Education and Training for Older People: Preparing the Future

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Abstract. Older people will play an important role in aging societies. Additionally, new technologies have a massive presence in our society, leading more and more seniors to incorporate them into their daily lives. This trend will be more pronounced in the future. Therefore services should be adapted to meet the needs of older people. Specifically, their participation in education can help improve their Quality of Life. An extensive literature search has been conducted to find eLearning educational environments adapted to older users. The search has been focused on Spain and, to the best of our knowledge, we could not find specialized platforms. Additionally, the use of mobile devices for educational purposes is underestimated. Thus, this work provides a list of manuals and standards that could be considered to develop educational environments for older users. They may be useful for developers, designers and teachers interested in this new promising line of work.

1 Introduction

The percentage of elderly people has steadily increased in most developed countries (USA, Japan, several European States, etc.) over the last 20 years. The medical advancements and the social changes enable people to reach retirement age in good physical and mental condition, which was unthinkable several decades ago. In this sense, Figure 1 shows the evolution of the proportion of population by age group from 2001 to 2012 in the European states, while Figure 2 presents the data of the old-age dependency ratio forecast [1]. Since this study is focused on Spain, we have also analyzed the Spanish case, obtaining similar results. Table 1 shows the life expectancy in this country.

Additionally, the lifestyle as well as the motivations and expectations of older people are changing together with the increasing life expectancy. People are living healthier and more active lives [2]. In this context, products and services should be adapted in order to meet the needs and preferences of the elderly people and create a cohesive inclusive intergenerational society (see for instance the Japanese example in [3]). Specifically, educational environments have the potential to increase the Quality of Life of the aging societies. In fact, that is the main focus of the present work.
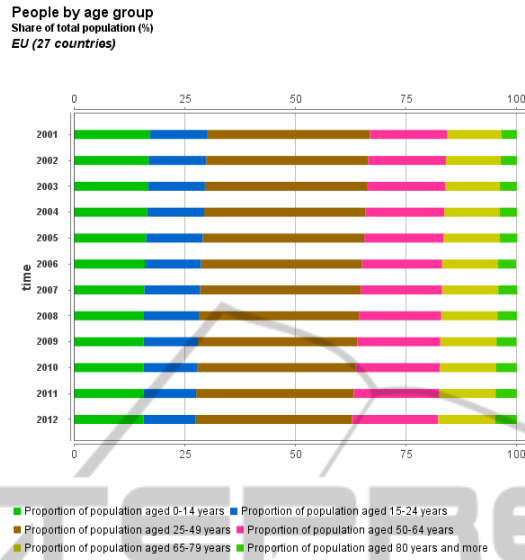
People by age group
Share of total population (%)
EU (27 countries)

Fig. 1. Proportion of population by age group in the European countries [1].

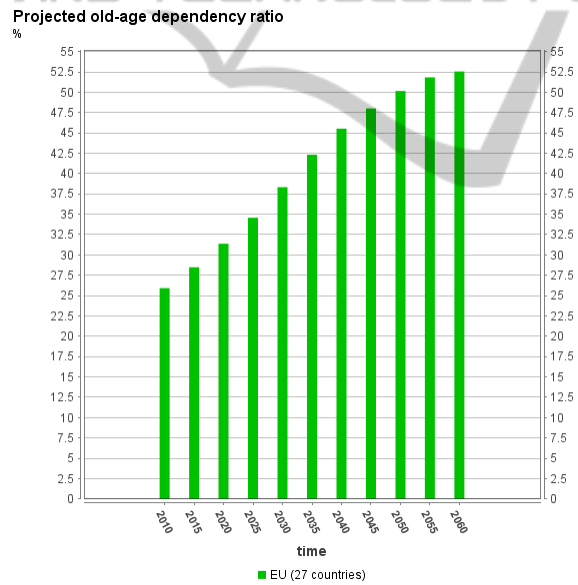Projected old-age dependency ratio
%

Fig. 2. Projected old-age dependency ratio in the European countries [1].

