

## Use of smartphones by older adults: characteristics and reports of students enrolled at a University of the Third Age (U3A)

### Abstract

**Introduction:** The increase in mobile device users aged > 60 years reflects a transformation in the information and communication technology (ICT) area. Supporting older adults in their digital literacy is a complex task. New skills for the digital age should be developed. **Objective:** To describe the sociodemographic characteristics of older adults on a digital literacy program, including patterns of use, reasons for learning, in addition to the difficulties and benefits reported regarding the use of technology. **Methodology:** A quantitative and qualitative study based on a digital literacy program within a U3A context involving professionals in the fields of gerontology and computing was conducted. **Result:** The program involved 317 older adults, most of whom were women (64.5%). Mean age of participants was 60-74 years (82%). Regarding characteristics, 44.2% were married, 40.7% had finished high school, 77.3% were retired, 65.1% earned ≤ 4 minimum wages, and 74.1% were not engaged in paid employment. Prior to participation, despite the high frequency of smartphone use (87.6%), 77.9% reported having a poor user experience. The most prevalent purposes for using smartphones were “Communication” (93.3%), “Strengthening affectional bonds with family and friends” (66.2%) and “Search for general information” (48.7%). The assessment of self-efficacy revealed that participants lacked competence for complex activities. **Conclusion:** The interest of older Brazilians in using smartphones is clear. Therefore, understanding previous competencies, as well as the obstacles faced by this group, is pivotal in aiding the process of digital inclusion.

**Keywords:** digital literacy; mobile devices; older adults.

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## Uso de smartphones para idosos: características e relatos dos inscritos na Universidade da Terceira Idade

### Resumo

O aumento de usuários de dispositivos móveis acima de 60 anos demonstra uma transformação na área de comunicação e informação para esta geração. Apoiar os idosos em sua alfabetização digital é uma tarefa complexa. É necessário desenvolver novas competências para a era digital. Objetivo: Descrever as características sociodemográficas dos idosos de um programa de alfabetização digital, uso e motivações para aprender, além das dificuldades e benefícios relatados quanto ao uso da tecnologia. Método: Estudo quantitativo e qualitativo baseado no programa de alfabetização digital em contexto UTA, envolvendo profissionais das áreas de gerontologia e informática. Resultado: O programa envolveu 317 idosos, predominantemente mulheres (64,5%). A média de idade foi entre 60-74 anos (82%). Quanto ao estado civil, 44,2% eram casados; 40,7% tinham ensino médio completo, 77,3% eram aposentados, 65,1% ganhavam até 4 salários-mínimos e 74,1% não exerciam atividade profissional remunerada. Antes da participação, apesar da alta frequência de uso do smartphone (87,6%), 77,9% relataram uma pobre experiência de uso. Quanto aos objetivos com o uso do smartphone, prevaleceram “Comunicação” (93,3%), “Aproximação de vínculos afetivos com familiares e amigos” (66,2%) e “Busca de informações gerais” (48,7%). Na avaliação da autoeficácia, os idosos não demonstraram competência em atividades complexas. Conclusão: Fica evidente o interesse dos brasileiros mais velhos em usar smartphones, portanto, é fundamental compreender as motivações, facilidades e obstáculos enfrentados por eles, para auxiliar no processo de inclusão digital.

**Palavras-chave:** letramento digital; dispositivos móveis; idosos.

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## 1 Introduction

The increase in users of mobile devices aged over 60 years reflects the transformation in the information and communication technology (ICT) area for this generation, which is growing, becoming intergenerational and posing new challenges for healthy aging (ILC-Brasil, 2015; KRUG *et al.*, 2018<sup>2</sup>; NIC.br, 2019; OLSSON *et al.*, 2019; PNAD, 2017). Several studies have shown that, of the digital technologies available, smartphones are the most used by older adults on a daily basis (FERNÁNDEZ-ARDÈVOL, 2019; LEUNG *et al.* 2012; MARTÍNEZ-ALCALÁ *et al.*, 2018; Q. MA, *et al.*, 2016). However, there is a digital gap (BRUGGENCATE *et al.*, 2019; FERNÁNDEZ-ARDÈVOL, 2017; GIL, 2017; PÁSCOA; DOLL; MACHADO; CACHIONI, 2016) evidenced by a lack of learning opportunities, adequate access, confidence, and development of (ALVARENGA; YASSUDA; CACHIONI, 2019; PÁSCOA; GIL, 2019; SANTOS, 2022) abilities to perform a wide range of tasks online, such as searching for information, banking transactions and uploading images, for instance.

In 2020, the pandemic caused by the novel Coronavirus (SARS-CoV-2) forced a change in behavior across society. Recommendations of stricter lockdowns for individuals aged 60 or older, justified by the higher risk of death among this age group, negatively impacted the living conditions of older people, who were one of the main groups affected by the health crisis and other social problems (ABRASCO, 2020; BONICENHA, 2022, SILVA *et al.*, 2021). However, the COVID-19 pandemic, despite imposing many limitations and revealing the low digital literacy of this population, also prompted an increase in the search for – and creation of – initiatives to promote learning, as well as discussions on the topic (DIAS, 2021).

Research carried out in the United Kingdom (LEUNG *et al.*, 2012) and China (Q. MA *et al.*, 2016) identified barriers related to personal skills, tasks, tools and the use of smartphones by the older population. However, Murray *et al.* (2014) reported there is no inherent impediment to their learning. In Brazil, Fernández-Ardèvol (2019) showed that the activities most performed on smartphones by Brazilian older adults (aged ≥60 years) were: making and receiving phone calls (93%); taking pictures (75%); sending messages (73%); and watching videos (67%). Similarly, the study by Santos (2022) on the use of ICTs

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and connections with the universe of work by people aged  $\geq 60$  years found greater use of *WhatsApp*, even among those with a low level of literacy.

The lack of digital literacy of this generation is evidenced by less complex actions, preventing the enjoyment of the countless possibilities offered by technology, such as exercising citizenship, searching for a job, and preserving autonomy and independence (PADILLA-GÓNGORA *et al.*, 2017; RAYMUNDO; SANTANA, 2019).

