Mobile as Assistive Technology

Brazil Case Study Report

AT2030 Insight Paper | Inquire Cluster
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Submitted by the Global Disability Innovation Hub

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2 Executive Summary

This study investigated the feasibility and impact of providing smartphones and digital skills training to people with visual and hearing impairments in Brazil, a country where over 84% of the population uses the internet, but a significant digital divide persists for those with disabilities. Recognizing the potential of mobile technology as a powerful assistive tool, this research aimed to understand how individuals with disabilities use smartphones, the impact on their quality of life, and how they can be best supported in developing crucial digital literacy. The project focused on bridging this divide, as people with disabilities in low- and middle-income countries often face significant barriers to accessing mobile technology that could otherwise enhance their independence, productivity, and social inclusion. The core objective was to generate evidence to inform the design of future, larger-scale programs that leverage mobile technology for empowerment.

The study involved 242 participants, evenly divided between Deaf and Hard of Hearing (DHH) individuals and Blind and Partially Sighted (BPS) individuals. Participants were recruited through strategic partnerships with established and trusted organizations such as Laramara and CADEVI, which were essential for building trust and facilitating recruitment. Each participant received a Samsung Galaxy A15 smartphone, a complimentary 10GB monthly mobile data plan, and customized digital skills training sessions focused on utilizing free accessibility tools.

BPS participants demonstrated statistically significant improvements in quality of life, mobile phone usage, and digital skills post-training. Many participants expressed a newfound sense of independence, empowerment, and social connection. They could perform daily tasks such as banking and shopping without assistance.

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"I feel more independent because now I can do things without depending so much on other people." — BPS participant

2.1 Report findings: critical gaps in AT access

- 50% participants reported not having access to essential assistive products such as hearing aids.
- The lack of a dedicated hearing aid pairing menu created a major barrier for DHH users.
- Some accessibility features, such as TalkBack and Magnifier, slowed down the phone performance.
- DHH participants consumed mobile Internet data at a much higher rate due to frequent use of WhatsApp video calls compared to BPS participants.

2.2 Recommendations

- Improve the affordability of smartphones for people with disabilities, to increase access to proper hardware that is compatible with accessibility tools.
- Zero-rate accessibility-essential applications such as BeMyEyes, Google Maps, and WhatsApp with mobile Internet data packages.
- Subsidize mobile Internet data packages for people with disabilities; in particular, those with financial need.

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2.3 Partners

This report was produced in partnership with Cadevi, Instituto Luz, Laramara, Claro, Riobranco, Instituto De Medicina Fisica E Reabilitacao and Fundacao, as part of GDI Hub's AT2030 programme.

2.3.1 About AT2030

AT2030 is a £51.8m programme funded by UK International Development and led by GDI Hub to explore and test innovative ways to address systematic challenges to get more AT to the people that need it around the world.

AT2030 tests 'what works' to enable access to life-changing assistive technology for all.

AT2030 creates deep community leadership and engagement to generate new evidence & insights, answering critical research questions and developing foundational methodologies to address intersectional challenges and research and evidence gaps. From incubating future tech inspired solutions to venture acceleration, AT2030 brings effective solutions to market - testing new mechanisms and ambitious scaling pathways - while strengthen systems to make inclusion a reality.

The AT2030 has reached 10 million people directly and 54 million indirectly driving a lifetime of potential.

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3 Introduction

Assistive technology (AT) refers to the application of organized knowledge and skills related to assistive products, systems, and services. Assistive products are external items not implanted in the body, including software, that are specifically designed or widely available to support individuals in maintaining or improving functioning and independence, thereby promoting well-being for people living with disabling health conditions.

In recent years, mobile technology has emerged as an important component of the AT ecosystem. A report published by ATScale and AT2030 in 2020 highlighted four key dimensions of digital AT:

1. Accessible devices, such as smartphones and tablets, and accessories such as switches or Braille readers.
2. Accessible platforms or operating systems that allow users to interact with devices and access digital content.
3. Accessible software and applications designed to support specific activities or tasks
4. Accessible content, including text, text-to-speech, availability in the native language, and pictograms (2).

Smartphones have significant potential as assistive tools. Built-in accessibility features and specialized applications can replicate or complement many traditional assistive products. When accessible and properly used, smartphones can increase independence and productivity, facilitate participation in the digital economy, and expand access to information and services (2). In this report, the terms “mobile phones” and “smartphones” are occasionally used interchangeably when referring to internet-enabled mobile devices, although the intervention specifically involved smartphones.

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3.1 Access to mobile technology

Despite these potential benefits, access to mobile technology remains uneven. People living in low- and middle-income countries (LMICs) are significantly less likely to access mobile internet and smartphones. Mobile internet adoption has grown steadily in these countries, which are home to more than three-quarters of the world's connected population. However, 93% of people who remain offline globally also live in LMICs (3). Within these contexts, people with disabilities are even less likely to own or use mobile phones, with reported ownership gaps ranging from 11% to 55% compared with the general population (2).

3.1.1 Introduction to Brazil

Brazil reflects many of these global trends. In 2021, 84.7% of Brazilians used the internet, and usage exceeded 90% among individuals aged 20 to 49. Internet use is most associated with watching videos, making voice or video calls, and exchanging messages through digital applications. However, 15.3% of the population, approximately 28.2 million people aged ten or older, remained offline. Among these individuals, 42.2% reported lacking the skills required to use the internet, while 20.2% cited economic barriers related to the cost of devices and connectivity (4).

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Mobile phone access is similarly widespread but not universal. Approximately 84.4% of Brazilians had a mobile phone for personal use, and nearly 95% of these users accessed the internet through their device. Among those without a mobile phone, economic constraints and limited digital literacy were again identified as key barriers (4).

Evidence suggests that people with disabilities in Brazil face additional challenges in accessing digital technologies. Data collected between 2012 and 2016 indicate that internet use, computer use, and mobile phone ownership are consistently lower among people with disabilities across all social classes. Within this population, 36.8% use the internet and 64.9% own a mobile phone. Mobile devices represent the most commonly used digital technology among people with disabilities, particularly among individuals with visual (72.7%), mobility (54%), and hearing (48.3%) impairments (5).

Affordability remains a major barrier. The cost of mobile phone access includes the purchase of the device itself as well as ongoing expenses such as applications, voice services, and data plans (2). These financial barriers often prevent individuals with disabilities from accessing or fully benefiting from mobile technologies.

Although some governments and mobile operators have introduced initiatives to improve digital accessibility, there is still limited evidence on the impact of providing smartphones or data plans to AT users in LMICs. Evidence is also limited on how such programs can be implemented effectively (2).

This study therefore aimed to examine the feasibility and impact of providing smartphones to assistive technology users in Brazil, with a specific focus on individuals with visual impairments, Blind and Partially Sighted (BPS), and individuals with hearing impairments, Deaf and Hard of Hearing (DHH). By focusing on these two groups, the

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research sought to better understand how mobile technologies can support independence, communication, and participation in the digital environment. The findings aimed to inform the design of future initiatives that use mobile technology to promote digital inclusion and independence among people with disabilities.

4 Methodology

4.1 Participant Recruitment

To ensure the secure management and organization of participant data, the research team held weekly meetings to review progress and coordinate activities. Separate spreadsheets were maintained for DHH and BPS participants, along with checklists tracking each stage of the project. Access to participant and partner institution information was restricted to the research team.

Two key concerns guided the design of the recruitment process. First, because the study provided participants with a free smartphone, precautions were needed to prevent individuals from enrolling solely to receive the device and then withdrawing. Second, it was important to ensure that potential participants understood that the study was a legitimate research initiative.

To address these concerns, the research team established partnerships with reputable institutions serving people with visual or hearing impairments. These organizations maintained large databases of potential participants, enabling the research team to identify individuals who met the study criteria. Introducing the project through trusted

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institutions also helped reassure potential participants about the legitimacy of the research. Institutional partners conducted an initial screening to identify individuals who would benefit most from the smartphone and digital skills training. Partnerships were avoided with institutions that had political affiliations or that requested compensation beyond what the project could provide.

Several institutions participated in initial meetings and agreed to support the study: the São Paulo Rotary Foundation programmes for the education and professional training of persons with hearing impairments (CES and CEPRO SELUR); the Brazilian Association to Assist People with Visual Impairment (Laramara); the Support Center for the Visually Impaired (CADEVI); and the Light for the Blind Institute. The research team also collaborated with a local BPS instructor who provided free basic computing classes for visually impaired individuals at the Guarulhos University Center of Excellence (ENIAC). When additional participants were required, snowball sampling was used to expand recruitment.

Initial contact with potential participants began at the end of February 2024 through partner institutions and their networks. During this stage, the research team verified eligibility requirements, confirmed individuals' affiliation with the institution that had shared their contact information, and collected basic demographic information including age, gender, place of residence, and initial interest in participating.

During follow-up contacts, additional information was collected regarding smartphone ownership or use, proficiency in sign language for DHH participants, estimated proficiency in smartphone and technology use (classified as low, medium, or high), and availability for training sessions. Some BPS participants required an additional contact to complete the pre-training survey. Further details on these procedures are provided in the "Accommodations" section of this report. Final contacts were made to confirm

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participation and inform individuals of the dates on which they would attend the project site to sign consent forms, receive the smartphone, and begin the digital skills training.

Establishing initial contact proved more challenging than anticipated. Although partner institutions had informed potential participants that the research team would contact them, many individuals did not respond to initial messages, particularly among BPS participants. Partner institutions therefore played an active role in reminding individuals about the study. Following their advice, the research team began contacting participants through phone calls rather than text messages, which significantly improved response rates.

Due to logistical constraints, the research team could not establish partnerships with additional institutions serving the DHH community beyond CES and CEPRO SELUR. As a result, snowball sampling was also used to recruit additional DHH participants. Individuals who had already been introduced to the research, confirmed to meet the eligibility criteria, and expressed interest in participating were asked to recommend other potential participants within their networks.

4.2 Materials

The study protocol originally specified the use of the Samsung Galaxy A14 smartphone. However, this model was no longer available on the Brazilian market when the local team began acquiring the devices. As a result, the Brazilian site used the newer Samsung

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Galaxy A15 model. This change caused unexpected delays, and the devices only arrived at the end of July 2024.

To ensure that the project could resume quickly once the devices were available, the research team completed the initial smartphone setup in advance. This included updating the Android operating system and inserting the SIM cards associated with the mobile data plans. After configuration, the devices were returned to their original packaging. All relevant information was recorded to ensure proper tracking and to avoid loss of information.

The mobile data plan was provided free of charge through an agreement between a local telecommunications provider (Claro S.A.) and the University of São Paulo Medical School General Hospital (HCFMUSP). The plan included unlimited calls and messages to any number in Brazil, as well as 10 GB of mobile data per month.