This paper is structured as follows. The second section is devoted to clarify the concepts of "elderly" and "quality of life" as well as the importance of the training for the aged people. The third section presents the elements that should be considered in order to develop educational environments for this sector of the population. Specifically the Spanish case is analyzed. This analysis has allowed us to identify the gaps in

the existing educational environments, the standards that should be applied to them and the guidelines that could be followed in the preparation of the future educational frameworks (Section four). Finally, section five draws some conclusions.

Table 1. Life expectancy in Spain [4].

	2012	2020	2030	2040	2050
Men	79,09	80,99	83,10	85,00	86,72
Women	84,99	86,37	87,95	89,36	90,63

2 Context

2.1 Old Age and Aging

According to Kelh and Fernández [5] any attempt to define the "old age" under chronological criteria is fraught with difficulties. In the literature there are numerous definitions and a high number of studies on this concept (see for instance the revision of Fernández [6], [7], [8], [9], or [10]). In fact, this problem has been discussed for decades. Similarly, it is possible to find a huge number of references to the concept of "aging" (see [11] or [12] among many others). A deep study of these works is beyond the scope of this paper, but all authors agree on one point: "older people" and "aging" concepts refer to subjects aged 60-65 or over. [13].

2.2 Quality of Life

A plethora of definitions of quality of life have emerged over the last decades within the health field and the social science disciplines. Therefore, there is no consensus on a definition of quality of life in older age or among the frailer elderly population [14]. As a result, it is not possible to find a common approach on how to measure quality of life [15] [16] [17]. Despite this variety, Plaza et al. stresses that there are several common needs of older people identified in the literature as well as components of quality of life [18]. They are related to: 1) Health and wellness and home care, 2) Safety, security and privacy. Mobility, 3) Chores and supply with goods, 4) Information, learning and education, 5) Religion/spirituality, 6) Social interaction, 7) Hobbies, and 8) Working life.

In this study, the interest is focused on the fourth item "Information, learning and education".

2.3 Information, Learning and Education to Improve the Quality of Life for the Elderly

Traditionally, old age has been associated with a period of decline. Although this view still persists to some extent [19], new and positive understandings about ageing and being old are changing the way societies and older people see themselves [20].

With regard to the field of education, numerous personal benefits are associated with training activities in the elderly [20]. Recent studies demonstrate that older people learn as well as, or even better than, younger individuals [21]. According to Harley [19], several authors argue that some older learners are likely to have excellent time-management skills because they might have dealt with a variety of domestic and occupational responsibilities for many years before they came to university. This has also been observed in the workplace: older workers have often accumulated substantial knowledge and devised efficient ways to do their work [22]. Creativity also remains independent of age when given positive stimuli [18]. Gaßner has observed that modern devices such as mobile phones, handhelds or e-newspapers allow elderly people to stay informed. Information is essential for individual development, maintaining contact with the outer world and preserving and exercising mental abilities. Conversely, services are needed to enable people to handle the new technologies [23].

3 eLearning Systems to Older People

Some studies on Learning in Adulthood have been published [24]. Specifically e-Learning and distance education can play an important role in helping older adults be integrated into the society. However, several aspects should be first considered [25]: the resistance to new technology, negative perceptions about older adults, class and educational barriers, technical problems, usability issues, the course design and problematic new technologies.

After reviewing the literature, we conclude that both the resistance to new technology and the negative perceptions about older adults are factors that can be overcome (as an example, see the experiences of Trentin [26] or Mayhorn [27]). But at the same time, the literature reviewed suggests that most of the projects on eLearning courses refer to PC applications, while other devices like mobile phones remain underemployed [18].

Thus, it is necessary to consider two aspects: the possible devices that could be used and the human factors that can influence the design of an educational pervasive environment for older people.