Although the learning difficulties experienced by older adults are attributed to factors such as natural decline in cognitive abilities (NARUSHIMA *et al.*, 2018; SCHREURS, 2017), lack of experience using mobile devices, problems with the device user interface (VAN DEURSEN *et al.*, 2016, CHIU *et al.*, 2019) or level of education (FERNÁNDEZ-ARDÈVOL, 2019; OLIVER *et al.*, 2017; TIRADO MORUETA, *et al.*, 2016), the use of methods that favor digital literacy in appropriate places are also relevant factors in the learning process (CACHIONI, 2015; CONTRERAS *et al.*, 2014; CRUZ; ROMAN; MARQUINE; GIL; BERNARDO, 2019; JACOBSON *et al.*, 2017; PAVON, 2015; PIEDRAHITA *et al.*, 2016).

Therefore, in view of the limited scientific output on the domains and competencies of the older population in using these devices and its low level of digital literacy, the objective of this study was to describe the sociodemographic characteristics of older students enrolled at a digital literacy program, offered by the University of the Third Age at the University of São Paulo, and to report: (1) the use of and competence involving smartphones; (2) reasons for use; and (3) difficulties and benefits related to the use of technology, enriching the data on the subject and encouraging further research investigating this topic.

## 2 Methodology

### 2.1 Study Design

An educational intervention, aimed at offering opportunities for digital literacy in the use of mobile devices (smartphones) to older adults involved in non-formal education was conducted. For the design and development of the larger project: “Digital literacy

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and remote intervention designed for older adults through the use of mobile devices” (funded by the Fundação de Amparo à Pesquisa do Estado de São Paulo | FAPESP | under Process No. 2017/19915-0), a multidisciplinary partnership was established between professionals and researchers in the fields of Gerontology (School of Arts, Sciences and Humanities | EACH) and Computing (Institute of Mathematics and Computer Sciences | ICMC) at the University of São Paulo (USP). An intervention was performed involving the specificities of Educational Gerontology and addressing the educational needs of older participants of the university extension program called the University of the Third Age (U3A), offered at both the EACH and the ICMC.

The multidisciplinary study allowed the sharing of specific methodology for the contents taught, interactive structure of classes and workload. A notable feature was the creation of a didactic resource supported by a computerized system (ESPIM – Experience Sampling and Programmed Intervention Method). The components of the ESPIM include: a mobile app (SENSEM) installed on participants' smartphones, and a Web system for planning data collections and interventions used by researchers and professionals with a Web Service for storing information.

## 2.2 Participants

A total of 317 people aged 60 or over participated in the study, enrolled at the digital literacy program for mobile devices (smartphones) at the two institutions investigated (EACH and ICMC) in 2018 and 2019.

## 2.3 Procedure

The criteria for inclusion in the study were that participants had to have their own mobile device running the Android operating system (version 4.4 or higher), with a minimum storage of 8GB. Participants were divided by convenience into groups of a maximum of 20 individuals, according to student availability. All participants received and signed the informed consent form and were interviewed and evaluated individually, both pre and post-test, as shown in Figure 1.

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Figure 1 – List and description of instruments used in evaluation protocol

INSTRUMENTS AND DATA COLLECTION PLANNING	
APPLICATION	spreadsheet with data about model, brand, storage, system and smartphone version of each subscriber
SOCIODEMOGRAPHIC	12 sociodemographic questions
WELLNESS AND HEALTH	2 health and well-being self-assessment questions
INFORMED CONSENT FORM	Document with all the information about the research for the students' consent for us to study their data. One copy for the student .
MOBILE DEVICE USAGE	10 questions about: use of mobile network, use and functions of the device, facilities and difficulties perceived regarding use.

Source: Digital literacy program on mobile devices involving older adults, EACH/ICMC, 2018, 2019.

Classes were run collaboratively between partner institutions and delivered by undergraduate students in Gerontology (EACH) and Computing (ICMC), under the leadership and supervision of master's and doctoral students involved in the larger project. The study plan, previously published by Cliquet *et al.* (2020), envisaged 15 weekly face-to-face meetings lasting two hours each, for a total of 30 hours.

#### 2.4 Ethical Aspects

The study was approved by the Research Ethics Committee of the School of Arts, Sciences and Humanities of the University of São Paulo, under permit No. 2.171.716.

#### 2.5 Data analysis

The sociodemographic data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 20.0. The description of the sociodemographic profile of the study sample was tabulated by frequency of categorical variables (gender, age group, etc.), with absolute frequency values (n) and percentage (%), as well as descriptive statistics of numerical variables (age, years of study) with mean values (M), standard deviation (SD).

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For the qualitative analysis of content, an investigative method described by Lawrence Bardin (2016) was employed for communication and reflection on the plurality of meanings found. The thematic content was analyzed with the registration unit referring to specific questions about the benefits and difficulties in the use of mobile devices, according to the author's criteria, for later organization, coding, categorization and inference of the content collected in their contexts. The nuclei of meaning, whose similarities form a set of expressions were identified and condensed into categories of analysis.

### 3 Results

Sociodemographic data (Table 1) show that women (59.3%) and individuals aged 60-69 years (59.6%) were more involved in the program, followed by 70-74 year-olds (22.4%) and by 75 year-olds or older (17.7%). For marital status, 44.2% of the individuals were married or in a stable relationship, 23% were widowed, 18.3% were single, and 14.2% were divorced. Regarding educational level, 40.7% had finished high school. For family income and retirement, most participants were retired (77.3%), 65.1% received  $\leq 4$  minimum wages, and 74.1% were not engaged in paid work. Of the respondents, only 35.8% lived alone.

Separate analysis of the data for the two institutions (EACH and ICMC) revealed that the characteristics pertaining to education, marital status, retirement status and income differed. Respondents from the EACH predominantly had an educational level of 5-8 years of study, an income of  $\leq 2$  MW and were either married or single.

