

Technological literacy of older adults for labor integration: Characterization and accessibility of websites

Janeth Beatriz Valecillos-Pereira.

Doctor in Sciences Applied to Education.

School of Education, Bachelor of Education Program, Universidad Viña del Mar,
Santiago, Chile.

Valparaíso, Chile.

janeth.valecillos@uvm.cl

<https://orcid.org/0000-0001-7234-0416>

<https://scholar.google.cl/citations?user=d7rvKNIAAAAJ&hl=es&oi=ao>

María de los Ángeles Ferrer-Mavárez¹.

Doctor of Sciences.

Department of Design, Faculty of Humanities and Social Communication
Technologies, Universidad Tecnológica Metropolitana, Santiago, Chile.

mferrer@utem.cl

<https://orcid.org/0000-0002-2174-6325>

<https://scholar.google.com/citations?user=Ti2rqfsAAAAJ&hl=es>

Erwin Robert Aguirre-Villalobos.

Doctor of Sciences.

Department of Planning and Territorial Planning, Faculty of Construction Sciences
and Territorial Planning, Universidad Tecnológica Metropolitana, Santiago, Chile.

erwin.aguirre@utem.cl

<https://orcid.org/0000-0003-0615-4943>

<https://scholar.google.cl/citations?user=vZWUEtwAAAAJ&hl=es>

Ronald Enrique Méndez-Sánchez.

Master Scientiarum in Process Control and Automation Engineering.

Faculty of Business and Technology, School of Engineering and Technologies,
Universidad Gabriela Mistral, Santiago, Chile.

ronald.mendez@academico.ugm.cl

<https://orcid.org/0000-0002-9199-827X>

<https://scholar.google.es/citations?hl=es&user=2rrozQAAAAJ>

¹ Correspondence: mferrer@utem.cl; Tel.: +56 9 84 700145

Abstract

The purpose of this study was to investigate the technological literacy process in older adults for labor integration using web employment portals in Chile. The research was carried out during 2022, from the Visual Communication Design program, attached to the School of Design of the Metropolitan Technological University. The aim was to recognize the meanings given by users to the experience of digital literacy for inclusive purposes for their incorporation into the labor market. For this, mixed research with a phenomenological approach was developed, through the UX methodology, focused on the needs and characteristics of users. It was theoretically based on User-Centered Design (UCD), from which the UX methodology is derived, to characterize and understand the accessibility of digital job search portals for older adults. The results of the research allowed us to characterize the needs and limitations of the study population in their digital literacy process, for the use of employability platforms, with the purpose of reintegrating into the labor market, as a mechanism for economic and social self-sufficiency. Platforms with greater simplification are required for their effective, intuitive and autonomous use; and information architectures that present the contents in a simple and legible way, with responsive UI that adapts to all devices.

Keywords: Older Adults; Digital Literacy; User Experience Design; Inclusivity; Website; Employability.

Introduction

The demographic density of populations, especially in developed and developing countries during the 21st century, has been characterized by low birth rates and an aging population; there are almost 900 million people over 60 years of age. Worldwide, people are living longer than before, a large part of the population has a life expectancy of over 60 years (World Health Organization (WHO), 2022). In Latin America and the Caribbean, of the 652 million inhabitants in total, 12% are older adults (more than 78 million people). It is estimated that by 2025, people over 60 years of age will represent a third of the world's population, while by 2050 it is expected that there will be around 2 billion people in this age range (24% of the total population) (Huenchuan, 2018). At this stage of human life, people's physical and mental capacities deteriorate greatly, in terms of mental agility, physical degeneration, dependence on others, and fears of loneliness or death increase (Faba-Pérez & Prieto, 2021).

In this sense, Chile is positioned in an advanced stage of this demographic phenomenon, with declining fertility rates and a significant increase in the life expectancy of the elderly (World Health Organization (WHO), 2020). In 1992, 1,311,699 people aged 60 years and older were identified (9.5% of the total population), and by 2021 the number increased to 3,472,243 (17.6% of the total

population) (Huenchuan, 2018; Rojas et al., 2022). In line with this reality and the challenges it entails for the nation, in 2002 Law 19,828 was enacted, which defines as older adults all persons who have reached the age of 60. Additionally, through Law 21,144, the category of the fourth age is established and stratified for those persons who have reached the age of 80 (Biblioteca del Congreso Nacional (BCN), 2019).

Given the accelerated increase in the population of older adults, it is necessary to promote actions from different disciplines that contribute to the public policies that the states have been promoting to guarantee the development, well-being and rights of older persons, promoting their independence, social participation, self-realization and the dignity that this entails. However, with the emergence of the Information and Knowledge Society (IKS), a new social inequality has emerged, called the digital divide, which affects the possibilities of use and access of vulnerable social groups, such as older adults (Gutiérrez-Provecho et al., 2021). The digital divide has become a new barrier to social integration, and is accentuated in older people, often caused by the insufficient availability of technologies and internet connectivity; therefore, it is one of the main challenges to forge an inclusive IKS (Amaro Agudo et al., 2020; Gutiérrez-Provecho et al., 2021; Selwyn, 2004; Varela Ferrío, 2015).

