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A Qualitative Study and Analysis on the Use, Utility and Emotions of Technology by the Elderly in Spain.

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Abstract. Living Labs are spaces and laboratories created in natural areas aimed at social innovation. The basic principle of these labs is improving people's quality of life and the improvement of regions, the functioning of companies, etc. One of the areas in which Living Labs interventions are applied is the elderly. Seniorlabs are initiatives aimed at improving the quality of life of older people. Actions include improving physical health, mental health, the home, and the creation of technologies for these purposes. The qualitative study presented in this document has been carried out with the aim of finding to find out the relationship established between the elderly and digital technology, in other words, what use do the elderly make of it. It also aims to answer the research question: do people over 65 years of age use technology in their daily lives? To carry out the study, using a phenomenological perspective, semi-structured interviews were conducted with people over 65 years of age in Spain. From the study, it can be concluded that various initiatives are optimistically being carried out in different European countries and that impact research on these actions is being published. Finally, it can also be concluded that older people use fewer technologies in their daily lives than those that exist to make their lives easier. The main reasons for this are that they do not know how to use them, or they are afraid to use them and damage the device.

Keywords: Techno-social environments, Gerontechnological innovation, use of technology, older people, qualitative research.

1 Introduction

Within the framework of the project <<Subjective adaptability in technological environments and life-based gerontechnological innovation (Seniorlab-LBD)>> of the 2019 call for R+D+i projects of the Spanish Ministry of Science and Innovation (PID2019-107826GB-I00), a qualitative study has been carried out from a phenom-enological perspective on the use that people over 65 years of age make of technologies, as well as on the usefulness they find in them. Semi-structured interviews were used for the qualitative study.

The project (PID2019-107826GB-I00) is framed within the social studies of science and technology (STS) and innovation management studies. STS is a field of study interested in the mutual relationships between social phenomena, the processes of scientific knowledge generation, and technological production dynamics. The STS participate in interdisciplinary approaches from, among others, the sociology of science, the history of science, anthropology, political science, or communication, and, although to a lesser extent, also from the educational sciences. From this general premise, the project is built and organized around three key ideas that are strongly interrelated: on the

one hand, the need to promote technological innovation process-es in which the end-users and recipients of the technological products themselves participate. On the other hand, we encourage and study collaborative experiences such as the so-called innovation communities (we will use the most widespread inter-national expressions such as LivingLabs and SeniorLabs) here. Finally, it assumes the idea of improving social inclusion, social participation, and quality of life of older people through designing and developing specific digital resources for socio-educational purposes [1; 2].

The SeniorLab_LBD project proposes three related studies linking research and transfer, which aim to develop a model of innovation management with the in-volvement of older people, in line with the challenge of trying to provide answers to the challenges of today's ageing societies. In this sense, the project is coherent with the European Commission's programme "Science with and for Society", primarily through the objective of connecting science, technology and society through responsible research and innovation (RRI), it connects with the social challenge called "health, demographic change and well-being" within the Horizon 2020 framework programme, in the framework of the State Plan for Scientific and Technical Research and Innovation 2017-2020 (connecting with the challenges "Health, demographic change and well-being", and, transversally, "Social sciences and humanities and science with and for society" and "Digital economy, society and culture") [3].

The SENIORLAB_LBD project focuses on technological innovation and especially innovation communities, an open innovation strategy whose study has been in-creasing in recent years. Specifically of interest are those communities that Lasher has called livinglabs. These open co-creation ecosystems have increased in the IT industry in recent years. Livinglabs typically bring together a small number of users in familiar contexts to articulate their creative potential in technology design and evaluation processes. In recent years, livinglabs have been growing in popularity, and their forms and applications have diversified. Among these livinglabs, some have become gerontechnology-oriented. These communities are known as seniorlabs.
SENIORLAB_ LBD aims to respond to the demand for the inclusion of older people in innovation processes.

The study presented in this paper was conducted by applying a qualitative study on the use of technology by people over 65 years of age through semi-structured interviews.