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Table 1 – Sociodemographic and economic characteristics of total sample and according to group of Digital literacy program on mobile devices for older adults at EACH and ICMC,

2018/2019

<b>Age (years old)</b>				
60-64	50 (58.1)	36 (41.9)	86 (27.1)	
65-69	65 (63.1)	38 (36.9)	103 (32.5)	
70-74 yo	43 (60.6)	28 (39.4)	71 (22.4)	0.689
75 ≤	30 (53.6)	26 (46.4)	56 (17.7)	
<b>Education (years)</b>				
1 - 4	30 (52.6)	27 (47.4)	57 (18)	
5 - 8	47 ( <b>70.1</b> )	20 ( <b>29.9</b> )	67 (21.1)	
9 - 11	41 (66.1)	21 (33.9)	62 (19.6)	0.076
12 ≤	70 (54.3)	59 (45.7)	129 (40.7)	
<b>Income (MW*)</b>				
≤ 2	53 ( <b>73.6</b> )	19 ( <b>26.4</b> )	72 (22.7)	
2 - 3	40 (60.6)	26 (39.4)	66 (20.8)	
3 - 4	40 (71.4)	16 (28.6)	56 (17.7)	< 0.001
4 ≤	46 ( <b>44.2</b> )	58 ( <b>55.8</b> )	104 (32.8)	
<b>Retirement</b>				
Yes	142 ( <b>66.4</b> )	72 ( <b>33.6</b> )	214(77.3)	
No	25 (39.7)	38 (60.3)	63(22.7)	< 0.001
<b>Paid work</b>				
Yes	45 (61.6)	28 (38.4)	73(25.9)	
No	119 (56.9)	90 (43.1)	209 (74.1)	0.495
<b>Marital Status</b>				
Married	74 ( <b>52.9</b> )	66 ( <b>47.1</b> )	140 (44.2)	
Widowed	39 (53.4)	34 (46.6)	73 (23)	
Single	43 ( <b>74.1</b> )	15 ( <b>25.9</b> )	58 (18.3)	0.010
Divorced	32 (71.1)	13 (28.9)	45 (14.2)	
<b>Live Alone</b>				
Yes	73 (64.6)	40 (35.4)	113 (35.6)	
No	115 (56.7)	88 (43.3)	203 (64)	0.168

Note: \*MW – Minimum Wage. \*\*Values in bold denote significant differences between groups.

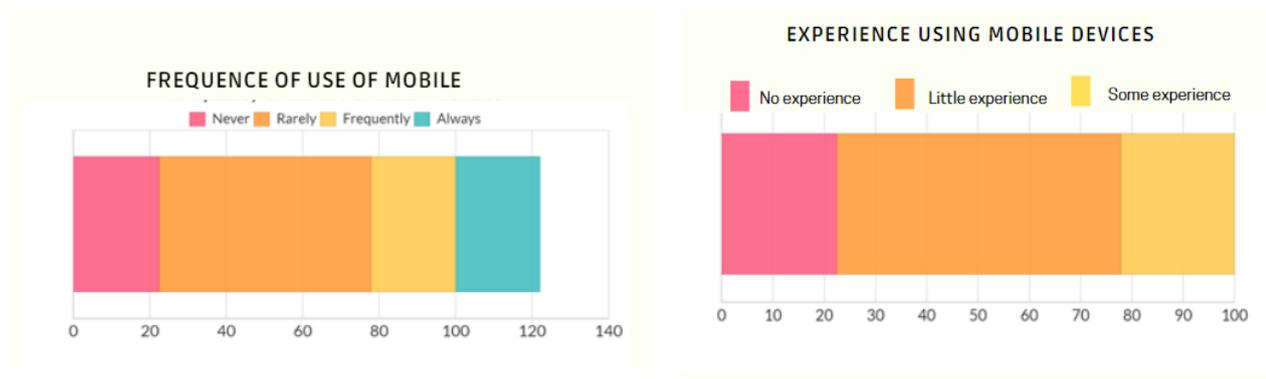
Source: Search results. Digital literacy program on mobile devices for older adults, EACH/ICMC, 2018/2019.

Regarding data obtained on previous experience and frequency of use of mobile devices by the participants, most of them reported little or no experience using smartphones (77.9%), although, for frequency of use, 87.6% reported using the device regularly, 77.4%, always and 10.2%, frequently (Figure 1).

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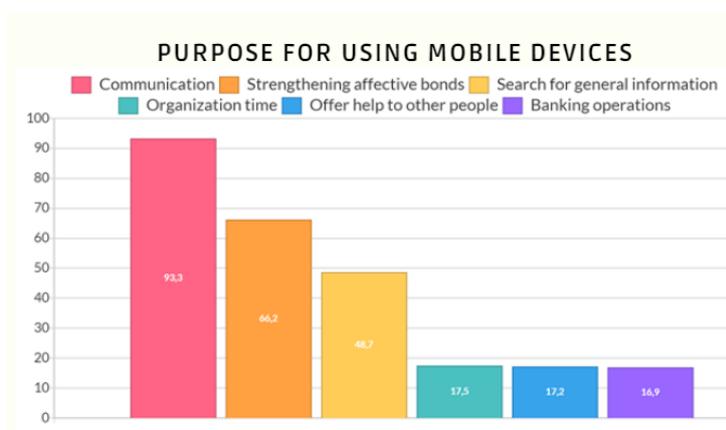
Figure 1 – Previous experience and frequency of use of mobile device according to the *Idosos Online Program*, a digital literacy program on mobile devices for older adults, 2018/2019



Source: Search results. Digital literacy program on mobile devices for older adults, EACH/ICMC, 2018/2019.

The intended purposes reported for using the devices were “Communication” (93.3%), followed by “Strengthening affectional bonds” (66.2%) and “Search for general information” (48.7%). Less prevalent reasons were “Organizing time” (17.5%), “Offering help to other people” (17.2%) and “Banking operations” (16.9%) (Figure 2).

Figure 2 – Intended purposes for using mobile devices by group of participants in the Digital Literacy Program on Mobile Devices – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019.



