ appointment online and communicating electricity consumption, 54,17% do not look for/book/buy trips with the device, 54,11% do not make grossery shopping lists online, 51,39% do not manage the bank account with the device, 50% do not watch tv with the mobile device and 50% do not use the mobile device to engage in gameplay, nor to make videos. Results show that 47,22% do not make payments/money transfers through the bank account, nor make letters or write texts, 44,44% do not check nor validate invoices, and do not install apps, 40,28% do not access learning platforms with mobile devices, 41,67% do not listen to music, nor research about health and well-being. Around 38,89% do not use the online diary for reminders and other activities, 36,11% do not use the mobile device to create or organize photo albums, 34,72% do not watch youtube videos, nor read newspapers, magazines and other sites, 33,33% do not search for recipes or culinary dishes and 31,94% do not search on google, nor share texts and/or images/videos in social networks (facebook).

It is important to emphasize that from the 36 settings presented, only 5 match the activities performed by the majority of the seniors in our sample, revealing a low use of mobile devices in the mentioned categories.

E. Using the computer

In the current sample, over half the seniors has already used a computer (70,83%), and from those 36,11% use it daily and 19,4% use it several times a week. The analysis also points out that the inquired population that uses the computer is more inclined to acquire touch-based mobile devices, with the chi squared tests showing a positive association between the variables of $p = 0,000$ (that is $p\leq 0,05$).

F. Type of computer use

Regarding the use seniors give to computers, analysis showed that all of them use computers; the type of computer use is distributed as follows: 61,11% for internet access, 48,36% for typing texts, 74,22% for e-mail services and 38,89% to access social networks.

VI. RESULTS AND DISCUSSION (PHASE 2)

Although this paper focuses on the results of phase 1, we find it pertinent to share some general conclusions regarding phase 2. Four focus-group sessions were conducted with 4 different groups of seniors, with the purpose of knowing the importance that mobile devices have in their life, the reasons for their use/lack thereof, performed activities, interests and needs, difficulties and barriers felt, and learning strategies they consider more effective. Collecting information was fundamental for the planning of the third phase of this project (training workshops), in terms of session design, topic selection, and learning strategies, among other topics.

Concerning the importance of mobile devices, seniors point out that these are useful to communicate “we don’t know how to live without them anymore”, as a way of recreation/distraction, of maintaining up to date, “understand this world which is in (such an) evolution”, as a working tool, to check social networks, to search for places, images, among others.

As for the reasons pointed by seniors to use mobile devices, they include calling and send messages (“talk to my kids”), access updated information (“formerly I used to take 30 days to get an information...today I take 30 seconds”), wakeup, check social networks, play games and take pictures.

As for the reasons that contribute to decreased use of mobile devices, seniors refer they are afraid to try/damage, lack of predisposition to technology (“a ridiculous feeling (...)), the unfamiliarity (“(...) I don’t use because I’m unfamiliar with”), and the lack of interest/utility.

Concerning the activities performed daily, seniors perform searches, take pictures, send messages, use the device as an alarm clock, as a locator (GPS, google maps), check weather forecast, make calculations (calculator), check the social networks, the news, make video calls, send emails, among other activities.

With regard to the learning they would like to take with their mobile device, seniors refer to a set of diversified activities, such as: google maps, email managing, provide electricity consumption data, check invoices/electricity payments, content transfer and synchronize, learning how to work with image edition apps, learning how to create and manage an online diary, access to music, social networks, internet dangers, and other learnings.

In what concerns the difficulties felt when using mobile devices, seniors emphasize ignorance about the devices’ potentialities (“we only have doubts about the things we did or tried to do...we don’t have doubts about the <<things>> we don’t know the device does”), difficulties in transferring contents and apps, difficulties at the usability level (“the

fingers are thick”), difficulties in the use of communication tools, in gaming, in the use of location apps (“want to test the kilometers”), in sending emails/messages, in sending/receiving images, and in keeping up with the technological evolution.

As for the way to overcome difficulties and/or the strategies they consider more effective for learning, seniors stressed the support of friends and family, searching on the internet (youtube), specific help through workshops (“what takes us 1 or 2 hours to understand, would take 5 to 10 minutes if someone would explain us”), trial and error, and content creation in digital support, so that they can review it at home.

VII. CONCLUSIONS

The aim of this study is to develop a training model prototype that supports seniors and professionals in the area to appropriate and/or develop activities resorting to touch-based mobile devices. The use of these devices in a pedagogical way and integrated in the mentioned areas, may help seniors to integrate easily in different contexts and to become less infoexcluded.

Analysis of the collected data in the first phase of the study, in what concerns the type of use made by seniors, shows that of the 36 presented settings, only 5 correspond to activities performed by the majority of seniors, thus showing a low deployment of mobile devices in the mentioned categories.

Considering that this research is based on the basic premise that adults learn when they are motivated, that is, when they feel that learning may be useful and bring benefits, data collected on the characterization of seniors’ profiles, of the way they manage time, of the activities they perform, interest areas, and of the way they interact with touch-based mobile devices, proves indispensable for the continuation of this study.

Therefore, we expect that by the end of the study, after all the research phases, seniors may appropriate their touch-based mobile devices, integrating and accompanying a society that continuously navigates through digital content.

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