As reflected by [4] in their study, in recent years, social changes have transformed traditional family models. Nowadays, the elderly plays a different role than they did decades ago due, among other reasons, to the difficulties in reconciling work and family life. Also, in addition to current social changes, the changing role of the elderly in the lives of their families, the advance and development of technology and its intrusion into the lives of society. As [5] reflect in their research: technology now supports or streamlines many everyday activities. This ongoing technological development is occurring alongside the aging of the world's population, creating opportunities for technology to assist older people in everyday tasks and activities. Another positive issue with technology is the potential it has to facilitate the lives of older adults to stay healthy, independent, and enjoy more of their leisure and free time [5].

Older people have been gradually incorporating the use of technology in their daily lives [6], so we consider it necessary to know what impact this has had on their lives, what utility they derive from it, and what feelings and emotions it provokes in them. So far, almost all research has focused on studying specific devices, such as for reading [6], the use of digital tablets [5], intelligent robots and support for cognitive complications [7], assistive and frailty support in the elderly [8], or for continuous support and care for older adults [9] among other examples.

The research by [5] obtains and reflects as a result the barriers to the use of technologies by older people, these are: lack of instructions and guidance, lack of knowledge and confidence, the cost, the complication of their use, lack of social interaction and negative characteristics of the devices themselves. In contrast, in the study by [4], the participants reflect how technological devices are a facilitator for interconnection in relationships with their relatives, especially bearing in mind the current situation generated by COVID-19.

It is important to highlight the emergence of all these researches relatively recently (last 5-10 years), since technologies have appeared and developed in our world. It is for this reason that our research and its subject matter also emerges, focusing more on describing and interpreting experiences, emotions and/or perceptions from the unique perspectives of the different participants, using their own words and/or expressions [4].

Although it is true, most of the research carried out in this regard, as mentioned above, focuses on a specific technological device in the lives of older adults or focuses on facilitating a specific aspect of their daily lives. There is little research that focuses on the use and usefulness that older adults give to technological devices in general and the feelings and emotions that this use, and knowledge provokes in them. For all these reasons, it is important to highlight the importance of this qualitative phenomenological study in which the first-person perspective of older adults on the use and usefulness of technologies will be analyzed.

The general objective of this study is to learn about the relationship established between older adults and technological devices. As specific objectives, we have the following: (1) to know what the use and usefulness of technological devices for older adults is and (2) to discover what emotions and feelings the use of digital devices provokes in older adults.

To answer these objectives, the research question we focus on and will answer is the following: do older people over 65 years of age use technology in their daily lives?

2 Methodology and materials

Next, the research design used, the study participants and the preparation of the semi-structured interview script and the category table are detailed.

2.1 Participants

The participants have been intentionally selected for accepting their collaboration with the research and being within the target age ranges for the research. A total of seventeen people have participated, being 70.59% women and 29.41 women. In reference to age, 35.30% were under 70 years old, 17.65% were between 70 and 80, and 47.05% were over 80 years old.

2.2 Research design

The research has been based on the qualitative paradigm, through the use of a content analysis research design. This design attempts to analyze textual material, ranging from media products to interview data, emphasizing the elicitation of categories, which are often derived from theoretical models, but not always limited to background [10]. For the content analysis, the proposal of [11] executed in previous research related to the analysis of the use and knowledge of technological resources will be taken as a reference [12; 13; 14; 15].

The process for the elaboration of the categories is, in the first place, deductive, through the analysis of the scientific literature, selecting those categories according to the questions and the research objectives. On the other hand, it is inductive, through the construction of emerging categories that arise when performing data analysis [16].
In reference to the coding process, it was carried out with the help of the qualitative data analysis software webQDA, taking as a reference the theoretical categories that emerged from the analysis of the scientific literature, together with the design of a table of categories that helped to efficiently carry out the analysis. Coding, following the steps for its creation described by [17]. The table 1 shows the fundamental processes developed during the investigation, arranged chronologically from first to last.

Table 1. Outline of the research design (authors' own elaboration).