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4.3 Study Procedure and Data Collection

This section describes the study procedures and data collection process, which are summarized in Figure 1.

Figure 1 Summarization of the study procedure in the Brazilian Site

4.3.1 Changes Implemented During the Study

Because the smartphones arrived later than expected, the study began later than originally planned. Several adjustments were therefore made to accommodate the shorter timeframe available:

- The number of participants was reduced from 550 to 300.
- The initial and final in-depth interviews were removed.
- The recording of digital skills training sessions was discontinued.
- Participant follow-up, including monthly interviews, was conducted for a minimum of four months rather than six.

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- Consent forms and other study documents

4.3.2 Consent forms and other study documents

To participate in the study, individuals were required to review and sign three different documents:

- **Free and Informed Consent Form:** the standard consent form used across all study sites.
- **Consent Form on International Data Transfer:** due to Brazil's General Data Protection Law (LGPD), participants were informed that their data would be stored on servers located outside Brazil and that appropriate security measures would be implemented to protect their information.
- **Terms of Use for the Device, Phone Number, and Data Plan:** because the mobile data plan was provided through an agreement between HCFMUSP and the telecommunications provider, participants were required to acknowledge their responsibilities regarding the appropriate use of the smartphone and SIM card. This document also recorded the identification codes associated with the smartphone and SIM card (IMEI codes).

During all stages of recruitment and prior to signing these documents, the research team remained available to answer any questions from potential participants.

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4.4 Digital Skills Training

The digital skills training used in this study was translated and adapted into Portuguese from the original project materials. The research team conducted internal preparation sessions to ensure familiarity with the TalkBack accessibility tool and to confirm that the training content was compatible with the smartphone model used in the study.

Several adjustments were made to the training materials: outdated slides referring to earlier smartphone models and Android versions were updated; slides related to SIM card installation and initial software updates were removed because these steps had already been completed by the research team; slides covering the installation and configuration of the Murmuras app were moved to the beginning of the training to allow earlier data collection; and a section on digital security and online safety was added.

WhatsApp group chats were created for each training group to facilitate communication between the research team and participants. The surveys, Murmuras monitoring, and training sessions followed the standardized protocols developed for the study.

4.4.1 Surveys

To characterize participants and collect study data, the research team used the Qualtrics platform to develop the survey instruments. Surveys were translated and adapted into Portuguese from the English survey instruments developed for the study.

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Two surveys were administered during the study: a pre-training survey administered at the start of the study, and a post-training survey administered after completion of the digital skills training.

4.4.1.1 Pre-training survey

The pre-training survey contained six blocks of questions. The sequence of blocks varied depending on whether participants already owned or used a smartphone. The six blocks included:

1) Demographic Questions;
2) Self-reported need and use of AT;
3) Mobile Phone Expectations;
4) Mobile Phone Usage;
5) Digital Skills Self-Assessment;
6) Quality of Life.

Participants who owned a smartphone or used someone else's smartphone completed blocks 1–2–4–5–6. Participants who neither owned nor used a smartphone completed blocks 1–2–3–6.

4.4.1.2 Post-training survey

The post-training survey contained five blocks of questions. The first four blocks corresponded closely to those used in the pre-training survey, while an additional block was included to assess the impact of the mobile data plan. All participants completed the same sequence of blocks:

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1) Demographic Questions;
2) Mobile Phone Usage;
3) Digital Skills Assessment;
4) Quality of Life;
5) Mobile Data Plan Impact.

4.4.2 Smartphone Use Monitoring (Murmuras)

An application called Murmuras was installed on participants' smartphones to record which applications were used and the duration of their use.

Before the start of the study, the research team conducted several tests to verify that the application functioned as intended. These tests included simulating typical smartphone use, testing accessibility tools commonly used by DHH and BPS participants, and enabling or disabling accessibility features to determine whether these interactions affected usage tracking.

Following these tests, several adjustments were required. In coordination with the application development team, updates were made to ensure that certain applications were correctly logged. These issues were primarily related to the smartphone model used in the study and to application package names that had not previously been tracked.

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The Murmuras database was monitored regularly throughout the study to confirm that data collection was functioning properly. When issues were identified, the research team followed troubleshooting procedures such as waiting several days to confirm whether data resumed, reinstalling the application using the participant's installation link, or repeating the configuration process when necessary.

4.4.3 Monthly Follow-Up Interviews

Between November 2024 and February 2025, a subset of participants was invited to participate in monthly follow-up interviews.

Each month, 16 interviews were conducted: eight with DHH participants and eight with BPS participants. Half of these interviews involved the same participants across the four months, while the remaining interviews were conducted with randomly selected participants who had not participated in previous interview rounds. Some interviews could not be completed and were not replaced.

The interviews were conducted through online audio or video calls between the researcher and the participant. A semi-structured interview script was used, translated and adapted into Portuguese from the original version developed for the study. Two additional questions were included in collaboration with the mobile data provider:

- What is your reason for using or not using the Minha Claro app?
- If you have used it, what was your experience like?

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4.5 Data Analysis

The main dataset for this study consisted of information from two sources: survey responses and smartphone usage data collected through the Murmuras application. Survey data included responses from both the pre-training and post-training surveys. Analyses were conducted separately for survey responses (self-reported information) and Murmuras data (application usage records).

4.5.1 Survey Data

Survey analyses were conducted for the full sample and then repeated separately for participants in the BPS and DHH groups.

Demographic variables were summarized using descriptive statistics. Categorical and ordinal variables were presented as counts and percentages of respondents, while continuous variables were summarized using mean, standard deviation, median, and total range. For selected questions, response distributions were illustrated using histogram plots.

To evaluate the effects of the training, responses from the pre-training and post-training surveys were compared for specific groups of questions. Only participants who completed both surveys were included in the analyses.

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The following comparisons were conducted:

- Comparison between expected smartphone usage reported before training and actual usage reported after training for participants who did not own or use a smartphone prior to the training (block 3 versus block 4)
- Comparison between self-reported smartphone usage before and after training for participants who already owned or used a smartphone prior to the training (block 4 versus block 4)
- Comparison of self-reported quality of life before and after training (block 6 versus block 6)

For each question within these sets, comparative histograms were produced to visualize pre- and post-training responses. Overall estimates for each set of questions were calculated by first averaging responses across all questions within a set for each participant. This produced a participant-level average score, which was then averaged across all eligible participants. These results were visualized using box-and-whisker plots combined with violin distribution plots.

Self-reported digital skills were also analyzed by comparing pre-training and post-training responses from block 5. Questions in this block were categorized according to an adapted version of the Mobile Device Proficiency Questionnaire (MDPQ). The MDPQ includes eight domains: Basics of Mobile Devices, Communication, Data and File Storage, Internet, Calendar, Entertainment, Privacy, and Troubleshooting and Software Management.

A final proficiency score (MDPQ score) was calculated by averaging the responses within each domain and summing the resulting domain scores. As with the other survey

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measures, overall pre-training and post-training estimates were obtained by averaging participant-level scores across all eligible participants. These results were presented using box-and-whisker plots with violin distribution overlays.

4.5.2 Statistical Analyses

Statistical analyses were conducted to further evaluate changes between pre-training and post-training measurements.

Paired comparisons between pre-training and post-training estimates were performed using the two-tailed Wilcoxon Signed Rank Test for paired samples. This test was selected instead of the traditional paired t-test because some score residuals showed strong skewness.

The effect size for the differences between pre-training and post-training results was estimated using Cohen's d. These effect sizes should be interpreted alongside the practical implications of the observed differences.

To examine associations between participant characteristics and outcome measures, Linear Mixed Models were fitted to the data. In the primary model, the score of interest was used as the outcome variable. Age, gender, and time (pre-training or post-training) were included as fixed effects, and a random intercept was included for each participant.

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4.5.2.1 Models

The model can be expressed as:

$$Score_{t,i} = \beta_0 + \beta_1 Time_{t,i} + \beta_2 Sex_i + \beta_3 Age_i + \mu_i + \varepsilon$$

Where the time (pre- or post-training) is encoded in the subscript $_t$; each participant is encoded in the subscript $Score_i$ is the score of interest being modelled; B_0 is the overall intercept for the model (expected value when all other variables are 0); other β are the coefficient for each of the fixed effect variables; μ_i is the participant-specific intercept (random effect); and ε represents the residuals.

A second model including interactions between fixed effects was also evaluated:

$$Score_{t,i} = \beta_0 + \beta_1 Time_{t,i} \times \beta_2 Sex_i \times \beta_3 Age_i + \times \mu_i + \varepsilon$$

In addition, changes in MDPQ scores between pre-training and post-training measurements were calculated as:

$$\Delta MDPQ = MDPQ_{Post} - MDPQ_{Pre}$$

These differences were modelled using linear regression models expressed as:

$$\Delta MDPQ = \beta_0 + \beta_2 Sex \times \beta_3 Age \times \beta_4 Group$$

Where the participant's group (BPS or DHH) is included in the model as $Group$.

For completeness, an interaction model was also included:

$$\Delta MDPQ = \beta_0 + \beta_2 Sex \times \beta_3 Age \times \beta_4 Group$$

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4.5.2.2 Confidence Intervals

For all models, 95% confidence intervals for coefficients were calculated along with p-values derived from z-tests.

Age was centred prior to model fitting by subtracting the mean age of participants. This transformation ensured that model coefficients were interpreted relative to the average participant age.

To account for multiple statistical tests, p-values were adjusted using the Holm-Bonferroni correction. Adjusted p-values below 0.05 were considered statistically significant.

4.5.3 Murmuras Data

Application session data were extracted from the Murmuras database. For each participant, all sessions associated with a specific application on a given day were summed to produce a single daily usage record per application. Each record therefore represents the total time a participant spent using a specific application on a particular day.

Participant identification codes were used to link Murmuras data with demographic information collected in the initial survey, including gender and age. This allowed

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analyses to be conducted for the full sample and then repeated for subgroups defined by gender (male or female) and age group. Age groups were defined as 0–39 years and 40 years or older. Analyses were also conducted separately for participants in the BPS group and the DHH group.

Accessibility applications of particular interest were identified and evaluated separately. These applications are listed in .