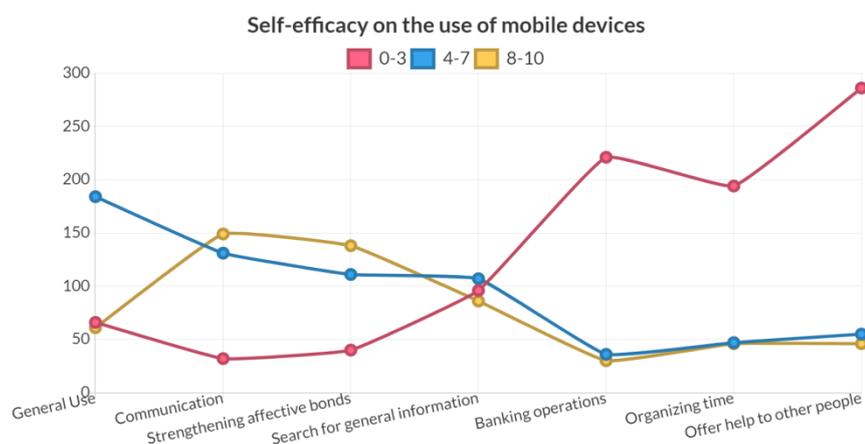
Source: Search results. Digital literacy program on mobile devices for older adults, EACH/ICMC, 2018/2019.

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Regarding the assessment of self-efficacy, the same intended objectives were used (Fig. 3). Based on these objectives, the participant indicated their level of competence in achieving them. A score of 0 to 10 points was used (“0” for no competence to achieve the objective and 10 for full competence). As shown in Figure 3, most respondents did not feel competent to achieve the intended objectives of “Organizing time” (78%), “Offering help, teaching, advising other people” (67.6%) and “Bank transactions” (64.7%). However, 47.8% of respondents felt capable of achieving “Communication” and 47.7% of “Strengthening affectional bonds”. For “Search for general information,” 107 participants scored between 4 and 7 points (47%), which is consistent with the results for the question involving general competence in the use of smartphones.

Figure 3 – Assessment of self-efficacy in the use of mobile devices by U3A students of the Digital Literacy Program on Mobile Devices – Smartphones, EACH/ICMC, 2018/2019.



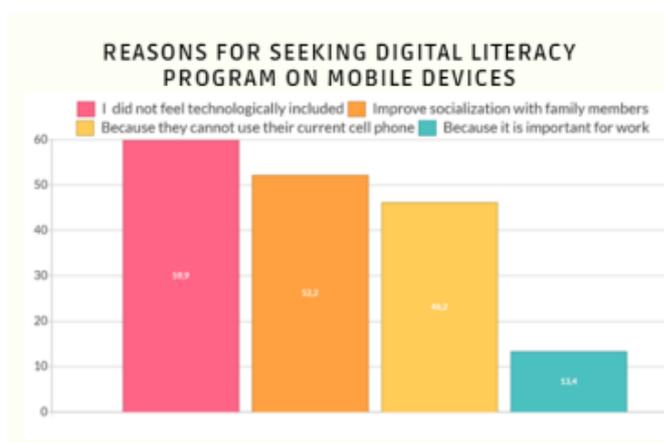
Source: Digital Literacy Program on Mobile Devices – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019.

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Regarding the reasons that led the students to seek the digital literacy program, according to options previously selected by the research group, 59.9% stated “I did not feel technologically included”; 52.2% wanted to “improve socialization with family members”; 46.2% joined “because cannot use current cell phone,” and 13.4%, “because it is important for work” (Figure 4).

Figure 4 – Assessment of reasons stated by U3A students for seeking the Digital Literacy Program on Mobile Devices – Smartphones, EACH/ICMC, 2018/2019



Source: Search results. Digital Literacy Program on Mobile Devices – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019.

The categories for qualitative analysis were generated from the responses related to perceived benefits or advantages and difficulties in the use of mobile devices (Tables 2 and 3).

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Table 2 – Categories and definitions according to sample question related to Difficulties using smartphones – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019

Theme: Difficulties		
Categories	Definition	Sample utterances
1) Understanding or perception through experience using mobile devices. (Code: CP)	This category includes utterances referring to the lack of general knowledge and familiarity with mobile information and communication technologies.	<p><b>Lack of general knowledge (D)</b>  <b>D230:</b> “Ignorance for not knowing some cell phone functions. but I'm interested.”  <b>D89:</b> “I'm afraid to touch my cell phone due to lack of knowledge.”  <b>D69:</b> “Because I think I was from another time, and I never took a course.”</p> <p>b. <b>Familiarity (F)</b>  <b>F70:</b> “It's very difficult for me because I don't know the basics, my wife knows and I don't...”  <b>F61:</b> “Everything! (Laughs) I'm often unable to operate it myself and I end up having to ask for help.”  <b>F307:</b> “I don't know how to use technology and its features; I can't find the things I want.”</p>
2) Report behavior about situations experienced (Code: ER)	This category includes utterances referring to feelings of discomfort, anxiety or fear when using mobile information and communication devices.	<p><b>Attitudes (A):</b>  <b>B75:</b> “Strengthening bonds and feeling capable of doing new things that are not so easy for our age.”  <b>D115:</b> “...select something I don't want, to write, buy things without knowing it.”  <b>D156:</b> “... I don't have much patience; I give up easily.”  <b>D62:</b> “...difficulties accepting and refusing things that suddenly appear on the cell phone screen.”  <b>D139:</b> “... I don't know how to operate it and don't try to learn to not mess up the settings or make mistakes.”  <b>B149:</b> “I can't live without it anymore. To communicate.”</p> <p>b. <b>Feelings (S):</b>  <b>D26:</b> “...afraid of using the apps, fear of being something fake.”  <b>D59:</b> “...afraid of doing something wrong. Virus. Share</p>