3.1   Web Applications

The Spanish eLearning situation has been studied using two sources of information:

a) On-line Courses and Training for the Elderly

An extensive literature search has enabled us to identify several courses for the elderly [28], [29]. These courses usually consist of:

    * On-line Slides
    * PDF documents that are available for download over the Internet.

The courses focus mainly on the following subjects: Health, diet, therapies, massage, beauty, plants, horticulture and physical activity.

It is not easy to find specialized platforms adapted to meet the needs and preferences of older people.

b) Websites for Older People

Thirteen Websites were found and analysed [30]. They dealt mainly with the following topics: Health and beauty, culture, family, money, home, leisure, information, technology and other subjects.

These websites consists of several sections and resources such as TV channels, social networks, radios, questions and answers, games, blogs, online stores, videos, weather forecasts, polls, forums and chats. In Figure 3, we show how the use of these resources is distributed. The results show that forums have the highest level of acceptance and that other resources such as chats, blogs and online stores are also highly valued.
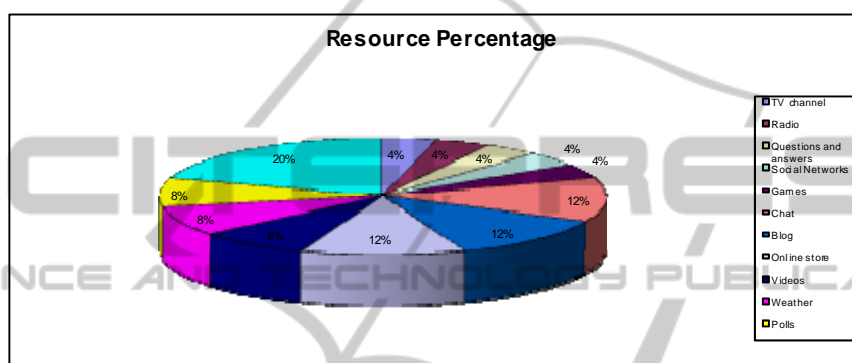

Fig. 3. Resource Percentage used in Websites.

If we analyze in detail figure 3, we can see that there are no specific eLearning sections in this kind of Websites. Therefore, the training and educational activities for senior citizens still follow the traditional model based on the physical class attendance. So the distance, on-line or blended learning has not been explored yet.

3.2 Mobile Devices and Applications

We can identify two main groups of mobile devices for older people:

a) Mobile Phones Adapted to the Elderly Population

Twenty-eight different models have been analyzed in this study [31]. They share several common characteristics such as speakers compatible with hearing aids, SOS button, flashlight, extra strong vibration, low battery level indicator, entry call notification, orange background light and black and white high contrast, hands free speaker, side keys (especially for adjusting the speaker volume), FM Radio, alarms, birthday reminders, extra-large concave keys or buttons and locator service. Table 2 shows an estimation of the percentage of models including these characteristics.

Table 2. Percentage of mobile phones that include relevant characteristics [31].

Characteristic	Percentage (%)
Vibration	75.00
Reminders	64.20
Flashlight	60.70
Speaker compatible with hearing aid	60.70
Low battery level indicator	46.40
Radio	39.20
SOS button	35.70

Additionally, common to all these devices is the lack of a free operating system, which makes it impossible to develop dedicated applications, as well as the inability to connect to the Internet, which limits the exchange of information. Therefore, dedicated mobile phones are not the best option to implement educational pervasive environments for the senior citizens.

b)   Smartphones and Tablets

Within this category, twenty-four models have been analysed (twelve Smartphones and twelve Tablets) [31]. All of them had a free operating system and Internet connection. The main conclusion of this study is that most of the characteristics of the mobile phones for seniors listed in Table 2 can also be implemented in smartphones and tablets. For example the low battery level indicator, the SOS button, entry call notification, the radio, the reminders, the strong vibration, etc. In addition, several important services like fall detection or location, which are highly demanded by the users, can be incorporated in these smart devices. In this sense, they also have the potential to include educational pervasive environments for older people. Some people may argue that seniors are reluctant to use smart devices. However, recent studies have shown that mobile phone usage by people aged over 60 has been growing rapidly [32], [33], and they are becoming common personal items for older persons [34].