Given the reality described, the World Health Organization (2020) promotes actions to strengthen active aging and achieve the full participation of older people in society; it maintains the need to promote lifelong learning, which implies digital literacy initiatives, recognizing the access barriers that exist in these digital environments, due to the lack of the necessary skills for the use of technology and its respective appropriation (Gutiérrez-Provecho et al., 2021; Martínez-Heredia, 2020; Pretel-Jiménez et al., 2022). It is necessary to encourage the participation of older adults in society's activities from digital environments, as it has a positive impact on their social integration, contributing to their quality of life and healthy aging (Cabero Almenara & Llorente Cejudo, 2020; Martínez-Heredia, 2020; Martín-García et al., 2021; Padial Espinosa et al., 2020; Román-García et al., 2016).

The design discipline, given its nature, allows us to propose and materialize technological solutions in response to people's needs, considering their characteristics and requirements. The application of the User Experience Design methodology - UX (Ferrer et al., 2020; M. D. los Á. Ferrer-Mavárez et al., 2021), is an innovative route that considers people (users) as co-creators of innovation proposals, making them participants throughout the design process, with the purpose of conceiving products in response to their characteristics, capabilities and needs. In this sense, this study focuses on the elderly population, who traditionally

for their social inclusion and especially their labor insertion have been relegated to a secondary role; many times, States address their needs from an almost exclusively welfare point of view, without considering the value of their experience in digital environments for the socio-economic development of a country (Nazar & Figueroa, 2015).

In Latin America, it is a tangible reality that older adults remain active in the labor market (formal and/or informal), due to low income from pensions and retirements, or due to an individual's choice to remain active (Huenchuan, 2018). Therefore, there is a robust international legal framework that supports initiatives that help improve the active and inclusive aging of this population: 1) Vienna International Plan of Action on Ageing, of the United Nations (1982); 2) United Nations Principles for Older Persons (1991); 3) Political Declaration and the Madrid International Plan of Action on Ageing, of the World Health Organization (WHO) (2002); 4) Active Aging: A Policy Framework, of the WHO (2002); and 5) Agenda 2030 for Sustainable Development. and the 6) Inter-American Convention on the Protection of the Human Rights of Older Persons (2015) ratified by Chile in 2017. Finally, in 2020, the United Nations (UN) declared the 7) Decade of Healthy Aging (2021-2030) (Courtis, 2017; Huenchuan, 2018; Organización de los Estados Americanos, 2017; Rojas et al., 2022).

This research aimed to study the digital literacy needs of older adults for the use of employability portals and to propose guidelines to improve accessibility and use on these digital platforms. The study was developed through an inquiry into the digital employability platform for older adults ServiSenior, a company selected due to its history of commitment to inclusion, especially in the older adult population in Latin America and Chile. This company has demonstrated a continuous innovative approach since its foundation in 2016, through different business models, promoting the development of flexible work opportunities for older adults. Accordingly, this research focuses on strengthening the quality of life of the older adult population, considering their social participation and economic independence, addressing the needs of digital literacy and accessibility to technologies that allow them to connect with the labor market; due to its value as an important resource for the economic development of the societies in which they are inserted (WHO, 2020).

This is why, from the design discipline, it is possible to create spaces that promote social inclusion, to achieve a real and solid technological and digital inclusion of older adults (Faba-Pérez & Prieto, 2021), thus overcoming the marked digital divide, a product of insufficient infrastructure, as well as the training of the individual for its efficient and meaningful use (Gutiérrez-Provecho et al., 2021;

Padial Espinosa et al., 2020). Older people have limited skills to make conscious and reflective use of these spaces; not being digital natives, they are unaware of the logic of how these "new media" operate, thus becoming the new technological illiterates (Loos & Ivan, 2024; Román-García et al., 2016); these limitations deprive this group of users of the benefits of the new digitalized society (Amaro Agudo et al., 2020). Despite this, the elderly population has been experiencing, in recent years, an increase in the use of communication technologies. A representative change is evident, due to the need to remain active in the workplace as part of the intrinsic processes of the digitalized society; mobile devices being the most used, which has generated a significant increase in their communication and work use (Martínez-Heredia, 2020; Martín-García et al., 2021).