Design of research
— Problem statement
— Formulation of research objectives
— Theoretical framework review
— Selection of participants
— Choice of registration units
— Creating the category table
— Preparation and validation of the semi-structured interview script
— Data collection
— Data analysis in webQDA
— Drawing conclusions, limitations and projection in the future

2.3 Preparation of the script for the semi-structured interview and the table of categories

To carry out the data collection, a semi-structured interview was constructed according to the indications of [18] for the development of interviews and from the constructed category table. The categories and subcategories of analysis were the following:

- Category 1: Use and utility of the devices (C1).
  - Subcategory 1.1: Use of known devices (SC1.1).
  - Subcategory 1.2: Potentiality of devices in everyday life (SC1.2).
  - Subcategory 1.3: Problems encountered in using the devices (SC1.3).
  - Subcategory 1.4: Design of the devices adapted to older people (SC1.4).
  - Subcategory 1.5: Main devices used (SC1.5).
  - Subcategory 1.6: Areas of application of the devices (SC1.6).
- Category 2: Emotions and feelings when using the devices (C2).
  - Subcategory 2.1: Positive emotions and feelings (SC2.1).
  - Subcategory 2.2: negative emotions and feelings (SC2.2).

Next, the categories created is shown in the table 2, which served as the basis for performing the data analysis. The research questions and objectives are included, in relation to the categories and subcategories of analysis, together with the key contents observed in the first readings of the documentary corpus.

Table 2. Category table (authors' own elaboration).

Category	Subcategory	Contents	Research question	Research objective
C1	SC1.1	-I don't know how to use the devices -Communicate with my family -To look for information -Video platforms -Social networks -To work	Why and for what you really use some devices and not others? What motivates you to use them?	To determine what older people use devices for
	SC1.2	-Devices make life less difficult -They are currently needed -They are useful -All tasks are much easier -I don't want to have more devices -They help me in my daily life	Do you think electronic devices are really useful to you? Needed? Do they help you in your day to day? Do you consider technology necessary for your quality of life?	To observe the potential of devices for the elderly in their day to day

	SC1.3	-I don´t have problems -I need help -I can't get the full potential -Technologies do not give me confidence -Addiction -I solve problems independently -Privacy -Fraud -Visual difficulty -They don't teach us to use them -They need training	Do you have problems using them? What happens when that happens? What do you feel when you are not able to use a device, it breaks? What do you do to fix it?	To check the main problems of the elderly population in relation to the use of electronic devices
	SC1.4	-Technologies are not adapted to the elderly -Technologies are adapted to the elderly -They are more suitable for young people. -Language -The older ones are not so agile -No need to adapt -Better social class equals better adaptation -Adapt technological designs to the elderly	Do you think that technologies are designed or adapted for older people? which ones yes and which ones no, what do you think and feel about this? Would you like them to adapt more? Do you think it is not necessary? Why?	To assess whether older people adapt adequately to the use of electronic devices
	SC1.5	-Mobile phone -Televisión -Tablet -Computer -Household appliances -Ebook -Radio -Alarm clock	What digital devices do you use most often?	To inquire about the electronic devices that older people use most frequently
	SC1.6	-Medicine -Online shopping -Economy -Leisure -Kitchen	In which area of life do you think electronic devices are most useful or of great importance?	To check in which areas electronic devices have a greater importance for the elderly
C2	SC2.1	-Entertains me -Illusion -To be stronger -Not be alone -It is positive -I feel good	What happens when you use electronic devices? What do you feel? Are you having fun? Are you proud	To observe if positive emotions and feelings are produced when using electronic devices in the elderly

SC2.2	-Liberty -Pride -Motivated -Impotence -Fear -Nervous -Not motivation -Burden -Distrust -Rage -Angry	when you are able to use it without problem? Do they scare you? Are you concerned?	To observe if negative emotions and feelings are produced when using electronic devices in the elderly

3 Results

The table 3 describes the frequencies of mention of the different analysis contents of category 1.

Table 3. Results of category 1 (authors' own elaboration).

Content	Frequency of mention	Comment
Subcategory 1.1: Use of known devices		
I don't know how to use the devices	17,86%	"What puts me off the most about using an electronic device is that there are many times that I don't know where I have to hit it"
Communicate with my family	40,46%	"I am forced to use the mobile phone to find out how my loved ones are, ask them about their day and tell them how mine has been"
To look for information	21,43%	"Well, when I use them for what I usually use them for, which is to look for information"
Video platforms	3,57%	"From there, she accesses YouTube above all to watch series chapters or look for patterns of work to knit later"
Social networks	8,33%	"In terms of social networks, I use Facebook since it is included in several reader groups forums and I share opinions of books that I am reading and I also do the same with sewing groups"
To work	8,33%	"I see technological resources as useful for working, for… it makes many things easier for you and if you know how to handle it, even more so"
Subcategory 1.2: Potentiality of devices in everyday life		
Devices make life less difficult	11,54%	"Yes, electronic devices are necessary to make life less difficult"
They are currently needed	15,38%	"If I consider that electronic devices are essential, you already need a minimum of learning, since many things that could be done at a window or office are now only possible through the Internet"