4.5.3.1 Table 1 Accessibility apps

TalkBack	com.samsung.android.accessibility.talkback
Text-To-Speech	com.google.android.tts
Lookout	com.google.android.apps.accessibility.reveal
Live Transcribe	com.google.audio.hearing.visualization.accessibility.scribe
Adapt Sound	com.sec.hearingadjust
Lazarillo	com.lazarillo
Hand Talk	br.com.handtalk
Seeing AI	com.microsoft.seeingai
Be My Eyes	com.bemyeyes.bemyeyes
Samsung Accessibility	com.samsung.accessibility
Sound Amplifier	com.google.android.accessibility.soundamplifier
Magnifier	com.sec.android.app.magnifier
Sign Language Interpreting Services	br.com.bolha.centrallibrass
Voice Access	com.google.android.apps.accessibility.voiceaccess

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Similarly, applications related to social media and social networking were identified and evaluated separately. These applications are listed in Table 2.

4.5.3.2 Table 2 Social Media Apps

Facebook	com.facebook.katana
Facebook Messenger	com.facebook.orca
WhatsApp	com.whatsapp
WhatsApp Business	com.whatsapp.w4b
Telegram Messenger	org.telegram.messenger
Pinterest	com.pinterest
Instagram	com.instagram.android
Threads	com.instagram.barcelona
X/Twitter	com.twitter.android
TikTok	com.zhiliaoapp.musically
Kwai	com.kwai.video
LinkedIn	com.linkedin.android

Applications related to essential or background Android system services and applications native to the device manufacturer framework were excluded from the analyses based on their package name patterns. Accessibility applications were not excluded. For this reason, a complete list of excluded applications is not provided.

The following analyses were conducted considering three datasets: all applications, accessibility applications only, and social media applications only.

- **Applications with the most users in the dataset.** A participant was considered a user if they used the application at least once during the data collection period.

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- **Applications with the highest total use time.** Total usage time was calculated by summing all recorded usage across all participants and all dates.
- **Applications with the highest average daily use.** Average use was calculated across all participants and all recorded dates.
- **Applications with the greatest increase and decrease in average use over time.** To identify changes in usage patterns, daily average usage for each application was calculated across all participants. These averages were plotted over the study period and a trend line was fitted to the data. A negative slope indicates that, on average, the application was used less frequently as the study progressed. Applications with the most negative slopes therefore represent those with the largest decline in usage among participants.

For all metrics, results were visualized using histogram plots. Comparative visualizations were also generated by gender and age group.

4.6 Accommodations

Throughout the project, reasonable accommodations were implemented to ensure accessibility for participants.

4.6.1.1 Video for CES and CEPRO SELUR's first interaction with potential participants

Before the research team contacted potential participants, the partner institution requested a short video introducing the research team and the project. The video was

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shared with potential participants to provide additional information about the study and to help identify individuals interested in participating.

4.6.1.2 Brazilian Sign Language videos

Videos in Brazilian Sign Language were produced by the research team for all study forms, surveys, and interviews.

4.6.1.3 Forms and survey narration

All consent forms were narrated before participants signed them. For BPS participants, pre-training and post-training surveys were conducted through phone calls, during which each question was read aloud by the research team.

4.6.1.4 Time extensions

Because of the delayed start of the study, two timeline extensions were required. The first extension occurred at the original end date in August 2024 and extended the study until December 2024. A second extension later extended the study period until February 2025.

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4.6.1.5 Digital skills training

Many participants faced long commuting times and scheduling constraints due to the urban mobility challenges in São Paulo. As a result, attending full-day training sessions was often difficult.

For this reason, digital skills training sessions were divided across two or more days rather than being delivered in a single full-day session.

Training sessions for BPS participants were held in locations that participants were already familiar with and could access independently, most often at the partner institution with which they were affiliated. To better support participants during training, sessions were delivered by two trainers working together. This allowed one trainer to provide individual assistance when needed while the other continued delivering the training content to the group.

Some training sessions for DHH participants were scheduled on Saturdays due to limited availability during weekday working hours.

Participants who missed a session were able to attend another group's training session to complete the program. The research team aimed to maintain a total training duration of approximately 8 to 9 hours for each group. When necessary, additional time was added to ensure that participants received the full training content. Groups supported by two trainers were generally able to maintain this training duration more efficiently.

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5 Findings

5.1 Survey Results

Results from blocks 1, 2, and 7 are presented in table format, while results from blocks 3, 4, 5, and 6 are presented as comparative violin plots. All results are reported for three participant groupings: all participants, DHH participants only, and BPS participants only.

5.1.1 Block one: demographics

The demographics block was used to characterize the study participants. Results are presented in Table 4.

5.1.1.1 Table 3 Results for Block One: Demographics

Q#	Variable	Category	All participants		DHH		BPS	
			# of answers	% of total	# of answers	% of total	# of answers	% of total
Q1.4	Disability	TOTAL	238	98.35	117	100	121	100
		Low Vision	59	24.79			59	48.76
		Completely Blind	62	26.05			62	51.24
		Hard of Hearing	21	8.82	21	17.95		
		Deaf	96	40.34	96	82.05		

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Q1.5	Educational-level and/or Vocational Training	TOTAL	237	97.93	117	100	120	99.17
		No formal education	4	1.69	2	1.71	2	1.67
		Primary school	25	10.55	9	7.69	16	13.33
		Secondary school	144	60.76	76	64.96	68	56.67
		Higher education	45	18.99	21	17.95	24	20
		Vocational Training	11	4.64	5	4.27	6	5
		Others	8	3.38	4	3.42	4	3.33
Q1.7	Can you tell us your gender?	TOTAL	242	100	117	100	121	100
		Male	122	50.41	66	56.41	55	45.45
		Female	118	48.76	49	41.88	66	54.55
		Prefer not to say	2	0.83	2	1.71		
Q1.8	What is the predominant floor material in your home?	TOTAL	242	100	117	100	121	100
		Wood	13	5.37	9	7.69	4	3.31
		Earth	2	0.83	2	1.71	9	7.44
		Cement	13	5.37	4	3.42	103	85.12
		Tiles	200	82.64	93	79.49	1	0.83
		Others	2	0.83	2	1.71	4	3.31
		Don't know	3	1.24	2	1.71		
		Do not wish to answer	9	3.72	5	4.27		
Q1.9	What is your occupation?	TOTAL	241	99.59	117	100	120	99.17
		Student	35	14.52	16	13.68	19	15.83
		Salaried job	80	33.2	55	47.01	24	20
		Business owner / self-employed	14	5.81	7	5.98	7	5.83
		Volunteer	14	5.81	2	1.71	12	10
		Qualified worker	9	3.73	6	5.13	3	2.5
		Others	70	29.05	18	15.38	51	42.5
		Do no want to answer	19	7.88	13	11.11	4	3.33

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Q1.10	What is your marital status?	TOTAL	242	100	117	100	121	100
		Single	141	58.26	76	64.96	62	51.24
		Married	63	26.03	33	28.21	29	23.97
		Divorced	18	7.44	5	4.27	13	10.74
		Co-habitation	9	3.72	1	0.85	8	6.61
		Widowed	8	3.31	1	0.85	7	5.79
		Others	1	0.41	1	0.85		
		Do not want to answer	2	0.83			2	1.65
Q1.11	Do you own a mobile phone?	TOTAL	242	100	117	100	121	100
		Yes	231	95.45	112	95.73	116	95.87
		No	11	4.55	5	4.27	5	4.13
Q1.12	Do you have access to a smartphone that is shared by someone?	TOTAL	11	4.55	5	4.27	5	4.13
		Yes	6	54.55	4	80	2	40
		No	5	45.45	1	20	3	60
Q1.13	What type of mobile phone do you own / have access to?	TOTAL	237	97.93	116	99.15	118	97.52
		Basic phone	33	13.92	13	11.21	20	16.95
		Feature phone	42	17.72	5	4.31	37	31.36
		Smartphone	158	66.67	96	82.76	60	50.85
		Do not know	4	1.69	2	1.72	1	0.85
Q1.14	Whose smartphone do you generally have access to?	TOTAL	6	2.48	4	3.42	2	1.65
		Own	4	66.67	3	75	1	50
		Child	1	16.67	1	25		
		Shared within the family	1	16.67			1	50
Q1.15	Can you access a smartphone anytime/whenever you want?	TOTAL	6	2.48	4	3.42	2	1.65
		Yes	6	100	4	100	2	100
Q1.16	Can you use the smartphone you borrow for as long as you want?	TOTAL	6	2.48	4	3.42	2	1.65
		Yes	6	100	4	100	2	100
Q1.17	Do you have to pay a fee to access a smartphone?	TOTAL	6	2.48	4	3.42	2	1.65
		Yes	2	33.33	2	50	2	100
		No	4	66.67	2	50		

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Q1.18	For how long did you own or had access to smartphone?	TOTAL	160	66.12	96	82.05	62	51.24
		Less than 1 year	8	5	4	4.17	3	4.84
		1 - 2 years	9	5.62	6	6.25	3	4.84
		2 - 3 years	4	2.5	3	3.12	1	1.61
		3 - 5 years	25	15.62	9	9.38	16	25.81
		Over 5 years	114	71.25	74	77.08	39	62.9
Q1.19	Can you use smartphone on your own without needing the help from someone else?	TOTAL	6	2.48	4	3.42	2	1.65
		Yes	4	66.67	2	50	2	100
		No	2	33.33	2	50		
Q1.20	Can you use any apps or services on the smartphone without any restriction?	TOTAL	6	2.48	4	3.42	2	1.65
		Yes	6	100	4	100	2	100

Question 1.6 (What is your age?) produced a large number of distinct responses and is therefore summarized in Table 5. On average, DHH participants were younger, while BPS participants were older.

5.1.1.2 Table 4 Participants' Age Information

Group	Average age	Std. Err	Youngest	Median	Oldest
All participants	40.69	15.3	19	39	82

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DHH	34.03	12.82	19	31.5	72
BPS	47.17	14.9	21	48	82

For Question 1.9 (What is your occupation?), many participants selected "other" as their response. A review of the written responses within this category revealed four recurring categories: retired, unemployed, participating in a youth employment programme, and receiving disability benefits. To better represent these responses, these categories were included as separate entries in an additional table for this question (Table 5).

5.1.1.3 Table 5 Question 1.9 from Block 1 with added categories

Q #	Variable	Category	All participants		DHH		BPS	
			# of answers	% of total	# of answers	% of total	# of answers	% of total
Q1.9*	What is your occupation?	TOTAL	241	99.59	117	100	120	99.17
		Student	35	14.52	16	13.68	19	15.83
		Salaried job	80	33.2	55	47.01	24	20

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	(Brazilian site options added)	Business owner / self-employed	14	5.81	7	5.98	7	5.83
		Volunteer	14	5.81	2	1.71	12	10
		Qualified worker	9	3.73	6	5.13	3	2.5
		Youth employment programme	4	1.66	4	3.42		
		Retired	28	11.62			28	23.33
		Unemployed	5	2.07	4	3.42	1	0.83
		Receiving disability benefits	15	6.22			15	12.5
		Others	17	7.05	10	8.55	7	5.83
		Do not want to answer	17	7.05	13	11.11	4	3.33

The study included a diverse group of 242 participants, split almost evenly between DHH and BPS individuals, as well as between males and females. On average, DHH participants (mean age 34 years) were younger than BPS participants (mean age 47 years). Most participants had completed secondary education, and many were employed in salaried positions or were retired. The majority of participants (95%) already owned a mobile phone prior to the study, with more than two-thirds of these devices being smartphones.