Therefore, it is necessary to investigate the designs of user interfaces and the experiences that the elderly population has been having, considering functional diversity, their characteristics and physical needs (Pretel-Jiménez et al., 2022). Hence the importance of using study methodologies that allow participation with an inclusive approach with particular characteristics, in the innovation or creation of products with equal opportunities, for all people (Faba-Pérez & Prieto, 2021). In this sense, digital literacy and innovation of digital platforms, adapted to the requirements and characteristics of older people, would allow us to minimize the marked digital divide, reduce inequality and promote the social inclusion of this group (Rojas et al., 2022). For this reason, this study gains strength by using techniques and tools that allow us to understand the needs of audiences and make decisions aligned with the characteristics of people (Nunnally & Farkas, 2016).

Methodology

This study was developed through mixed research, with a phenomenological approach, based on the application of the User Experience Design Methodology (UX), defined by Ferrer Mavárez et al. (Ferrer Mavárez et al., 2020; M. D. los Á. Ferrer-Mavárez et al., 2021; M. de los Á. Ferrer-Mavárez et al., 2023) as the path of inquiry into the applicability and usability of digital communication systems, in order to recognize the interaction, use, access and effective experience of users (D. Nielsen & Thurber, 2019; J. Nielsen & Loranger, 2006; Nielsen Norman Group, 2021). It allows effective connections between people who interact with the digital world, where design makes possible the creation of products connected to consumers (Rowland et al., 2015). These postulates are combined with what is proposed from the theoretical notions of Design Thinking, which integrates various agile development techniques, to recognize and innovate websites to provide users with a pleasant experience (Aguirre et al., 2023; Aguirre-Villalobos et al., 2024; Gothelf, 2015; Gothelf & Seiden, 2014, 2016; Ritter & Winterbottom, 2017).

The UX Methodology is made up of five phases: 1) Define, 2) Analyze and 3) Design, 4) Prototype and 5) Test (M. D. los Á. Ferrer-Mavárez et al., 2021), but for the realization of this study the first three phases were applied, which behave as pillars of the research. In the first two phases, techniques were developed that allowed consolidating the process of reflection and diagnosis of the users. The purpose is to diagnose the needs, barriers and limitations that older adults face when interacting with the employability portal. The third phase had the purpose of prospecting the characteristics of the digital service platforms, to offer a pleasant experience to senior citizens, through digital literacy for use and access to employability platforms.

The study population consisted of 30 senior citizens, made up of 18 men and 12 women, between the ages of 60 and 68. The investigation sought to understand the experience of the study population during the process of applying for jobs and using the employability platform, in order to evaluate digital literacy for its use and access; also, the effectiveness of the service offers and the experience of interacting with them. Table 1 presents the techniques used during each phase of the research, along with the specific purposes and objectives of the study.

Table 1. Data collection techniques

Phase	Purpose	Techniques	Research objectives
1. Define	Needs assessment.	Survey	Diagnose the needs and barriers that older adults face when interacting with digital employability platforms.
2. Analyze	User characterization.	HUMULU Protopersona	To characterize the study population to understand the user profile of the Servi Senior employability platform
3. Design	Preparation of the proposal.	Prototipado	To explore the characteristics that digital employability portals should have, considering the experience, use and access of older adults.

Source: Own elaboration (2024)

In the definition (diagnosis) stage, the survey technique was applied, which allowed us to know the needs and requirements of users according to their particular characteristics (Rubin & Chisnell, 2008); in order to obtain true information from the diagnosis of the actors involved in the study (older adults), using digital employability platforms. Likewise, this phase allowed an approach to the central information of the project, to know in depth the perceptions, opinions, desires and emotions of people (Goodwin, 2009; Portigal, 2013). For the execution of the survey, a semi-structured instrument of closed and open questions was applied that allowed to know the level of digital literacy, experience and preference of users when interacting with the website when applying for job opportunities. The closed questions were statistically tabulated and analyzed descriptively, to know an approximation of the behavior of users; To this end, the analysis based on quantitative data attempts to produce an estimator of the intervention studied as a practical tool to enable decision-making (Moreno et al., 2018). On the other hand, as a complement to the quantitative approach, the open questions were analyzed from a qualitative approach, which was deployed through a systematic process of categorization, theoretical contrast, and theorization to reinforce the reliability and validity of the study (Borjas García, 2021).

In the second stage, called information analysis, the HUMULU technique was applied (from the acronyms HU - heavy user, MU - medium user and LU - light users) (M. D. los Á. Ferrer-Mavárez et al., 2021), which allowed us to know the trends of the user group around the type of use they make of the employability website and the level of familiarity and experience with technology in general. The instrument used was the diagramming of the categories subtracted from the survey. Likewise, the technique called Protopersona was applied to create a user profile or

prototype, taking into account the global and specific characteristics of these users, considering the common and differentiating factors. With this technique, an estimate or profiling was made on the needs and limitations that this population group may have. Finally, in the third stage, the design of the innovation proposal for the employability platform for older adults is presented, based on the results of the UX research.

Results

The results of the study will be presented below, using the methodological phases defined in the UX model as a guiding principle.