Nonetheless, smart mobile devices, as they are conceived, represent a major usability barrier for low-skilled users. Therefore, they should be adapted to the needs of older users in order to improve usability and accessibility. In this sense, the next section summarizes the guidelines and standards that could be applied by developers, researchers or teachers to adapt the mobile devices.

4   Standards and Guidance Manuals to Design Educational Environments for Older People

Older people present a specific physical and mental condition that should be considered in the design of educational environments.

Kurniawan [34] identified issues related to the use of mobile phones by people aged 60 years and over: 1) Buttons: Some are too small, rubbery, do not click when pressed and therefore provide no feedback regarding whether the associated number had been dialed, 2) Menus: Too many, and most of them are unnecessary and difficult

to understand and recall, 3) Devices: Too small to hold comfortably, 4) Text size: Too small to read even with corrective lenses.

Several standards have been developed to provide design guidelines about information technology, computer applications and Websites. They refer to hardware requirements and human-computer interaction. Although they were not originally designed for educational purposes, they could also be applied to training and educational activities. In this sense, the result of the research conducted is shown in table 3. It consists of a list of standards that could be applied in the design of educational environments.

Table 3. Standards applicable to the design of educational environments.

Standard	Title
ISO/IEC TR 19766:2007	Information technology – Guidelines for the design of icons and symbols accessible to all users, including the elderly and persons with disabilities.
ISO 9241-151:2008	Guidance on World Wide Web user interfaces
ISO 9241-171:2008	Ergonomics of human-system interaction — Part 171: Guidance on software accessibility.
ISO 9241-303:2008	Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays.
ISO 9241-920:2009	Ergonomics of human-system interaction — Part 920: Guidance on tactile and haptic interactions.
ISO/IEC TR 29138-2:2009	Information technology — Accessibility considerations for people with disabilities — Part 2: Standards inventory.
UNE-ISO/IEC TR 29138-1:2012 IN	Information technology.Accessibility considerations for people with disabilities. Part 1: User needs summary.
UNE-ISO/IEC TR 29138-3:2012 IN	Information technology. Accessibility considerations for people with disabilities. Part 3: Guidance on user needs mapping.
UNE 139801:2003	Computer applications for people with disabilities. Computer accessibility requirements. Hardware.
UNE 139803:2012	Web content accessibility requirements.

Additionally, other authors have published manuals providing design guidelines. Without pretending to be exhaustive, we may cite the following: Web Accessibility and Older People: Meeting the Needs of Ageing Web Users by W3C [35], Making Your Website Senior Friendly – from the US government [36], Designing Web Sites for Older Adults: Expert Review of Usability for Older Adults at 50 Web Sites [37] or Guidelines to design smartphones applications for people with intellectual disability: a practical experience [38].

As noted above, none of these manuals have been originally conceived to be used in the education field, but they can serve as a reference to design and implement older user-centered educational environments.

5 Conclusions

Older people reach retirement age in a healthier physical and mental state. Information, learning and education are important factors that can help improve the Quality of life of elderly people, especially the more active minded. In this sense, new technologies can be used to support the teaching-learning process. Specifically, we have conducted an extensive search of adapted eLearning platforms in Spain. We can conclude that, to the best of our knowledge, there are no specific educational environments for senior citizens. We could also identify that the use of mobile devices for educational purposes has not been explored yet. Therefore, in order to facilitate the development of educational environments for older users, the present work has provided a list of guidance manuals and standards that should be taken into account. The digital generations of today will be the elders of the future. Thus, it is necessary to prepare for what is to come, and this is a new promising line of work.

Acknowledgements

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