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5.1.2 Block 2 – Self-reported need and use of AT

This block of questions was included only in the pre-training survey. Results are presented in Table 6. Participants who answered “yes” to Questions 2.3 and/or 2.5 were asked to provide additional details.

5.1.2.1 Table 6 Results for block 2 - self reported need and use of AT

Q #	Variable	Category	All participants		DHH participants		BPS participants	
			# of answers	% of total	# of answers	% of total	# of answers	% of total
2.1	Do you have difficulty seeing without using any devices? (e.g. reading books, newspapers, smartphone or signs, or identifying people across the road)	TOTAL	121	50			121	100
		No difficulty	2	1.65			2	1.65
		Some difficulty	17	14.05			17	14.05
		A lot of difficulty	39	32.23			39	32.23
		Cannot do at all	63	52.07			63	52.07
2.2		TOTAL	114	47.11	114	97,44		

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	Do you have difficulty hearing, without using any products? (e.g. hearing when others talk or when answering the phone)	No difficulty	28	24.56	28	24.56		
		Some difficulty	24	21.05	24	21.05		
		A lot of difficulty	19	16.67	19	16.67		
		Cannot do at all	43	37.72	43	37.72		
2.3	Do you currently use any assistive product(s)?	TOTAL	239	98.76	114	97.44	121	100
		Yes	154	64.44	80	70.18	72	59.5
		No	85	35.56	34	29.82	49	40.5
2.5	Do you think you need any assistive product(s) that you do not currently use, or you currently use but it needs to be replaced?	TOTAL	218	90.08	114	97.44	100	82.64
		Yes	103	47.25	68	59.65	33	33
		No	115	52.75	46	40.35	67	67

For Question 2.3 (Do you currently use any assistive product(s)?), participants reported a range of assistive technologies. Among DHH participants, commonly cited products included hearing aids, the ICOM app (Brazilian Sign Language interpreting services), Live Transcribe, and Live Captions. Among BPS participants, commonly reported products

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included magnifying glasses, white canes, braille typewriters, braille displays, TalkBack, Google Assistant, Google Voice Search, and glasses.

For Question 2.5 (Do you think you need any assistive product(s) that you do not currently use, or that you currently use but need to replace?), commonly cited needs among BPS participants included braille typewriters, braille displays, artificial vision systems, screen magnification tools, TalkBack, and solutions to support personal urban mobility.

Before the intervention, approximately two-thirds of participants reported using at least one assistive product. Examples included hearing aids and the ICOM app among DHH participants, and white canes or TalkBack among BPS participants. At the same time, nearly half of the participants indicated that they required additional assistive products that they either did not currently have or that needed replacement, suggesting a substantial unmet need for AT within this population.

5.1.3 Block 3 - Mobile Data Plan Impact

This block was included only in the post-training survey and aimed to capture participants' experiences and behavior related to the mobile data plan. Results are presented in Table 7.

5.1.3.1 Table 7 Results for Block 3

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Q#	Variable	Category	All participants		DHH		BPS	
			# of answers	% of total	# of answers	% of total	# of answers	% of total
Q7.1	How often do you encounter data bundles depletion while using the mobile phone?	TOTAL	221	100	105	100	117	100
		Never	77	34.84	4	3.81	73	62.39
		Rarely	40	18.1	18	17.14	22	18.8
		Occasionally	38	17.19	31	29.52	7	5.98
		Frequently	32	14.48	22	20.95	10	8.55
		Always	34	15.38	30	28.57	4	3.42
Q7.2	On average, how much data do you consume per day while using apps on your mobile phone?	TOTAL	219	99.1	103	98.1	116	99.15
		Less than 100 MB	43	19.63	13	12.62	30	25.86
		100 MB - 500 MB	56	25.57	15	14.56	41	35.34
		500 MB - 1 GB	39	17.81	17	16.5	22	18.97

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		1 GB - 2GB	30	13.79	21	20.39	9	7.76
		More than 2 GB	51	23.29	37	35.92	14	12.07
Q7.3	How often do you actively monitor your data bundles usage on your mobile phone?	TOTAL	220	99.55	104	99.05	116	99.15
		Never	86	39.09	6	5.77	80	68.97
		Rarely	24	10.91	12	11.54	12	10.34
		Occasionally	52	23.64	38	36.54	14	12.07
		Frequently	14	6.36	9	8.65	5	4.31
		Always	44	20	39	37.5	5	4.31
Q7.4	To what extent did the depletion of data bundles affect your ability to use apps on the mobile phone?	TOTAL	220	99.55	104	99.05	116	99.15
		Not at all	54	24.55	8	7.69	46	39.66
		Slightly	37	16.82	18	17.31	19	16.38
		Moderately	47	21.36	25	24.04	22	18.97

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		Considerably	39	17.73	22	21.15	17	14.66
		Significantly	43	19.55	31	29.81	12	10.34
Q7.5	How likely are you to adjust your app usage behavior to conserve data when nearing your data limit?	TOTAL	219	99.1	104	99.05	116	99.15
		Very unlikely	35	15.98	4	3.85	31	26.72
		Unlikely	18	8.22	8	7.69	10	8.62
		Neutral	49	22.37	31	29.81	18	15.52
		Likely	55	25.11	30	28.85	25	21.55
		Very likely	63	28.77	31	29.81	32	27.59

Participants' experiences with data depletion differed between groups. A majority of BPS participants (62%) reported never running out of mobile data and generally monitored their usage less frequently. In contrast, DHH participants were more likely to report data depletion, with nearly half indicating that it occurred frequently or always. This pattern suggests that DHH participants, who often rely on data-intensive forms of communication such as video calls and streaming, may have consumed mobile data at higher rates than BPS participants.

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5.1.4 Block 4 (Mobile Phone Expectation) and Block 5 (Mobile Phone Usage) Comparison

Participants who did not own or use a smartphone before the training answered Block 4 (Mobile Phone Expectations) in the pre-training survey and Block 5 (Mobile Phone Usage) in the post-training survey. This section compares expected usage with reported usage after training.

5.1.4.1 Table 8 Comparison of Mobile Phone Expectations (Pre-Training) vs. Usage (Post-Training) for participants who did not own a smartphone before the study

Group	n	Pre-Training Avg. Score	Post-Training Avg. Score	Score Change	p-value (Wilcoxon)	Effect Size (Cohen's d)	Key Findings from Mixed Linear Model
All Participants (Figure 2)	74	2.82	2.73	-0.09	0.08	0.15 (low)	Score decreases with age (-0.015 pts/year).
DHH Participants (Figure 3)	17	3.25	3.34	+0.09	0.92	0.15 (low)	No statistically significant variables.
BPS Participants (Figure 4)	55	2.67	2.52	-0.15	0.06	0.27 (low)	Score decreases with age (-0.017 pts/year).

5.1.4.2 Figure 2 - Block 4 x Block 5 comparison - All participants

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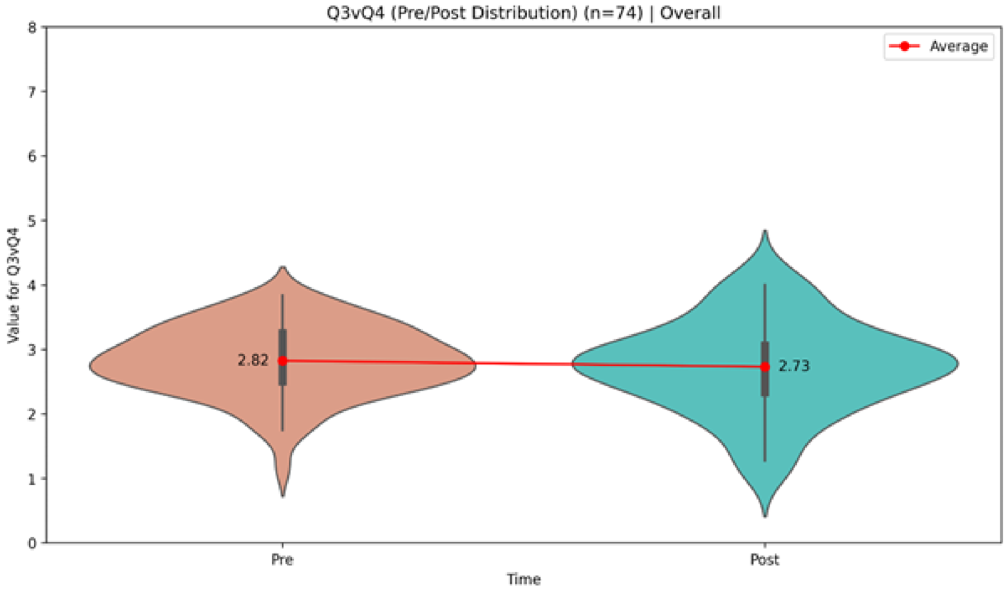
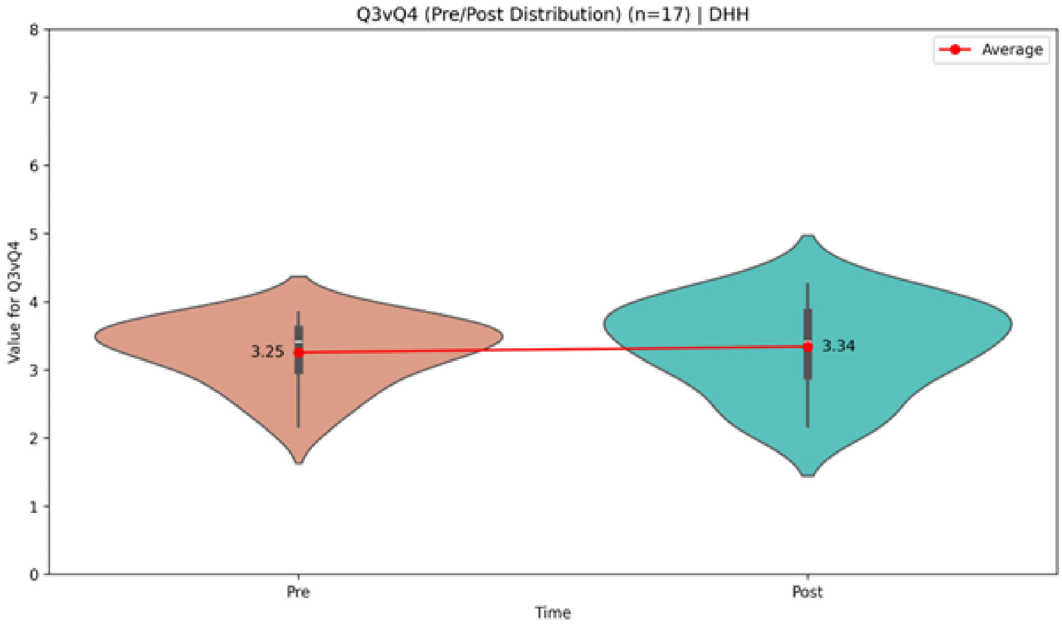