Phase 1: Define

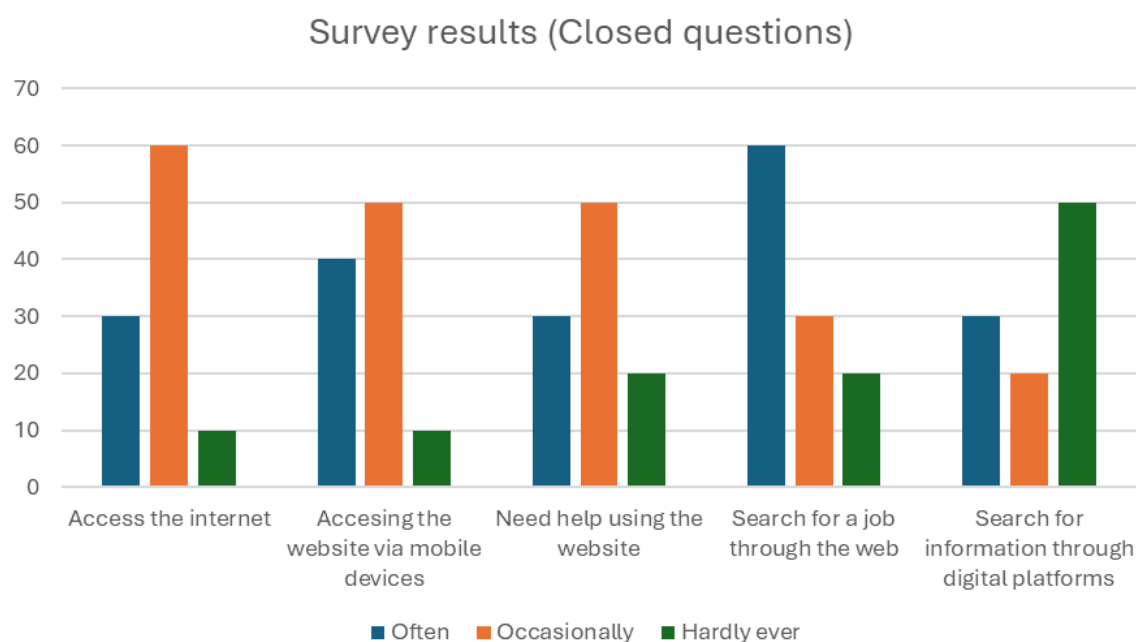
The quantitative results of the survey application are presented below (See Figure 1).

Statistical analysis of the results

- Regarding internet access, a favorable acceptance is observed in the elderly population, who gradually begin to use it as a tool to access communication and search for information on the different web platforms. Padial Espinosa et al. (2020), state that the technological revolution and the use of the internet have made it possible to shorten the communication and information gaps, providing solutions to the needs of people, especially in minority groups such as older adults, in diverse areas, improving the quality of life and especially the emotional one in a way that was previously unimaginable.
- The smartphone is presented as the device whose tendency is the preference of older people to access the web, along with other traditional devices such as the computer or the laptop. Aedo-Neira (2022) states that post-pandemic society has made the use of the telephone device its ally, allowing users to access fundamental networks and applications to work and inform themselves without discrimination, the most used being WhatsApp, Instagram, Meet and Zoom; likewise, the use of the telephone device has allowed users to be connected at any time and in any place (Sabater Fernández & Díaz Cama, 2020).
- Regarding third-party assistance for the use of the web, the results show how older adults require digital platforms to adapt to their autonomy needs (Llorente-Barroso et al., 2023); that is, they must be intuitive, easy to navigate and guarantee timely and simple responses to the service requests they request.
- Searching for jobs on the web, users despite their digital, physical and social limitations increasingly resort to the use of employability platforms to enter

the labor market. Emerging paradigms propose a change in perspective and inclusiveness regarding aging and old age based on greater freedom and empowerment, where the wealth of linking and social networks that protect the elderly from decline, loss of functions and deterioration is essential (Casamayou & Gonzalez, 2017).

Figure 1. Survey results (closed questions)



Source: Own elaboration (2024)

The qualitative data provided by the research instrument are detailed below (see table 2).

Table 2. Qualitative analysis (open questions)