They are useful	30,77%	"I find electronic devices useful"
All tasks are much easier	1,92%	"Well, man, because things are much easier. Before, for example, to make an invoice you had to take it physically and now by email"
They are not essential	25%	"Man as much as help I don't know. It works for me but the TV does not help me, it is not completely essential for everything"
I don't want to have more devices	7,77%	"At the moment with the mobile phone it is enough for me I do not need more"
They help me in my daily life	9,62%	"Yes, electronic devices help me in my day to day"
Subcategory 1.3: Problems encountered in using the devices		
I don´t have problems	11,63%	"I know how to use all the electronic resources I have to a greater or lesser extent and I manage well with this, I have no problems"
I need help	37,21%	"To solve problems with electronic devices, I ask my daughters or a friend for help, since my husband is not very good at it either"
I can't get the full potential	1,16%	"I have problems, I can't get the most out of my television"
Addiction	8,14%	"I think that electronic devices create a lot of addiction, especially in young people"
I solve problems independently	5,81%	"I almost always try to fix the problems myself when a device is not working"
Privacy	4,65%	"I see a problem with my privacy, that puts me on a site that can be put where I am"
Fraud	3,49%	"But it is true that there are many traps. It is not that technology is bad, but that people are bad and there are many traps that they can do to you"
Visual difficulty	2,33%	"What sets me back the most is that I don't see it well, because I can't see anymore"
They don't teach us to use them	5,81%	"But my daughters go around with their cell phones or call their grandchildren and great-grandchildren to solve it instead of explaining it to me and in the end they don't teach me well"
Social relationships worsen	1,16%	"In addition to that they forget to talk to the people around them"
They need training	18,60%	"I think that I would need to go to some course, in which they teach me the basics since I have grown up without any of this and everything has come to me now"
Subcategory 1.4: Design of the devices adapted to older people		
Technologies are not adapted to the elderly	28,57%	"In my opinion, technologies are not fully adapted to older people. In addition, many of my friends already have reduced mobility"
Technologies are adapted to the elderly	16,33%	"Man, I really think technologies are adapted to the elderly"
They are more suitable for young people	22,45%	"Of course, it costs less for young people than us to use the devices"

Language	2,04%	"You have to understand the language in which the phone or the computer speaks to you"
The older ones are not so agile	2,04%	"Man because we are not so agile in reflexes or..."
No need to adapt	12,24%	"Well, no, I don't need to have such devices at this point in life either. Being so old, why do I want it?"
Better social class equals better adaptation	2,04%	"In summary, what I want to say is that if you have had a good situation and have been able to train, you will surely understand and use the technologies better because you will be a person prepared with studies"
Adapt technological designs to the elderly	14,29%	"That the people who design the devices, as well as the applications, think a little about older people, who have never had contact with these devices"
Subcategory 1.5: Main devices used		
Mobile phone	43,08%	"I only use the mobile"
Television	13,85%	"The television that I often put on while having breakfast"
Tablet	6.15%	"Although he also frequently uses the Tablet."
Computer	9,23%	"I use the computer when I ask my daughter to"
Household appliances	15,38%	"At lunchtime I really start to use the ceramic hob, and mine is one of those tactile ones. And well, very practical"
EBook	6,15%	"I frequently use the EBook"
Radio	4,52%	"I used the radio at night"
Alarm clock	1,54%	"The alarm clock too but it's fixed and you don't have to go around with it, you put it on one day and it's worth it"
Subcategory 1.6: Areas of application of the devices		
Medicine	33,33%	"I believe that one area in which technologies are very important is in health in the sense of advances in medicine"
Online shopping	6,06%	"I find them useful, for example, in online shopping, although I always need help to do so"
Economics	27,27%	"From my point of view, I see greater utility in areas related to economics"
Leisure	30,30%	"80% of what they use the mobile is for leisure, which is what I see most badly, sometimes I don't know if they go out with each other or with the mobiles phones"
Kitchen	3,03%	"And the vitro is for cooking because I have always had a wood-burning stove and I was too old to light it every day"