5.1.4.3 Figure 3 - Block 4 x Block 5 comparison - DHH participants



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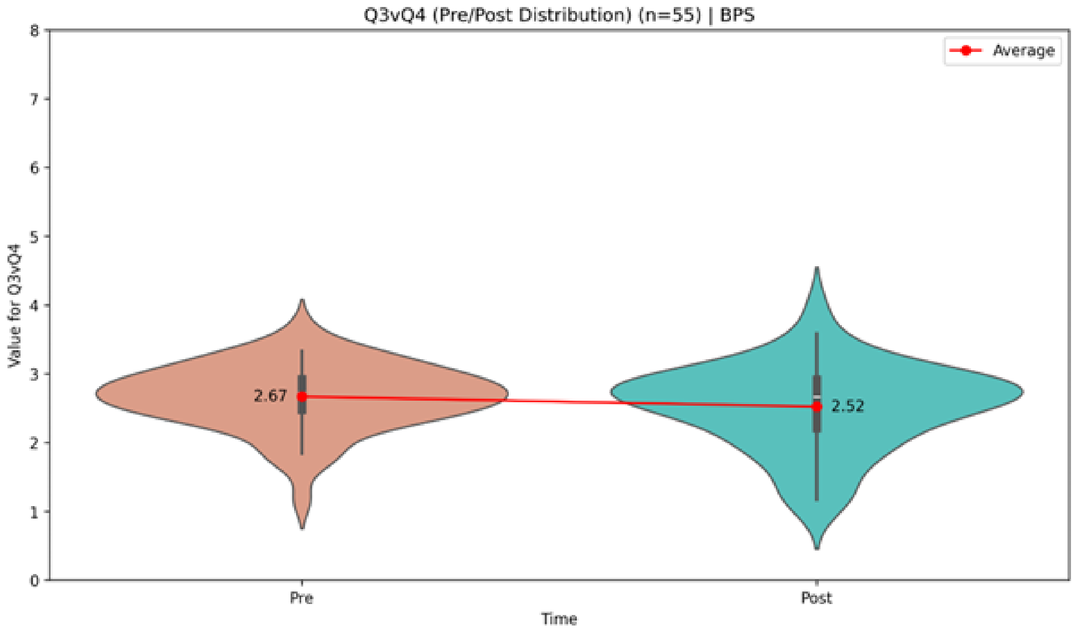
5.1.4.4 Figure 4 - Block 4 x Block 5 comparison - BPS participants



Overall, participants who were new to smartphones reported slightly lower usage than they had initially expected. This pattern was mainly driven by BPS participants. DHH participants reported slightly higher usage than expected, although none of these differences were statistically significant. Age was consistently associated with lower scores, with older participants reporting lower expectations and lower usage.

5.1.5 Block 5 – Mobile Phone Usage Comparison

This block was included in both the pre-training and post-training surveys and assessed self-reported mobile phone usage before and after the digital skills training.

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Because several participants did not own or use a smartphone prior to the training, the number of records available for direct pre- and post-training comparisons was reduced.

5.1.5.1 Table 9 - Comparison of Mobile Phone Usage (Pre-vs-post training) for participants who already owned or used a smartphone before the study

Group	n	Pre-Training Avg. Score	Post-Training Avg. Score	Score Change	p-value (Wilcoxon)	Effect Size (Cohen's d)	Key Findings from Mixed Linear Model
All Participants (Figure 2)	139	2.80	2.77	-0.03	798	0.04 (low)	Score decreases with age (-0.012 pts/year).
DHH Participants (Figure 3)	79	3.11	2.91	-0.20	3	0.39 (medium-low)	Score decreased significantly post-training (-0.183 pts).
BPS Participants (Figure 4)	57	2.36	2.55	+0.19	< 0.001	0.35 (low)	Score increased significantly post-training (+0.188 pts); score decreases with age (-0.012 pts/year).

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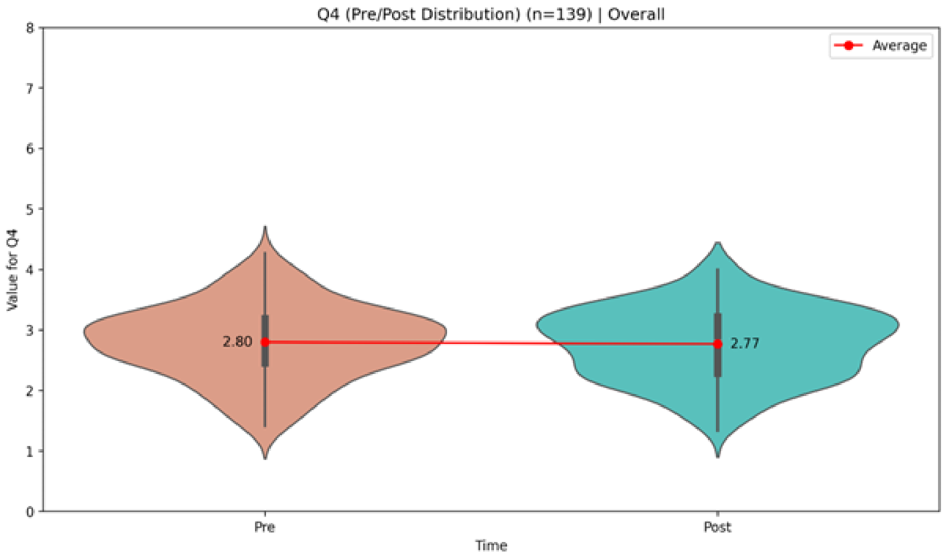
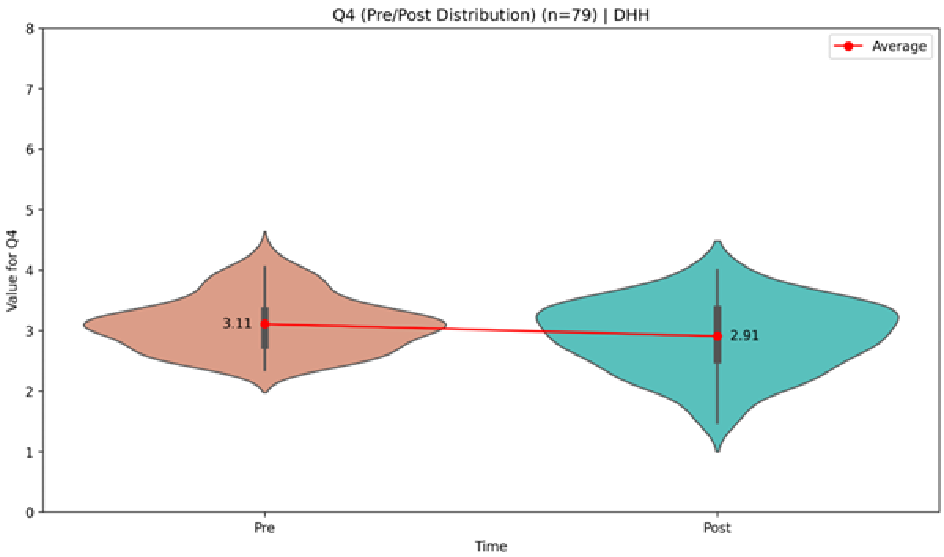
5.1.5.2 Figure 5 - Block 5 Comparison - All participants



5.1.5.3 Figure 6 Block 5 Comparison - DHH Participants



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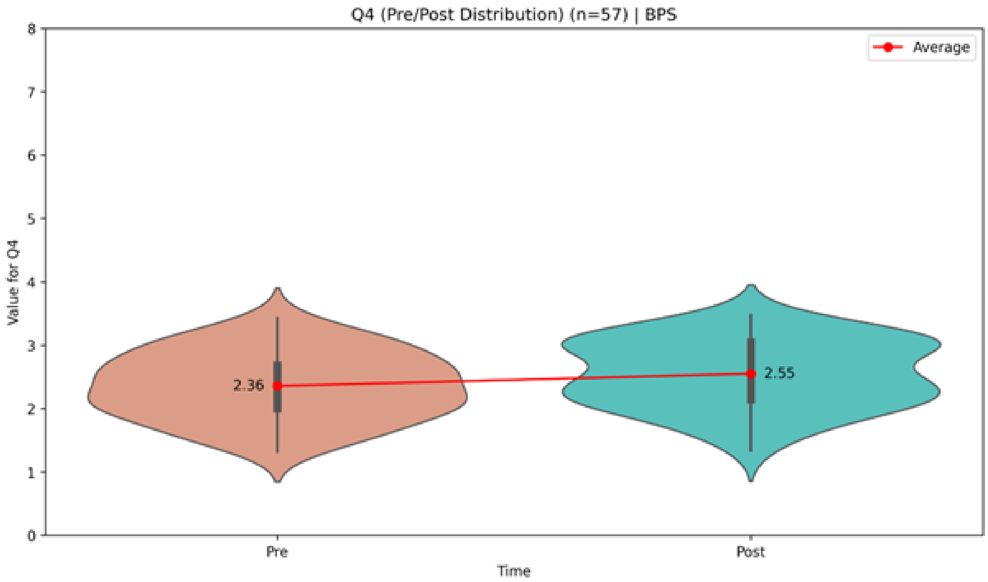
Participants who already owned or used a smartphone before the training had a final average mobile phone usage score of 2.91, while those who did not previously own or use a smartphone had a final average score of 3.34. This difference may reflect the smaller sample analyzed or a novelty effect among new users who had recently learned how to use smartphones and their accessibility features.

5.1.5.4 Figure 7 Block 5 Comparison – BPS Participants



Among participants who already owned a smartphone, the digital skills training had different effects across groups. DHH participants reported a statistically significant decrease in mobile phone usage after the training, while BPS participants reported a statistically significant increase. For both groups, age was associated with lower reported usage, with older participants generally reporting lower scores.