Categories	Theoretical contrast
Job Search	The search for employment through digital platforms is based on the socioeconomic needs of this population. The income they receive from their retirement is insufficient for their economic autonomy; additionally, some users did not even manage to have pension savings. According to Castro et al. (2018), economic autonomy in the elderly population is associated as a determining factor in quality of life; the search for employability is seen as a resource for adaptability in the face of the adverse contexts that this sector faces.
Digital literacy	They understand the importance of training in the use of information and communication technologies, but admit that they require assistance. Digital platforms are seen as fast-track ways to enter the labor market and access services; they alleviate the physical and social constraints that many of them have. Digital literacy allows for positive aging, helping older adults connect and learn to produce and interact in family, community, work and civic settings (Guzmán Olea et al., 2017).
Interaction through mobile devices	Older adults recognize the inequality that exists between people who use digital devices or not. They prefer smartphones over computers and laptops for digital interaction, because they are more user-friendly, have greater availability of models adaptable to their needs, and have a variety of affordable costs on the market. Communicating through mobile devices mitigates the feeling of loneliness and isolation that many in this segment of the population suffer from. According to Gajardo Jauregui (2015), loneliness at this stage of life responds to an emotional condition, given the distance and lack of understanding that family and close environment have of older adults. Interaction through new technologies favors autonomy in the daily activities of older adults, making the purchase of basic necessities such as food, medicine, hygiene products, and other services accessible (Mojica Rondón & Huertas Huertas, 2024).

Phase 2: Analyze

Application of the HUMULU technique

The HUMULU technique was applied to profile or characterize the archetypes of users, considering the results of the survey; its purpose is to have a comprehensive view of their needs, expectations and frustrations in relation to the use of a technology, in particular the employability platform. The technique allowed us to know the trends of the user groups, around the type of use they make of the website and the level of familiarization and experience with technology in general. For this study, it is highlighted that the users presented a profile of 'Light Users' (low level of use), due to the low frequency of use of technologies, which translates into a low experience with this type of digital platforms, as pointed out in their studies by Amaro Agudo et al. (2020) coupled with a high level of frustration when interacting with this type of technology. Older adults declared a clear desire to learn, that is, to become technologically literate (Nordin et al., 2022). Regarding the user experience, older adults faced digital illiteracy barriers that prevented them from effectively interacting with the digital portal. It is noteworthy that the task of filling out the job application form was complex, requiring help from third parties to complete it; which caused frustration at the impossibility of doing it autonomously. Digital and technological illiteracy together with platforms not suited to the characteristics of their users represent barriers and limitations that affect the social inclusion of older adults, making it impossible to create links with the society in which they are inserted (Cabero Almenara & Llorente Cejudo, 2020; Llorente Barroso et al., 2023; Padial Espinosa et al., 2020).

Protopersona

In this study, the construction of the protopersona had the purpose of describing the archetype of the client, whose behavior is inscribed within the user profile (elderly adult). This technique allowed organizing and evaluating employability platforms, to create the first design criteria for a solution to the problem reported by the study population. The profile is represented by retired people who do not want to work full-time, but rather take advantage of the part-time model, as it allows them to combine it with their personal activities. This type of work schedule contributes to their physical and economic autonomy; additionally, it positively impacts on the strengthening of their self-esteem by continuing to be self-sufficient. Most of them are not afraid of technology, but sometimes they feel frustrated when they are unable to use it properly, or do not receive timely responses. They are satisfied to be recognized as useful people or role models in society, based on their effort, enthusiasm and vitality. They use technology to communicate and search for information because they recognize the importance of being interconnected with family, friends and society in general.

Phase 3: Design

Proposal for innovation of the employability platform for older adults, based on the results of UX research

- The graphical interface design (UI, from the acronym 'user interface') must be intuitive and friendly, allowing the user to effectively perform tasks, making it possible for older adults to use it independently, without the support of third parties.
- The digital product must contemplate automated notification mechanisms for new job offers according to the profile and time availability of the senior, in line with the need for employability and the level of activity that they demand to avoid uncertainty detected in the application process.
- The website must be complemented by the rest of the company's communication channels: email, telephone, personal attention, to mention a few references, in such a way as to provide support to the particular needs of each of the seniors during their process of use and access to the website.
- Start the design process under the premise of mobile first, since most older adults emphasized that they prefer the mobile device to access the website.
- Design a much simpler contact form in terms of content and simplified design. In addition, clearly identify the mandatory text fields in the forms.
- Take care of the information architecture, and design the site map structure from the premises of the DCU, through the 'card sorting' technique to ensure the findability of digital content.
- Present the information in a limited way and write it with greater simplicity, to ensure its understanding by the population under study.
- Show medium to large texts, with high contrast (light text on a dark background or vice versa) to ensure the readability of the content.
- In light of the above, present the informative content in text format, with the possibility of enlarging its size, thus adapting to the visual capabilities of each user.

Conclusions

The following are the conclusions that respond to the proposed research objectives.

Technological literacy in the elderly population helps to overcome stigmas and stereotypes about old age, which allows their integration as part of the general society, helping to mitigate social isolation, which improves their quality of life. To achieve technological literacy in older adults, a gradual process of training digital skills is required, based on the construction of positive and friendly experiences with devices or computers, which reduce technological anxiety.

The understanding and use of technology allows older adults to acquire and enhance communication and integration in the labor market. Despite their limitations in technological management, the inaccessibility of the Internet in some geographic areas, and its associated cost, this population shows a significant increase in the use of digital platforms for job searching. They need to integrate into the labor market to maintain their autonomy and sustainability, due to the low economic income they receive from retirement and other state or municipal allowances.