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		<p>misinformation.”</p> <p><b>D81:</b> “I’m terrified when the cell phone rings and have difficulty answering the call.”</p> <p><b>D161:</b> “...fear of losing cell phone data.”</p> <p><b>D172:</b> “... afraid of using it wrong and damaging the cell phone and also of using an application.”</p> <p><b>D306:</b> “...afraid of doing something wrong because I don't understand much about how to use some apps.”</p>
<p>3) Identification of a new language. (Code: NL)</p>	<p>This category includes utterances referring to the report of specific difficulties in the recognition, decoding and use of specific resources or applications of mobile information and communication devices.</p>	<p><b>Resources (R):</b></p> <p><b>D5:</b> “... I have difficulty installing, updating and using apps.”</p> <p><b>D269:</b> “...comprehend what the cell phone is showing, I cannot understand the language of the device.”</p> <p><b>D152:</b> “...difficulty changing some keyboard settings.”</p> <p><b>D291:</b> “...what buttons do, writing fast”.</p> <p><b>b. Applications (Apps):</b></p> <p><b>D11:</b> “...play store, sign up to websites, search and update.”</p> <p><b>D24:</b> “...experienced a lot of difficulty regarding settings and app installation.”</p> <p><b>D77:</b> “...difficulties understanding the differences between the apps, there are too many different names.”</p> <p><b>D299:</b> “Gets lost on the screen, in the apps, doesn't know how to exit.”</p> <p><b>D312:</b> “... Using apps, e.g. social media platforms, bank; concerns about viruses.”</p>

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<p>4) Temporary or permanent changes characterized by sensory, motor or cognitive manifestations (Code: ATP)</p>	<p>This category includes utterances referring to sensory changes in vision and hearing, difficulties in handling and memory complaints considered obstacles to the use of mobile information and communication devices.</p>	<p><b>Sensory Changes and Handling (AI):</b>  <b>D21:</b> “...general difficulty handling the device.”  <b>D28:</b> “...visual and hearing problems.”  <b>D123:</b> “...fumbles with two functions at the same time.”  <b>D125:</b> “I type very slowly.”  <b>D175:</b> “...using keys and searching, accessing Google.”  <b>D176:</b> “...during use when I activate one thing, I end up doing another.”  <b>D236:</b> “...keyboard size (too small), difficult to type.”  <b>D241:</b> “...font size, difficulty with display.”  <b>D244:</b> “Very fast, messages arrive and there is no time to read them, the letters are very small.”  <b>D258:</b> “I get really lost when I use my cell phone.”</p> <p>b. <b>Memory (Me):</b>  <b>D72:</b> “...difficulty memorizing the new information.”  <b>D98:</b> “...difficulty memorizing.”  <b>D247:</b> “...difficulty memorizing.”  <b>D302:</b> “...difficulty remembering actions correctly.”</p>
<p>5) Lack of security (Code: FS)</p>	<p>This category includes utterances referring to specific difficulties in discriminating aspects of security, being protected, aspects related to privacy in the use of mobile information and communication devices.</p>	<p><b>Security (S):</b>  <b>D4:</b> “really afraid of viruses”  <b>D66:</b> “...I get a lot of ads that create uncertainty about whether they are safe.”  <b>D169:</b> “Lack of trust and security.”</p> <p>b) <b>Privacy (P):</b>  <b>D200:</b> “... afraid of making mistakes, passing on confidential information, being robbed.”</p>
<p>6) Unnoticed difficulties (Code: DN)</p>	<p>This category includes utterances referring the denial of difficulties in using mobile devices.</p>	<p>a) <b>Negation (Ne):</b>  <b>D316:</b> “...no difficulty in mind.”  <b>D228:</b> “... I don't know...”  <b>D216:</b> “... I don't have much trouble.”</p>

Source: Search results. Digital Literacy Program on Mobile Devices – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019.

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Table 3 – Categories and definitions according to sample question related to the topic Benefits of using smartphones

Theme: Benefits		
Categories	Definitions	Sample utterances
1. Acquisition of knowledge for intellectual development. (Code: AD)	Included in this category are the utterances of respondents regarding the benefits promoted for cognition related to memory, reasoning.	<b>Memory (Me)</b> <b>B204:</b> "...improves performance with class recordings." <b>Intellectual Development (DI)</b> <b>B131:</b> "Get smart in life. I admire people who know how to use them." <b>B143:</b> "Engagement with modernization and evolution."
2. Possibilities and Opportunities that simplify the development of a practice, of an act. (Code: PO)	This category includes utterances referring to benefits promoted in the performance of daily tasks, showing the practicality, versatility and speed of mobile devices (smartphones).	<b>Facilitating (Fc):</b> <b>B53:</b> "Make things easier. Facilitates communication, sending location. Yields wide array of benefits, time saving, practicality." <b>B66:</b> "Facilitates interaction with other people, especially those living far away. Through the smartphone, I was able to keep in close touch again with people who lived far away." <b>B106:</b> "Bill payment, locating people, products, mobility."  <b>Fast (Ag):</b> <b>B73:</b> "Check balances, payments and scan barcodes." <b>B77:</b> "...faster contact, especially with the family." <b>B185:</b> "It's my life! I need it a lot, for contact, diary, alarm clock, social media... I use it for everything."
3. Applications and their uses in everyday life (Code AUP)	This category includes utterances from older people in relation to the benefits promoted by using specific smartphone functions and applications.	<b>Application (Ap)</b> <b>B219:</b> "I think it helps a lot for banking, social media, etc." <b>B224:</b> "... have an uber and ifood app." <b>B13:</b> "...WhatsApp, send a message, take a picture." <b>B51:</b> "Listen to music, keep a phonebook, GPS and map." <b>B59:</b> "Learning, courses, research, YouTube."