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5.1.6 Block 6 – Digital Skills Assessment – MDPQ

In the pre-training survey, this section was completed only by participants who already owned or used a smartphone. In the post-training survey, all participants answered. Statistical analyses were conducted using only the participants who completed this section in both surveys.

5.1.6.1 Table 10 Comparison of Digital Skills Assessment (MDPQ)(Pre-vs-post training)

Group	n	Pre-Training Avg. Score	Post-Training Avg. Score	Score Change	p-value (Wilcoxon)	Effect Size (Cohen's d)	Key Findings from Mixed Linear Model
All Participants (Figure 8)	138	30.81	31.28	+0.47	0.07	0.09 (low)	Score decreases with age (-0.330 pts/year); Female participants scored lower than males (-2.328 pts). Individual variance was

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							the biggest influence, with an average of 34 points.
DHH Participants (Figure 9)	78	35.29	34.99	-0.30	0.77	0.08 (low)	Score decreases with age (-0.180 pts/year).
BPS Participants (Figure 10)	57	24.64	26.21	+1.57	1	0.17 (low)	Score increased significantly post-training (+1.642 pts); score decreases with age (-0.263 pts/year). Individual variance was the biggest influence, with an average of 55 points (having a skewing effect on the “all participants” group).

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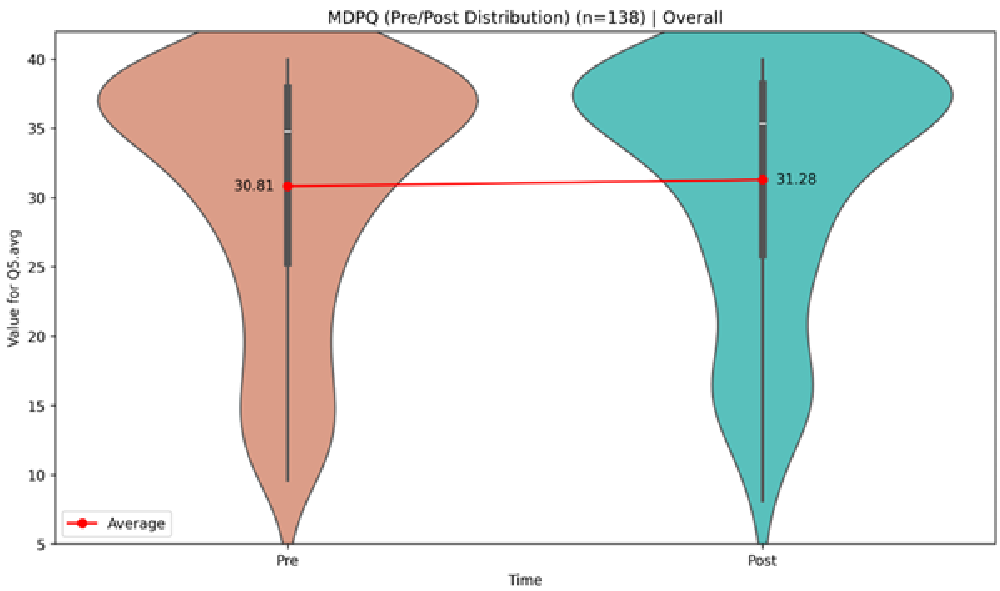
5.1.6.2 Figure 8 Block 6 comparison - All participants



5.1.6.3 Figure 9 - Block 6 Comparison - DHH Participants

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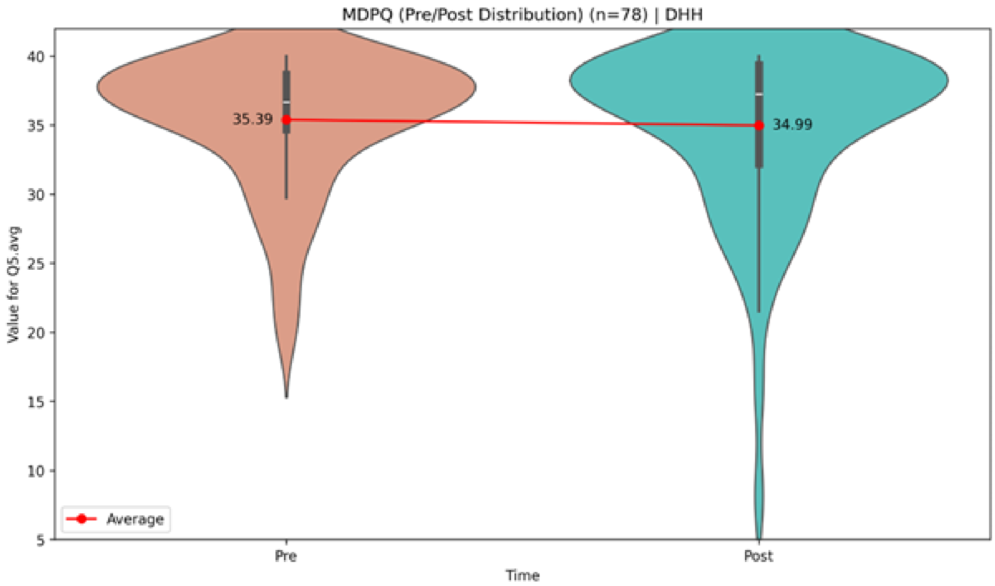
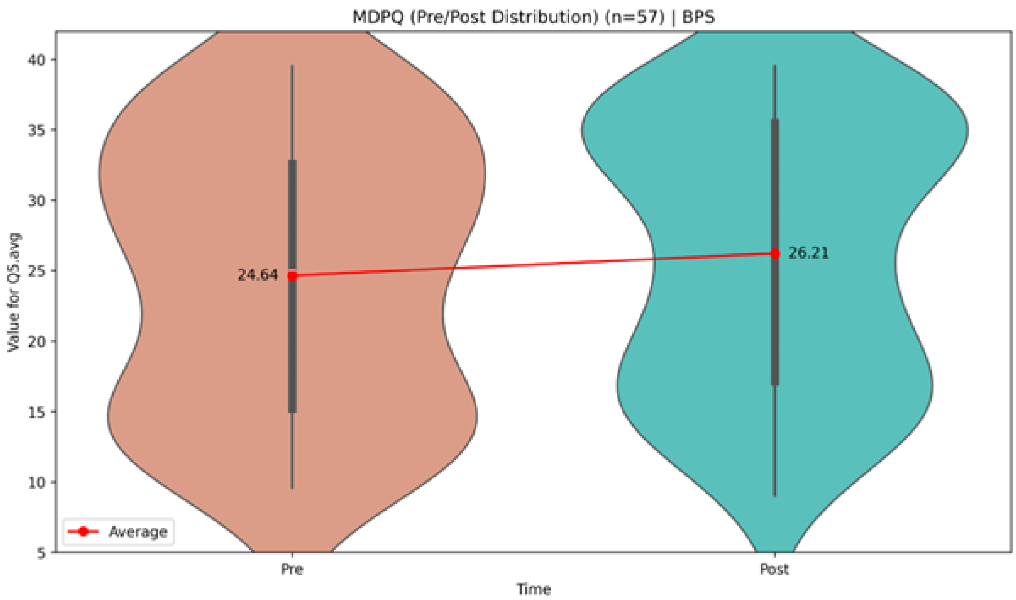


5.1.6.4 Figure 10 - Block 6 Comparison - BPS Participants



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The digital skills training significantly improved the self-assessed proficiency of BPS participants, who began with lower baseline scores. In contrast, DHH participants, who started with higher initial proficiency, showed a slight but non-significant decrease in scores. Across all participants, age was strongly associated with lower proficiency scores. Gender was also associated with differences in the overall sample, with female participants reporting lower average scores.

5.1.6.5 "Never Tried" Case

When analyzing responses to Block 5 (Digital Skills Assessment), an unexpected increase in the "Never Tried" response option was observed for some questions between the pre- and post-training surveys (Table 8). To better understand this pattern, the total number of "Never Tried" responses was calculated for all participants and separately for DHH and BPS groups, comparing pre- and post-training results. Most of these responses were reported by BPS participants.

5.1.6.5.1 Table 11 - Increase in "Never Tried" Responses from Pre-to-post Training Survey

	Pre-training	**Post-training**	**Difference**
All participants	648	756	+108
DHH participants	80	117	+37
BPS participants	568	639	+71

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The questions that showed the largest increase in "Never Tried" responses were Question 19 (use of video conferencing apps), Question 31 (storing email addresses in contact lists), and Question 44 (resetting the smartphone to factory settings).

One possible explanation for this increase is that participants may not have reported their digital skills accurately in the pre-training survey. Some participants may have avoided selecting "Never Tried" because they believed that demonstrating higher proficiency was necessary to participate in the study. After completing the training and becoming more familiar with the research team and the process, participants may have felt more comfortable responding honestly, which could explain the higher number of "Never Tried" responses in the post-training survey.

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5.1.7 Block 7 – Quality of Life

This block of questions was included in both surveys, with results presented in Table 11.

5.1.7.1 Table 12 Comparison of Quality of Life (Pre- vs. Post-Training)

Group	n	Pre-Training Avg. Score	Post-Training Avg. Score	Score Change	p-value (Wilcoxon)	Effect Size (Cohen's d)	Key Findings from Mixed Linear Model
All Participants (Figure 11)	211	3.82	3.87	+0.05	0.07	0.09 (low)	No statistically significant variables.
DHH Participants (Figure 12)	94	3.76	3.72	-0.04	0.75	0.04 (low)	No statistically significant variables.
BPS Participants (Figure 13)	112	3.88	3.99	+0.11	0.02	0.21 (low)	Score increased significantly post-training (+0.104 pts).