It is imperative to create websites that adapt to the needs and interaction requirements of the elderly population. The user interface (UI) design must be intuitive and friendly, making autonomous use possible by older adults. Notification mechanisms must be automated and clear; and they must present simplification in tasks and processes through limited user flows.

The UI design must be responsive, so that it adapts correctly to all resolutions and devices. The information architecture must be aligned with the users' mental models, so that the content is easy to find; and the information must be written in a clear and simple manner.

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References

- Aedo-Neira, G. B. (2022). Entre el aislamiento y las brechas digitales: Sistematización de experiencia de acompañamiento socioemocional en personas mayores de Temuco, Chile, en tiempos de COVID-19. *PROSPECTIVA. Revista de Trabajo Social e Intervención Social*, 33–56. <https://doi.org/10.25100/prts.v0i33.11540>
- Aguirre, E., Guzmán, C., & González, L. (2023). Metodología Design Thinking en la enseñanza universitaria para el desarrollo y logros de aprendizaje en arquitectura. *Revista de Ciencias Sociales*, 29, 510–525. <https://doi.org/10.31876/rsc.v29i2.39992>
- Aguirre-Villalobos, E. R., Ferrer-Mavárez, M. de los Á., Valecillos-Pereira, J. B., & Bustos-López, G. I. (2024). Metodología UX para la educación: Desarrollo de la creatividad desde proyectos de innovación. *Revista de Ciencias Sociales*. <https://produccioncientificaluz.org/index.php/rsc/article/view/42257>
- Amaro Agudo, A., González García, E., & Martínez-Heredia, N. (2020). Desafíos para una ciudadanía inclusiva: Competencia digital entre adultos mayores y jóvenes. *Comunicação Mídia e Consumo*, 17(48), 11–33. <https://doi.org/10.18568/cmc.v17i48.2247>
- Biblioteca del Congreso Nacional (BCN). (2019). *LEY 21144. MODIFICA LA LEY N° 19.828, QUE CREA EL SERVICIO NACIONAL DEL ADULTO MAYOR, PARA ESTABLECER EL CONCEPTO DE CUARTA EDAD*. www.bcn.cl/leychile. <https://www.bcn.cl/leychile>
- Borjas García, J. E. (2021). Validez y confiabilidad en la recolección y análisis de datos bajo un enfoque cualitativo. *TRASCENDER, CONTABILIDAD Y GESTIÓN*. <https://trascender.unison.mx/index.php/trascender/article/view/90>
- Cabero Almenara, J., & Llorente Cejudo, C. (2020). La adopción de las tecnologías por las personas mayores: Aportaciones desde el modelo TAM (Technology Acceptance Model). *PUBLICACIONES*, 50(1), 141–157. <https://doi.org/10.30827/publicaciones.v50i1.8521>
- Casamayou, A., & Gonzalez, M. J. M. (2017). Personas mayores y tecnologías digitales: Desafíos de un binomio. *Psicología, Conocimiento y Sociedad*, 7(2), 199–226.
- Castro, P., Cruz, E., Hernández, J., Vargas, R., Luis, K., Gatica, L., & Tepal, I. (2018). Una Perspectiva de la Calidad de Vida Laboral. *Revista Iberoamericana de Ciencias*. <http://www.reibci.org/publicados/2018/dic/3200115.pdf>
- Courtis, C. (2017). *Las personas mayores y la Agenda 2030 para el Desarrollo Sostenible: Oportunidades y desafíos* [Text]. <https://www.cepal.org/es/enfoques/personas-mayores-la-agenda-2030-desarrollo-sostenible-oportunidades-desafios>
- Faba-Pérez, C., & Prieto, I. C. (2021). Las bibliotecas públicas y la integración de las tecnologías en la tercera edad. *Revista General de Información y Documentación*, 31(1), 15–35. <https://doi.org/10.5209/rgid.73761>