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<p><b>4. Information Sharing (Code: CI)</b></p>	<p>This category includes utterances from respondents regarding communication as a tool for integration, instruction, mutual exchange and development.</p>	<p><b>Communication</b>  <b>B27:</b> "...keep in touch with the children."  <b>B39:</b> "It helps me keep in touch with family and friends, communicate with distant relatives, obtain information on Facebook, on culture and to kill time."  <b>B77:</b> "Allows swift contact, especially with the family."  <b>B85:</b> "It is very important to communicate, even more so when you are far from others."  <b>B297:</b> "Provides immediate contact with people. This is very useful."  b. <b>Interaction (In):</b>  <b>B108:</b> "...Without it you can't interact 100% with the world..."  <b>B246:</b> "A more sociable life..."</p>
<p><b>5. Ability to choose (Code: CE)</b></p>	<p>This category includes utterances of respondents regarding preservation of autonomy, independence in safe and informed use of mobile devices.</p>	<p><b>Autonomy (Au)</b>  <b>B102:</b> "...more autonomy."  <b>B122:</b> "This helps me, and I feel safe, especially in communication and interaction. I like to be involved with other people."  b. <b>Independence (Id):</b>  <b>B176:</b> "...when I go out, I can order an uber. Use apps. I don't want to be dependent."</p>
<p><b>6. Learning new concepts and ideas. (Code: NC)</b></p>	<p>This category includes the utterances of the respondents regarding the possibilities of updating their daily lives and general information, and keeping abreast of events locally and worldwide.</p>	<p>ttttt. <b>Update (At):</b>  <b>B62:</b> "I always use my cell phone, it's important to stay informed, call and keep in touch with other people."  <b>B242:</b> "...to stay abreast of the world in your hand because of the internet."  b. <b>Information (If):</b>  <b>B161:</b> "...have greater access to information and learn to transfer photos from your cell phone to another computer."  <b>B204:</b> "...the smartphone has transformed information. It revolutionized every point of view."  <b>B299:</b> "... to research on the internet, check prices, use the internet in general."  <b>B309:</b> "The cell phone is an essential tool. An inseparable companion, it connects us with the world."</p>

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<p><b>7. Social participation</b> (Code: PS)</p>	<p>This category includes the utterances referring to the possibilities of social participation and intergenerationally.</p>	<p><b>Society (SC):</b>  <b>B124:</b> “It helps me feel safe, especially with communication and interaction. Being involved with other people.”  <b>B200:</b> “...feeling a confident citizen.”  <b>B235:</b> “...to be able to talk to younger generations.”  <b>B309:</b> “Contact other people, join the social media platforms and see photos of tourist attractions.”</p> <p>b. <b>Social Network (RS):</b>  <b>B246:</b> “A more social life, I would like to promote my work, not spend credit on messages. Being able to enjoy convenience for everyday life.”</p>
<p><b>8. Adverse situations.</b> (Code: SA)</p>	<p>This category includes the utterances of participants referring to the perception of mobile devices as a source of help in adverse situations.</p>	<p><b>Emergencies (Em)</b>  <b>B58:</b> “Important, because any problem with the car, falling ill needing to rescue someone, this is a tool that everyone should have to talk to others...”  <b>B317:</b> “...for emergencies as well, I communicate with the mother of my grandchildren, who stay with me”.  <b>B95:</b> “Cell phones are important, especially at our age, I've already fallen on the street – I passed out. I felt again and had a cell phone, so I called my husband.”  <b>B202:</b> “If you are lost, you can find help either on maps or by calling someone.”</p>
<p><b>9. Ignorance about benefits</b> (Code: IB)</p>	<p>Includes utterances of the participants regarding the lack of knowledge about the possible benefits.</p>	<p>a. <b>Disinterest</b>  <b>B142:</b> “Today I couldn't say because I don't use the resources, but at the end of the course I hope I'm an expert.”  <b>B237:</b> “...a lot... I don't know which ones, but I know there are...”  <b>B257:</b> “...I know it can help me, but I don't have the knowledge.”  <b>B262:</b> “I can give a lot, but I don't know how to use them.”  <b>B277:</b> “For now there are none.”</p>
<p><b>10. Psychological benefits</b> (Code: BP)</p>	<p>Includes utterances of participants regarding emotional or attitudinal benefits.</p>	<p><b>Inclusion</b>  <b>B22:</b> “not to be isolated in the world. , offers better mobility.”  <b>B139:</b> “It's part of life, if we don't know how to use our cell phone, we're out of everything.”</p>

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		<p>b. <b>Satisfaction</b></p> <p><b>B114:</b> “happiness”</p> <p><b>B129:</b> “Get smart in life. I admire people who know how to use it.”</p> <p><b>B138:</b> “well-being; it’s rewarding to be able to make calls and do things by myself.”</p> <p><b>B215:</b> “...personal satisfaction. Happy to use it without asking others for so much help.”</p>
<p><b>11. Economic Benefits (Código BE)</b></p>	<p>Includes utterances related to economic benefits.</p>	<p><b>Work (Tr):</b></p> <p><b>B220:</b> “...work with uber.”</p> <p><b>B191:</b> “I get clients via cell phone, keep in touch with them, ...”</p> <p><b>B92:</b> “To help with work, to communicate, today everything is on the cell phone. There are a thousand functions. A person without a cell phone is nothing.”</p> <p><b>B303:</b> “It can be a tool for work, very useful and with potential to be explored.”</p> <p>b. <b>Economic (Ec):</b></p> <p><b>B57:</b> Quick problem-solving, no bank queue, traveling by plane.</p> <p><b>B116:</b> “... with WhatsApp you can stay close to the person even if they are far away, we keep in touch with the person all day and the best thing is it’s free of charge.”</p>

Source: Search results. Translated by the authors. Digital Literacy Program on Mobile Devices – Smartphones, University of the Third Age, EACH/ICMC, 2018/2019.

Difficulties using mobile devices represented the smallest number of categories (6), the most reported being ignorance with 103 (29.5%), settings with 68 units of analysis (19.5%), and apps with 65 units of analysis (18.6%). The second theme, Benefits of using mobile devices had 11 categories, notably communication with 125 units of analysis (25.1%), facilitating with 68 units of analysis (13.6%), and Information with 66 units of analysis (13.2%) (Table 4).