The main electronic device used by older people is the mobile phone (43.08%), far removed from household appliances (15.38%) and television (13.85%). The results show that the participants preferentially use the electronic devices they know to communicate with their family and friends (40.48%) and to a lesser extent (21.43%) to search for information, either through online search engines. such as Google, or through mobile phone applications and virtual resources, such as newspaper websites. It stands

out that 17.86% of the participants do not know how to use most of the electronic devices that are in all homes, which greatly hinders their relationship with peers and family members.

On the other hand, a large part of the participants indicated that electronic resources are very useful (30.77%) helping them in many of their daily tasks. But they declare that they are not essential (25%) since they could continue carrying out all the activities they normally carry out without having the help of electronic devices, except communication with their relatives.

When dealing with the problems caused by electronic resources, a large part state that they asked a family member for help to teach them or make a device work (37.21%). In addition, they indicated that they need training in this sense (18.60%) and that they find it very interesting and necessary that they could be given classes on the use of technological resources, either at the university for the elderly or through the town hall. A significant percentage reports that they have no problem using the devices (11.63%) and that they use them autonomously.

In reference to the adaptation of the elderly to the use of electronic devices, a greater part of the participants think that the technologies are not adapted for the elderly (28.57%) compared to those who indicate that the devices are adapted emails to the elderly (16.33%). However, a large sector of the participants believe that young people are much better adapted to technology than them (22.45%), since it is a generation that has lived alongside technology.

The analysis of the consideration of the main areas in which electronic devices are fundamental and that offers them great development, shows that they are on the one hand medicine (33.33%) which is one of the main needs of this group, since they affirm that they present diseases that require the use of technological resources, together with leisure (30.30%) and the economy (27.27%) where this group presents great difficulties with the gradual disappearance of personalized attention in banks, having to carry out transactions through ATMs or virtually.

The table 3 shows the main emotions and feelings that older people have expressed that they feel in relation to the use of electronic devices (category 2).

Table 3. Results of category 2 (authors' own elaboration).

Content	**Frequency of mention**	**Comment**
Subcategory 2.1: Positive emotions and feelings		
Entertains me	36,36%	"Well, I like to use electronic devices because it is a new form of entertainment for me"
Illusion	2,27%	"I don't enjoy using the mobile as such, but I notice a certain illusion when I can connect with my young grandchildren by video call and see how they play and grow"
To be stronger	4,55%	"I see myself more comfortable, more, I don't know how to tell you, more powerful, more in a different way"

Not be alone	2,27%	"But sometimes the mobile helps me not to be alone. Sometimes I miss receiving letters like they used to, but the mobile phone is faster and more efficient and nobody writes anymore"
It is positive	4,55%	"Well-used technology is very good and is positive"
I feel good	18,18%	"Now that I know how to use them, I feel good, I'm used to it"
Liberty	2,27%	"I think this is a great advance as you can take your mobile phone anywhere and it gives you a lot of freedom"
Pride	13,64%	"Whenever I encounter any difficulty and am able to solve it on my own, I feel very proud because it is a great novelty"
Motivated	2,27%	"I am motivated to use technology because I like it"
I like them	9,09%	"I'm not worried about electronic devices, on the contrary I like"
To feel young	4,55%	"Look I don't feel any way because this is what it is. You have to try to be modern in everything and learn continuously, but if one day you can't or it goes through, then nothing happens"
Subcategory 2.2: Negative emotions and feelings		
Impotence	11,36%	"When I am not able to use electronic resources I feel impotence"
Fear	27,27%	"I am afraid of not knowing how to use a device well and breaking it or damaging it, they are very expensive"
Nervous	22,73%	"I get a little nervous when I have to make a payment or do something with a machine"
Not motivation	11,36%	"I never feel motivated to learn how to use a new device"
Burden	9,09%	"I get overwhelmed if I can't find someone who can help me at that moment when using a device that I don't use"
Distrust	2,27%	"But there are things that I don't trust, they don't give me confidence"
Rage	2,27%	"They feel anger at not being able to do what I want with my mobile"
Angry	2,27%	"Well, it pisses me off a lot, when the computer starts to give me problems because once or twice a month that I need it is when it gives me problems and it pisses me off a lot"
Anxiety	2,27%	"In general, technology causes me anxiety"
Frustration	9,09%	"I feel frustrated because I want to use electronic devices on my own"