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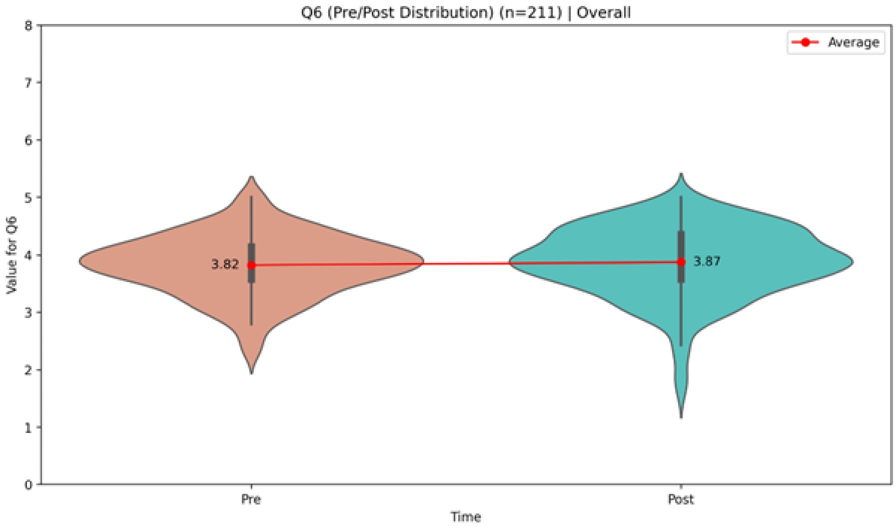
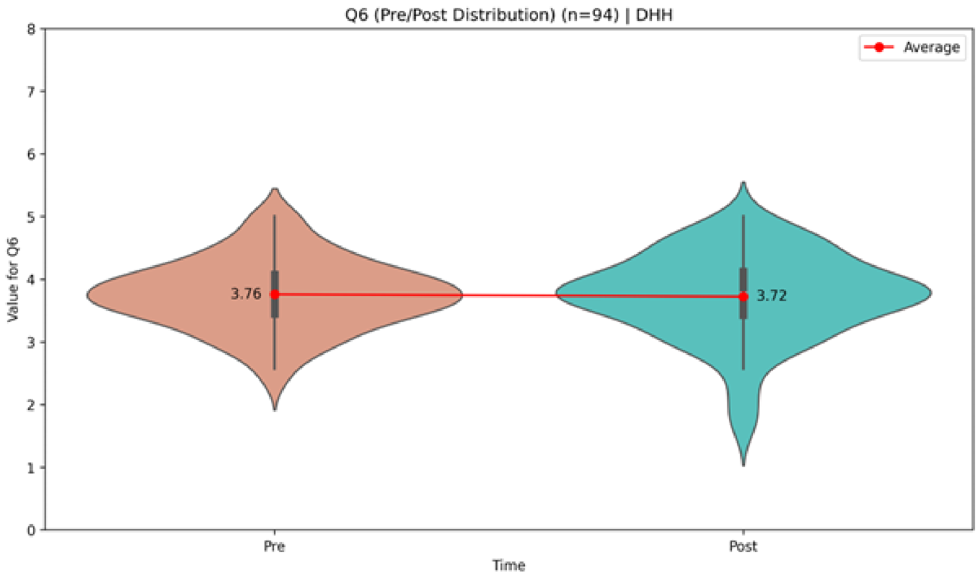
5.1.7.2 Figure 11 - Block 7 comparison - All participants



5.1.7.3 Figure 12 - Block 7 - DHH Participants



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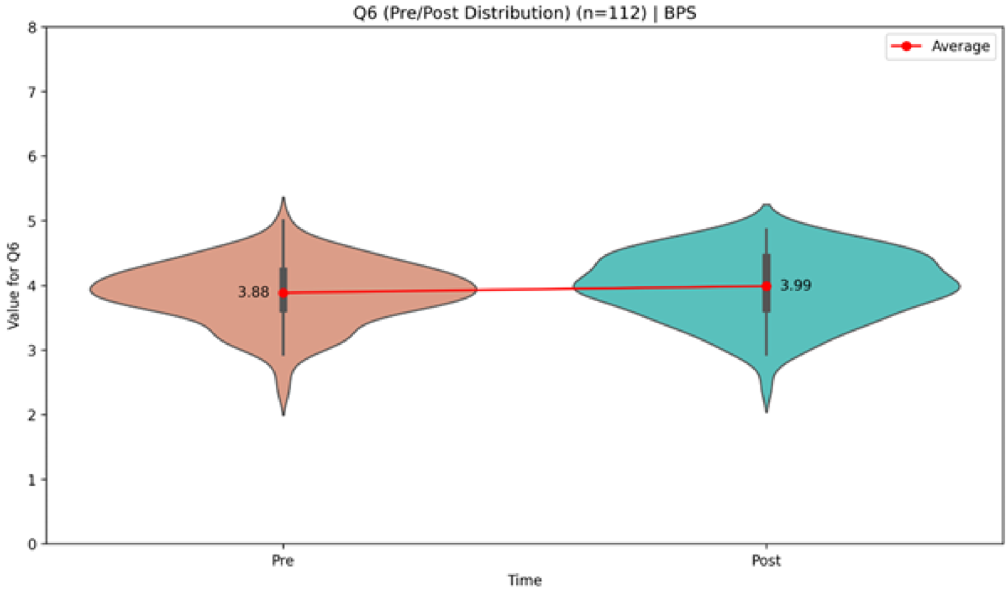
5.1.7.4 Figure 13 - Block 7 Comparison - BPS Participants



The intervention had a positive and statistically significant impact on the self-reported quality of life of BPS participants. However, no significant change was observed for DHH participants or for the overall sample. This suggests that, within the study period, the benefits of the device and training were experienced more strongly by visually impaired participants.

5.2 Murmuras

This section presents selected results from the Murmuras dataset. A complete set of charts is available in the supplementary material. Results are presented in the following

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format: App name (ranking – score). The unit for the score is specified at the beginning of each subsection.

5.2.1 Top 15 apps with the most unique users

Score in this section represents the number of unique users.

WhatsApp is the app with the largest number of unique users for all groupings and age or gender comparisons, probably due to its massive presence in Brazil and the possibility of communication through text, audio and video.

5.2.1.1 All Participants

For "All participants", the top 3 social apps are WhatsApp (1st, 228), Facebook (2nd, 174) and TikTok (4th, 150), and the top 3 accessibility tools are Text-to-Speech (3rd, 152), Live Transcribe (7th, 125) and TalkBack (10th, 106).

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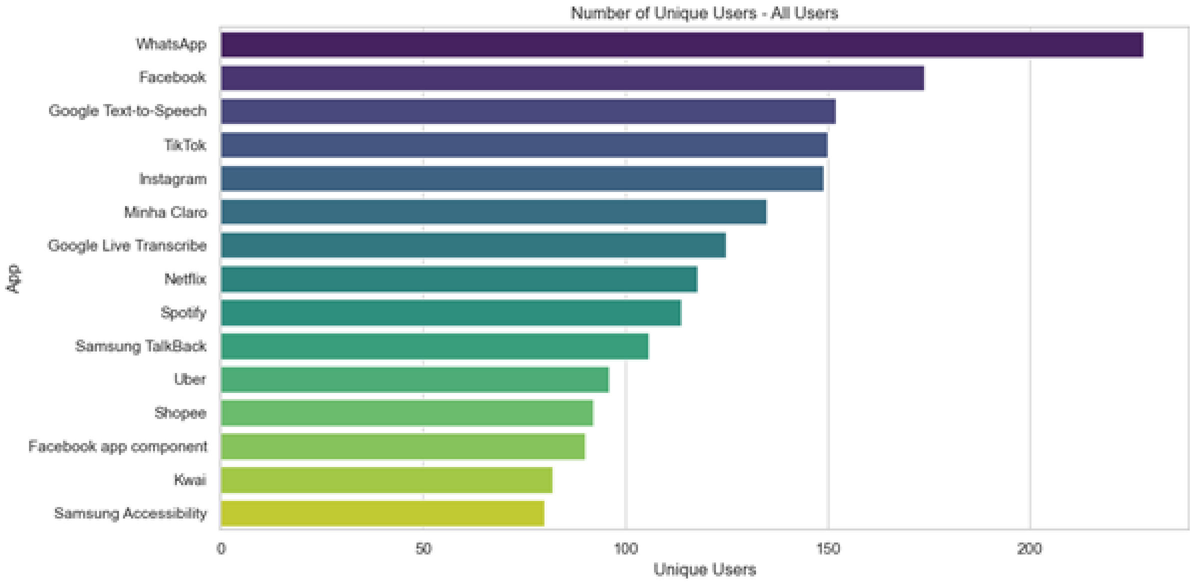
5.2.1.1.1 Figure 14 - Top 15 Apps by Number of Unique Users - All Participants



5.2.1.2 DHH Participants

For “DHH participants”, the top 3 social apps are WhatsApp (1st, 114), Instagram (3rd, 98) and Facebook (5th, 90), and the top 2 accessibility tools are Live Transcribe (2nd - 106) and Text-to-Speech (9th, 51).

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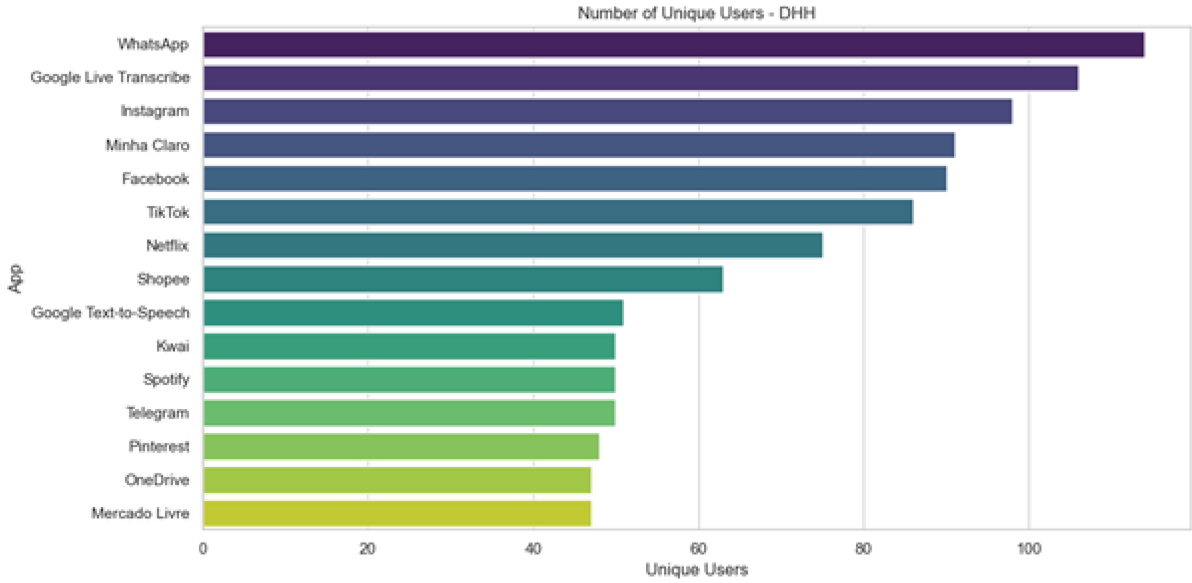
5.2.1.2.1 Figure 15 - Top 15 Apps By Number of Unique Users - DHH Participants



5.2.1.3 BPS Participants

For "BPS participants", the top 3 social apps are WhatsApp (1st, 114), Facebook (4th, 84) and TikTok (9th, 64), and the top 3 accessibility tools are Text-to-Speech (2nd,101), Talkback (3rd, 100) and Lazarillo (5th, 70).