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Table 4 – Benefits and Difficulties related to the use of mobile devices

Benefits and Difficulties related to the use of mobile devices.	Frequency		Frequency	
	n	%	n	%
<b>Difficulties using mobile device</b>			<b>Benefits of using mobile device</b>	
<b>Understanding or perception through experience using mobile devices.</b>			<b>Acquisition of knowledge for intellectual development.</b>	
Ignorance	103	29.5	Memory	6
Familiarity	18	5.1	Intellectual development.	35
<b>States and reactions capable of expressing events experienced</b>			<b>Possibilities that simplify the development of a practice.</b>	
Attitudes	8	2.2	Facilitating, practicality	68
Feelings	34	9.7	Mobility	16
<b>Identification of a new language.</b>			<b>Software and its uses in everyday life</b>	
Settings	68	19.5	App	30
Apps	65	18.6	<b>Information Sharing</b>	
<b>Temporary or permanent alterations</b>			Communication	125
Sensory and Handling Changes	12	3.4	Socialization	21
Mobility	10	2.9	<b>Ability to choose</b>	
Memory	9	2.6	Autonomy and Independence	23
<b>Lack of security</b>			<b>Learning new concepts and ideas</b>	
Insecurity	15	4.3	Update	66
<b>Unnoticed difficulties</b>			Information	23
Negation	17	4.9	<b>Social Participation</b>	
			Social network	10
			Leisure	5
			<b>Adverse Situations</b>	
			Emergencies	13
			<b>Ignorance about benefits</b>	
			Lack of interest	20
			<b>Psychological benefits</b>	
			Inclusion	7
			Satisfaction	18
			<b>Economic benefits</b>	
			Job	11
			Value for money	2
Total	349	100.0	Total	499

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## 4 Discussion

Technological advances and the growing shift in the age pyramid worldwide have brought transformations across all sectors of society, and digital literacy has emerged as an adequate alternative for lifelong learning that comes as a late understanding of this new language by the older population. In this respect, the digital inclusion of older people is a crucial factor, as is the development of user-friendly products and the availability of innovative methodologies in suitable programs offered within favorable environments, such as those found in Universities of the Third Age (U3A), as presented in this study.

The results of the sociodemographic assessment showed a high participation of women. Although this finding does not differ from evidence found in other countries, it shows female interest in learning to use mobile devices. However, as identified by Fernández-Aldèvol (2019) – in survey carried out in Brazil covering all states on Internet use on mobile devices –, the gender difference was not significant. The mean age of the study participants was 68.78 (+ 5.89 SD) years, with a lower number of individuals aged over 75 years. The presence of a more marked digital gap with increasing age was also observed in other studies (PÁSCOA; GIL, 2017). Fernandèz-Aldèvol *et al.* (2017), in a study involving octogenarians and nonagenarians, attributed this phenomenon to the heterogeneity of old age, desires and life experiences. However, lack of interest, difficulties related to aging itself, non-recognition of the benefits of technology and low level of digital literacy can be decisive factors in the adoption of technology by the older population. In a study by Santos (2022), the learning of ICTs was also associated with the desire and need to use the technology among the older population, along with mediators to help them.

Fernández-Ardèvol (2019) and Santos (2022) found that individuals with higher education make more varied use of mobile devices and are interested in digital literacy courses. Oliver, *et al.* (2017) observed that 60% of their sample had finished high school or college, as observed in this study. The low demand for learning by the low-educated population warrants attention and may be driven by the lack of literacy (FERNÁNDEZ-ARDÈVOL, 2019). The study by Santos (2022) found that the group identified as having a

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low level of literacy received help from friends or family members that were not always available. By contrast, the group with a high level of literacy relied on YouTube tutorials and mediators such as technology professionals. According to the author, the role of the mediator is fundamental in the learning process of older individuals. However, although mediators can enable autonomy, they may also limit it, in as far as they exert more control over what their family member “can” or “can’t” use. Another obstacle to technological inclusion involves the economic issue. Retirement pension was highlighted as the only source of income for most interviewees, which in general indicates a loss of material resources and, according to Van Deursen & Helsper (2015), can affect the degree of internet access, as staying connected entails costs. Indeed, income can be a determinant of how ICTs are used and developed in this age group (BONICENHA, 2022; HELSPER, 2020; SANTOS, 2022). Also, according to the authors, income is one of the determinants of how ICTs will be used and developed in this age group. However, although the economic issue is recognized as a relevant factor for internet access, this was not evident in our study, where most participants had a low income, were retired and not involved in paid work, yet 84% had mobile devices with 3G or 4G networks. Another interesting fact is that, although 44.2% of the participants were married, 64% did not live alone, which may indicate coexistence between generations (intergenerationality). According to Bruggencate (2019), this mix can stimulate the use of technology and help reduce the digital gap between young and old, as they share the same interests, favoring the exchange of experiences and learning, integrating generations.

With the growing interest of the Brazilian older population in mobile devices, the experience and frequency of use of these devices was notable. Only 8.0% of the participants had never used mobile devices, and the program was their first contact with them. However, although most respondents confirmed using smartphones (87.6%), little or no previous experience was also reported (77.9%) by the participants. The importance of digital literacy programs as a learning tool is highlighted, as merely being connected does not guarantee the benefits reported by several studies on the use of technology (DOLL; MACHADO; CACHIONI, 2016).

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This study exposes the main reported goals for the use of smartphones, namely, in descending order, “communication,” “strengthening of affectional bonds” and “search for general information.” Regarding communication, practicality and ease of use were clear (93%). However, more complex activities such as “banking transactions,” “organizing time” and “offering help, teaching, guiding other people,” represented low use, suggesting insecurity in the use of devices, possibly related to both lack of trust in the product (hostile applications, complex devices) and themselves (CHIU *et al.*, 2019; RAIMUNDO; SANTANA, 2019). The search for information was reported by almost 50% of the participants, revealing the exercise of autonomy, independence and social practices, since the interest in searching stems from personal desires and needs (PADILLA-GONGÓRRA, 2017), a point also cited in the study by SANTOS (2022) as a benefit found by users.

The reasons for wishing to learn about smartphones were mainly prompted by a “feeling of technological exclusion.” This proves the proactiveness and determination to learn of this group, as observed by Narushima, Liu and Distellkamp (2018) in a study on the meaning of lifelong learning among older people in vulnerable situations. Becoming a part of something, bringing oneself up to date, and a sense of belonging are relevant factors in the digital age. The second reason was “Not being able to use current mobile devices,” and it reinforces that rapid evolution and technological dynamism require constant and continuous learning. Therefore, new knowledge, intention and reflection are needed, as mentioned by Murrya *et al.* (2014), in addition to ensuring safe and effective use, since there is no impediment for the older generation to becoming competent users of technology. “Improve socialization with family members” was the reason chosen by 52.2% of the participants. To remain close and in frequent contact with distant relatives seems to be a necessity for the Brazilian older population. This contact, besides suggesting more security, revives memories, past stories and life experiences, and enhances the growth of a support network, and greater social and civic interaction, even if online.