- Ferrer, M. de los A., Aguirre, E. R., Mendez, R. E., Mediavilla, D. G., & Almonacid, N. J. (2020). UX Research: Investigación en experiencia de usuario para diseño de mapa interactivo con variables georreferenciadas en EMR. *Revista ESPACIOS*, 41(01).
<https://www.revistaespacios.com/a20v41n01/20410127.html>
- Ferrer Mavárez, M. de los Á., Aguirre Villalobos, E. E., & Méndez Sánchez, R. E. (2020). *UX Una metodología de diseño eficiente*. 2020.
- Ferrer-Mavárez, M. D. los Á., Aguirre-Villalobos, E. R., & Méndez-Sánchez, R. E. (2021). Ruta UX para comunicadores. Un modelo para el desarrollo de productos digitales desde la mirada de la comunicación. *Estudios Sobre El Mensaje Periodístico*, 27(2), 497–517. <https://doi.org/10.5209/esmp.70420>
- Ferrer-Mavárez, M. de los Á., Aguirre-Villalobos, E. R., & Valecillos-Pereira, J. B. (2023). Applicability of the User Experience Methodology: Communication and Employment Web Portal for Older Adults. *Media and Communication*, 11(3). <https://doi.org/10.17645/mac.v11i3.6775>
- Gajardo Jauregui, J. (2015). Aging and loneliness: Implications from building the notion of risk. *Acta Bioethica*, 21(2), 199–205.
<https://doi.org/10.4067/S1726-569X2015000200006>
- Goodwin, K. (2009). *Designing for the digital age: How to create human-centered products and services*. Wiley Publishing Inc.
- Gothelf, J. (2015). *Lean UX: Applying lean principles to improve user experience*.
- Gothelf, J., & Seiden, J. (2014). *LEAN UX: Cómo aplicar los principios Lean a la mejora de la experiencia de usuario (LEAN UX: How to apply Lean principles to improve the user experience)*. Universidad internacional de la Rioja (UNIR).
- Gothelf, J., & Seiden, J. (2016). *Lean UX: Designing great products with agile teams*. O'Reilly Media.
- Gutiérrez-Provecho, M. L., López-Aguado, M., García LLamas, J. L., & Quintanal Diaz, J. (2021). La brecha digital en población en riesgo de exclusión social. *Pedagogía Social Revista Interuniversitaria*, 39.
https://doi.org/10.7179/PSRI_2021.39.08
- Guzmán Olea, E., Maya Pérez, E., López Romero, D., Torres Poveda, K. J., Madrid Marina, V., Pimentel-Pérez, B. M., & Agis Juárez, R. A. (2017). *Eficacia de un programa de empoderamiento en la capacidad de autocuidado de la salud en adultos mayores mexicanos jubilados*.
<https://doi.org/10.22199/S07187475.2017.0001.00001>
- Huenchuan, S. (2018). *Envejecimiento, personas mayores y Agenda 2030 para el Desarrollo Sostenible: Perspectiva regional y de derechos humanos*. Comisión Económica para América Latina y el Caribe.
<https://www.cepal.org/es/publicaciones/44369-envejecimiento-personas-mayores-agenda-2030-desarrollo-sostenible-perspectiva>
- Llorente Barroso, C., Anzanello Carrascoza, J. L., & Ferreira, I. F. (2023). Compromiso corporativo e inclusión social de adultos vulnerables. *Revista ICONO 14. Revista Científica de Comunicación y Tecnologías Emergentes*, 21(1). <https://doi.org/10.7195/ri14.v21i1.1982>
- Llorente-Barroso, C., Sánchez-Valle, M., & Viñarás-Abad, M. (2023). The role of

- the Internet in later life autonomy: Silver surfers in Spain. *Humanities and Social Sciences Communications*, 10(1), 56.
<https://doi.org/10.1057/s41599-023-01536-x>
- Loos, E., & Ivan, L. (2024). Not only people are getting old, the new media are too: Technology generations and the changes in new media use. *New Media & Society*, 26(6), 3588–3613.
<https://doi.org/10.1177/14614448221101783>
- Martínez-Heredia, N. (2020). Desafíos en la era digital actual: TIC y personas seniors de la Universidad de Granada (España) / Current challenge in the digital age: ICT and the elderly at University of Granada (Spain). *Texto Livre: Linguagem e Tecnologia*, 13(1), 82–95.
<https://doi.org/10.17851/1983-3652.13.1.82-95>
- Martín-García, A. V., Muñoz-Rodríguez, J. M., Serrate González, S., & Murciano Hueso, A. (2021). Intención de participación en programas universitarios de mayores en modalidad a distancia. *Pedagogia Social Revista Interuniversitaria*, 39. https://doi.org/10.7179/PSRI_2021.39.07
- Mojica Rondón, W. F., & Huertas Huertas, J. I. (2024). *Exploración de las variables técnicas y de mercado asociadas a proyectos digitales en etapa de prefactibilidad que influyen en la aceptación y uso de nuevas tecnologías para la compra de alimentos, medicamentos, aseo y cosméticos en personas mayores de 60 años en la ciudad de Bogotá D.C.* [Master Thesis, Maestría en Gerencia de Proyectos].
<https://repository.universidadean.edu.co/handle/10882/13354>
- Moreno, B., Muñoz, M., Cuellar, J., Domancic, S., Villanueva, J., Moreno, B., Muñoz, M., Cuellar, J., Domancic, S., & Villanueva, J. (2018). Systematic Reviews: Definition and basic notions. *Revista Clínica de Periodoncia, Implantología y Rehabilitación Oral*, 11(3), 184–186.
<https://doi.org/10.4067/S0719-01072018000300184>
- Nazar, G., & Figueroa, C. (2015). Creencias estereotípicas sobre el desempeño laboral de trabajadores mayores en Chile. *Psicoperspectivas. Individuo y Sociedad*, 14(1), 114–125. <https://doi.org/10.5027/psicoperspectivas-Vol14-Issue1-fulltext-435>
- Nielsen, D., & Thurber, S. (2019). *The Secret of the highly creative thinker: How to make connections others don't.* (Laurence King Publishing).
- Nielsen, J., & Loranger, H. (2006). *Usabilidad. Prioridad en el Diseño Web.* Anaya Multimedia.
- Nielsen Norman Group. (2021). *Nielsen Norman Group. World Leaders in Research-Based User Experience.* Retrieved.
- Nordin, S., Sturge, J., Ayoub, M., Jones, A., McKee, K., Dahlberg, L., Meijering, L., & Elf, M. (2022). The Role of Information and Communication Technology (ICT) for Older Adults' Decision-Making Related to Health, and Health and Social Care Services in Daily Life—A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(1), 151. <https://doi.org/10.3390/ijerph19010151>
- Nunnally, B., & Farkas, D. (2016). *UX Research: Practical techniques for designing better products.* O'Reilly Media, Inc.