Finally, it is highlighted that there is equality between positive and negative feelings and emotions towards technology by older people (50%). As can be seen, a large part of the participants state that electronic devices entertain them (36.36%) since having a lot of free time due to their retirement, they can use them to entertain themselves. In addition, they state that they feel good when using them (18.18%) and proud (13.64%) of being able to use them autonomously.

In relation to negative emotions and feelings, fear (27.27%) and nervousness (22.73%) stand out as the main negative emotions when using electronic devices. These emotions have been observed in participants who do not have adequate knowledge of

the use of technological resources and in those who own or handle very expensive devices and are afraid of breaking them.

4 Discussion

In response to the research question in this study: do people over 65 years of age use technology in their daily lives? The elderly who participated in the study do tend to use technology. However, the number of devices they use is limited and some of them cannot be considered new technologies, since they have been with us for decades. The devices they tend to use are cell phones and telephones. Regarding the cell phone the apps and pages they tend to make use of are Google and WhatsApp. Other devices, although not new, that they use are the microwave, the alarm clock and the ceramic hob. While these make life easier for the user, they cannot be considered new technologies. The good news is that digital devices do enter the homes of the elderly. However, there is a need to examine how to bring them closer to ICTs. Many of them say that they do not use other types of devices for fear of breaking it, of damaging it, of dropping it, of touching a button or option and having it stop working as also demonstrated by the study of [5]. Others indicate that they do not use other types of devices such as tablets, smart bracelets, or Smart TVs because they are not even aware that they exist, or if they do, they do not know how they work. Even when asked what other devices they would suggest designing to make their daily lives easier, they suggest options that already exist, such as home automation controlled by cell phones or electronic devices for cleaning the home. In most of the speeches they confess that the use they make of the devices is not for fun or entertainment, but they do it out of necessity, to know how their family is doing, especially during times of pandemic and confinement thus sharing the opinion with the results of the study by [4].

Comparing these results with the literature consulted, there is a need to encourage laboratories and spaces for social innovation aimed at the elderly [1; 2]. There is a need to fortify efforts to bring innovation into the lives of the aging population, not only to amuse and entertain, but also to respond to the needs that arise in their day-to-day lives [19; 20]. Finally, it should not be forgotten that artificial intelligence and technologies can be applied to promote the physical, social, and mental health of the elderly, both for prevention and intervention [21; 22; 5]. For example, from devices and apps, people can be put in contact with each other, to avoid isolation, as highlighted by the study participants themselves. But it is also possible to create devices that help to regulate the heartbeat or level analytical parameters.

It is in this direction that Living Labs emerge and develop, the seniorlabs that seek, through their initiatives, to promote the improvement of the quality of life of the individual.

5 Conclusions

With the investigation carried out, the following conclusions have been confirmed:

- Older people generally use a mobile phone with keys, home appliances and television, but they do not want more devices as they get nervous and feel afraid when they have to learn how to use it.
- They use technology to communicate and stay informed, but they show that the devices do not adequately adapt to people their age and they feel that young people are easier to use.
- Older people need help when they do not understand how to use an electronic device and demand that they be offered training on the use of electronic resources by public administrations.
- They are trying to adapt to making greater use of electronic devices, since they see that they should not be left behind in society and they feel proud when they improve in learning to use them.

Among the main limitations of the research, the difficulty found in conducting interviews with this type of population stands out, due to their sensory difficulties. On the other hand, COVID-19 has forced interviews to be carried out by telephone, which has implied difficulties and a lack of clarity in communication. However, being able to use technological resources has allowed the investigation to be carried out within the established deadlines.

The use of a qualitative methodology for the analysis of the use, usefulness and emotions towards technology, has allowed us to investigate the reason for the lack of adaptation by this group towards the use of electronic devices. In the future, new lines of research should be generated in the application of training programs and in emotional education towards technological learning, from a qualitative perspective, since an interest in improving their abilities in the use of these devices has been observed.

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