The use for work, on the other hand, was not reported as an important reason (13.4%). It is understood, in line with Páscoa and Gil (2017) and Raymundo and Santana

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(2019), that knowledge and technological adaptation is essential for work. However, the fact that the participants were retired or not engaged in paid work may have heavily influenced the answers to this question. In this context, Santos (2022) also noted that the workspace expands the networks and relationships of older individuals when actively engaged in work activities, which justifies the answers reported on this subject.

The next point to be discussed is self-efficacy. Bandura (2016) presents self-efficacy as the beliefs of each person about their own abilities to produce the expected levels of performance. In this study, the self-efficacy reported by the respondents was similar to the data cited on the goals to be achieved by the use of smartphones. The greatest competencies were the functions for which they are determined and performed; including “communication,” “strengthening of affectional bonds” followed by “search for information.” Schreurs, Quan-Haase and Matim (2017) state that there is a paradox involving digital literacy, insofar as the fear of experiencing ICT prevents effective literacy. Exposure or training facilitates the execution of procedures, whereas the opposite prevents the acquisition of digital competence. The low degree of self-efficacy indicated by the participants in carrying out “banking transactions” is noteworthy, corroborating other studies that suggest a lack of knowledge in tasks of this nature (FERNÁNDEZ-ARDÈVOL, 2019; LEUNG *et al.* 2012; MARTÍNEZ-ALCALÁ *et al.*, 2018;).

Olsson *et al.* (2019), Lin and Chuang (2019), and Schreurs & Quan-Haase (2017) emphasize the importance of purpose in accessing information and communication technologies (ICT) among older adults, as well as their skills in using them, the cognitive and socio-emotional aspects of digital engagement to ensure the provision of different learning opportunities in environments conducive to the exploration of information. In this context, learning is referred to as a social process, and digital literacy is best acquired in social contexts. The program conducted in a university environment, with interactive interventions, as occurred in this study, is an alternative to minimize the difficulties related to the use of smartphones.

Although mobile devices are constantly evolving, handling them was reported as a major difficulty. Issues related to font size and display are the most common. Regarding social contact, Piedrahita *et al.* (2016) reported greater physical distance from the family,

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less physical interaction, addiction and technological dependence as disadvantages in the use of technology by individuals under 60 years of age. However, the opposite seems to occur in individuals aged over 60 years. These impressions, verified by the younger ones, were not confirmed for the older population. In this and other study groups, older people refer to proximity and to the possibility of interacting with those who are distant as a benefit in the use of technology. Perhaps this distinction is due to the constant and indiscriminate way younger people use technology. The study identified a lack of knowledge in the use of mobile devices as one of the most cited reasons under the subject of difficulties.

PNAD (2021), however, in a survey conducted in Brazil, found that lack of knowledge was reported by 46.26% of participants. It is highlighted that a lack of knowledge of both the basic functions of the device and the internet confers a feeling of insecurity, apprehension and fear, as evidenced in the comments reported, such as “fear of touching the cell phone,” “terrified when it rings” and “fear of using it wrong,” preventing the user from being effectively exposed to the smartphone itself. The use of apps seems to be unknown by older users. There are conflicting views on the subject, as in “I don't try to learn so I don't set it up wrong,” “...afraid of using apps, fear of sending something fake and become a liar.”

Sensory alterations and handling were also cited as difficulties regarding the use of the devices, such as “it gets in the way,” “two functions at the same time,” “too fast,” “there is no time to read,” “the letters are too small.” Motor difficulties, individual dexterity and the speed with which information appears on smartphone screens are important characteristics to be considered in digital literacy programs and reveal how essential it is to develop user-friendly products, especially at a time when governmental bodies are offering important services to the population via digital channels.

According to the utterances presented, numerous difficulties were reported by the older population in the use of smartphones. However, the benefits proved to be even greater. Communication, social participation, and psychological improvements are some of the categories related to benefits. Terms recorded include “very important,” “well-being,” “doing things on my own,” “part of life,” “not being isolated from the world,”

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“feeling like a citizen,” “immediate contact,” and “family”. Bringing distant friends and family closer, carrying out activities independently and social participation in different digital environments enhance citizenship, which can, as mentioned by Pascoa and Gil (2017), lead to greater social development.

The categories facilitating, apps and updating were reinforced by issues that promoted time management, practicality, accessibility, mobility and location of people. Bonicenha (2022) added that devices should be compatible with the platform apps and other desirable digital resources. There were many cases of devices being passed down from sons/daughters or grandchildren because they were obsolete.

This diversity is reinforced by Jacobson *et al.* (2017), when reflecting on the high degree of variability of preferences and technologies, as well as the versatility of these devices and heterogeneity among users.

According to the participants, just having a smartphone, for many, meant security. They portrayed the device as a quick means of connection and access tool in emergency situations, e.g., to ask for help or help someone. However, the use of devices also generates insecurity in terms of privacy and fear of making mistakes, factors which potentiated feelings of anxiety and fear when handling the device. There is a clear need for the digital inclusion of older adults through digital literacy programs within favorable environments that facilitate the learning of this age group.

## 5 Conclusions

The objective of this study was to understand the interests and characteristics of older people who seek digital literacy programs, listening to their perceptions about the use of mobile devices, considering their benefits and difficulties, intended purpose, self-efficacy and reasons for learning how to use them.

The study identified the need for digital literacy programs as a process of digital and social inclusion of the older population, reflecting on the multiple dimensions of old age and heterogeneity, in order to improve autonomy and independence.

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The results showed the older population's interest in learning about technology, highlighting the importance to encourage innovative teaching-learning opportunities in favorable environments, in addition to the development of user-friendly products that enhance their use.

Considering the importance of social participation in one's life, there is a need for in-depth studies on the older population's digital skills and abilities. It is essential to develop personalized teaching-learning strategies for digital literacy programs to improve the quality of life of this group, thereby ensuring inclusion, social participation and protection of their rights.

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