- Organización de los Estados Americanos. (2017). *Convención Interamericana sobre la Protección de los Derechos Humanos de Las Personas Mayores* [Text].
https://www.oas.org/es/sla/ddi/tratados_multilaterales_interamericanos_A-70_derechos_humanos_personas_mayores_firmas.asp
- Padial Espinosa, M., Pinzón Pulido, S., Espinosa Almendro, J. M., Kalache, A., Garrido Peña, F., Padial Espinosa, M., Pinzón Pulido, S., Espinosa Almendro, J. M., Kalache, A., & Garrido Peña, F. (2020). Longevidad y revolución digital. Contribución de las tecnologías de la información y de la comunicación al envejecimiento saludable. *Gerokomos*, 31(1), 6–14.
- Portigal, S. (2013). *Interviewing users. How to uncover compelling insights*. Rosenfeld Media.
- Pretel-Jiménez, M., Viñaras-Abad, M., Universidad Complutense de Madrid (España), Abad-Alcalá, L., & Universidad CEU San Pablo (España). (2022). Factores clave que determinan la relación y el uso del comercio electrónico por parte de las personas mayores en España. *Cuadernos.Info*, 53, 253–272. <https://doi.org/10.7764/cdi.53.39399>
- Ritter, M., & Winterbottom, C. (2017). *UX for the web: Build websites for user experience and usability*.
- Rojas, F. H., Rodríguez Canache, L., & Rodríguez León, J. (2022). *ENVEJECIMIENTO EN CHILE: Evolución, características de las personas mayores y desafíos demográficos para la población*. Default.
<http://www.ine.gob.cl/inicio/documentos-de-trabajo/documento>
- Román-García, S., Almansa-Martínez, A., & Cruz-Díaz, M.-R. (2016). Adults and Elders and their use of ICTs. Media Competence of Digital Immigrants. *Comunicar*, 24(49), 101–110. <https://doi.org/10.3916/C49-2016-10>
- Rowland, C., Goodman, E., Charlier, M., Light, A., & Luí, A. (2015). *Designing connected products: UX for the consumer internet of things*. O'Reilly Media, Inc.
- Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing: How to plan, design, and conduct effective tests*. John Wiley & Sons.
- Sabater Fernández, C., & Díaz Cama, M. Á. (2020). Los tiempos del Covid-19 acentúan la brecha digital como brecha social en La Rioja. In *5th Virtual International Conference on Education, Innovation and ICT* (REDINE, Red de Investigación e Innovación Educativa, Madrid, Spain).
<https://www.edunovatic.org/wp-content/uploads/2021/02/EDUNOVATIC20.pdf>
- Selwyn, N. (2004). Reconsidering Political and Popular Understandings of the Digital Divide. *New Media & Society*, 6(3), 341–362.
<https://doi.org/10.1177/1461444804042519>
- Varela Ferrío, J. (2015). *La brecha digital en España. Estudio sobre la desigualdad postergada* (Comisión Ejecutiva Confederal de UGT. Secretaría de Participación Sindical e Institucional.).
https://www.ugt.es/sites/default/files/la_brecha_digital_en_espana._estudio_sobre_la_desigualdad_postergada.pdf
- World Health Organization (WHO). (2020). *Decade of Healthy Aging 2020-2030*.

https://cdn.who.int/media/docs/default-source/decade-of-healthy-ageing/decade-proposal-final-apr2020rev-es.pdf?sfvrsn=b4b75ebc_28&download=true

World Health Organization (WHO). (2022). *Envejecimiento y salud*.

<https://www.who.int/es/news-room/fact-sheets/detail/ageing-and-health>