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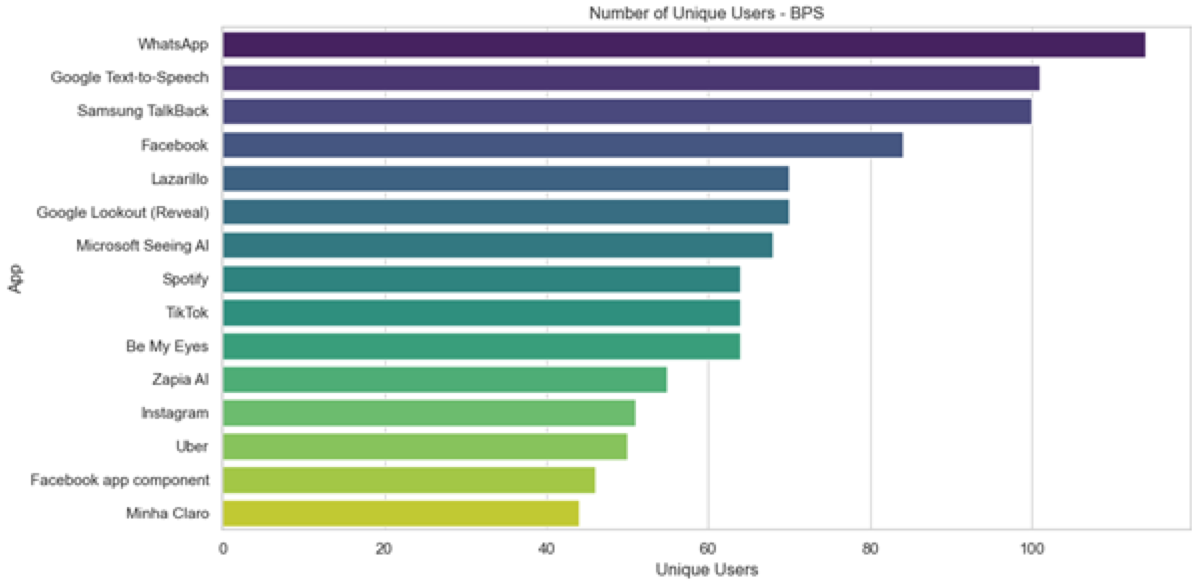
5.2.1.3.1 Figure 16 - Top 15 Apps by Number of Unique Users - BPS Participants



5.2.2 Top 15 apps with the highest total use time

Score in this section represents minutes.

5.2.2.1 All participants

For "All participants", the top 3 social apps are Instagram (1st, 335,734.10), WhatsApp (2nd, 309,779.02) and TikTok (3rd, 111,355.76), and the top accessibility tools are Live Transcribe (10th, 11,614.94) (Figure 17).

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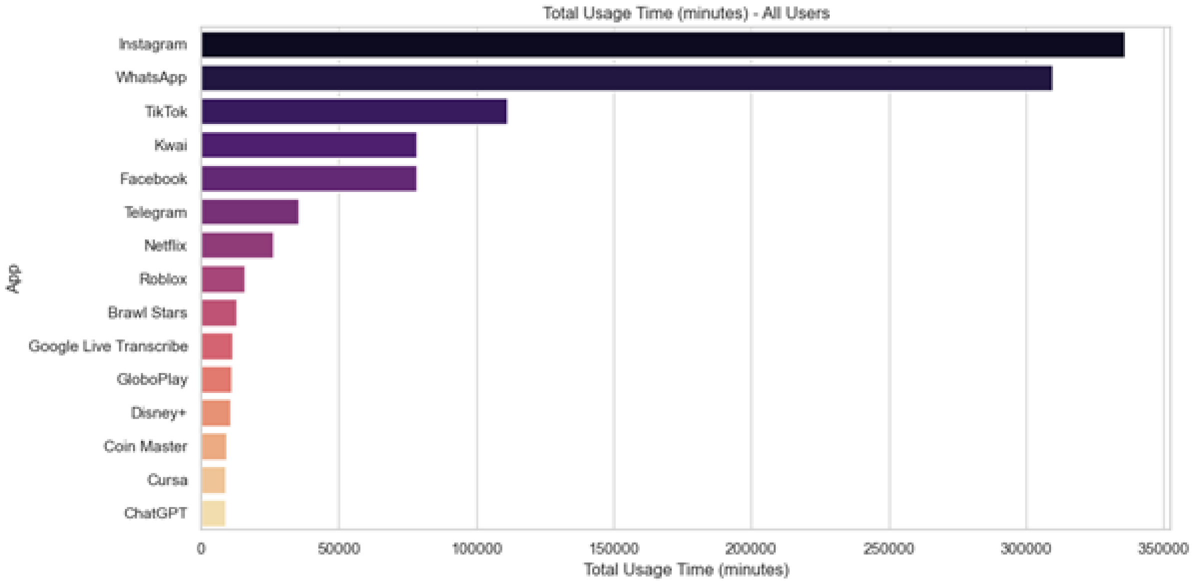
5.2.2.1.1 Figure 17 - Top 15 apps with the highest total use time - All participants



5.2.2.2 DHH participants

For "DHH participants", the top 3 social apps are Instagram (1st, 287,790.56), WhatsApp (2nd, 182,331.20) and TikTok (3rd, 56,141.73), and the top accessibility tools are Live Transcribe (8th, 11,514.32) (Figure 18).

5.2.2.2.1 Figure 18 - Top 15 apps with the highest total use time - DHH participants

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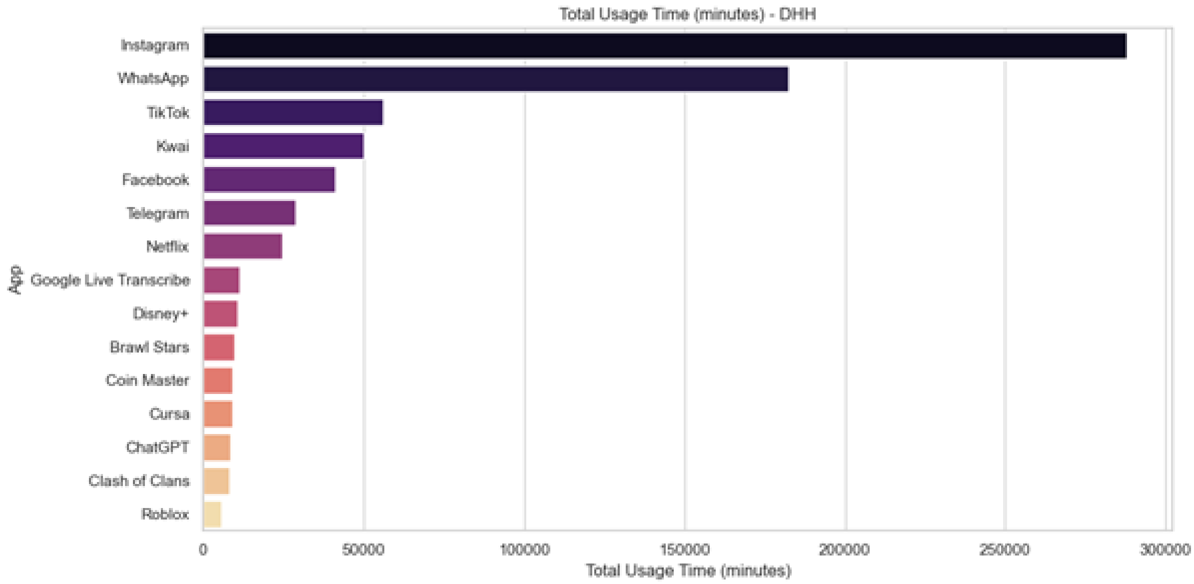

5.2.2.3 BPS participants

For "BPS participants", the top 3 social apps are WhatsApp (1st, 127,447.82), TikTok (2nd, 55,214.03) and Instagram (3rd, 47,943.54), with no accessibility feature figuring in the top 15 (Figure 19).

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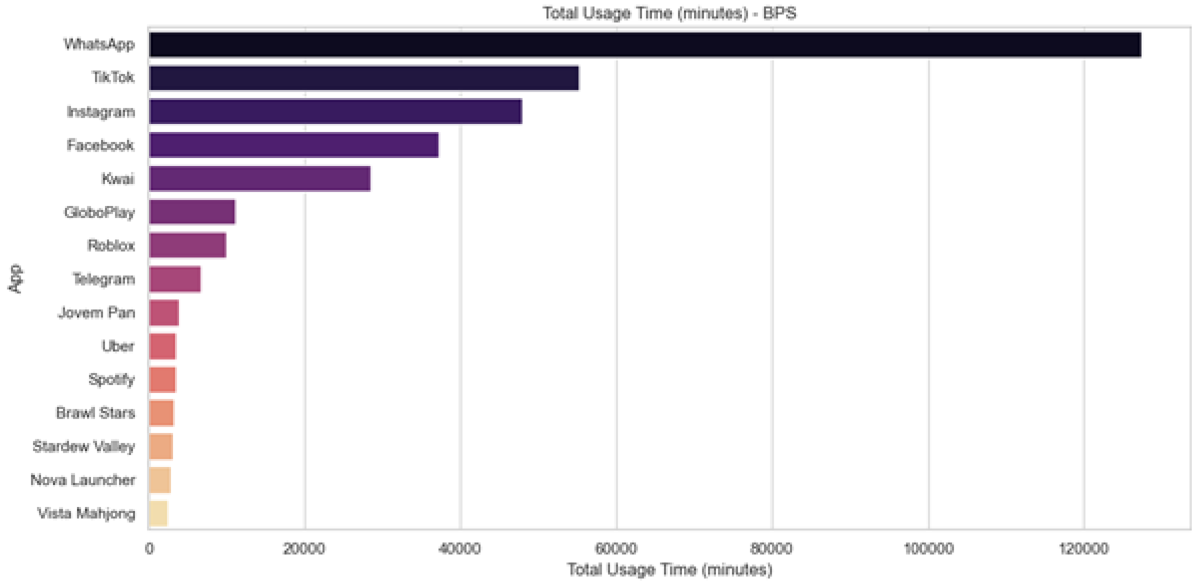
5.2.2.3.1 Figure 19 - Top 15 Apps with the Highest Total Use Times - BPS Participants



5.2.3 Top 15 apps with the highest daily average use

Score in this section represents minutes.

5.2.3.1 All participants

For "All participants", the top 3 social apps are Instagram (3rd, 33.19), TikTok (4th, 26.01) and WhatsApp (7th, 18.24), with no accessibility feature figuring in the top 15 (Figure 20).

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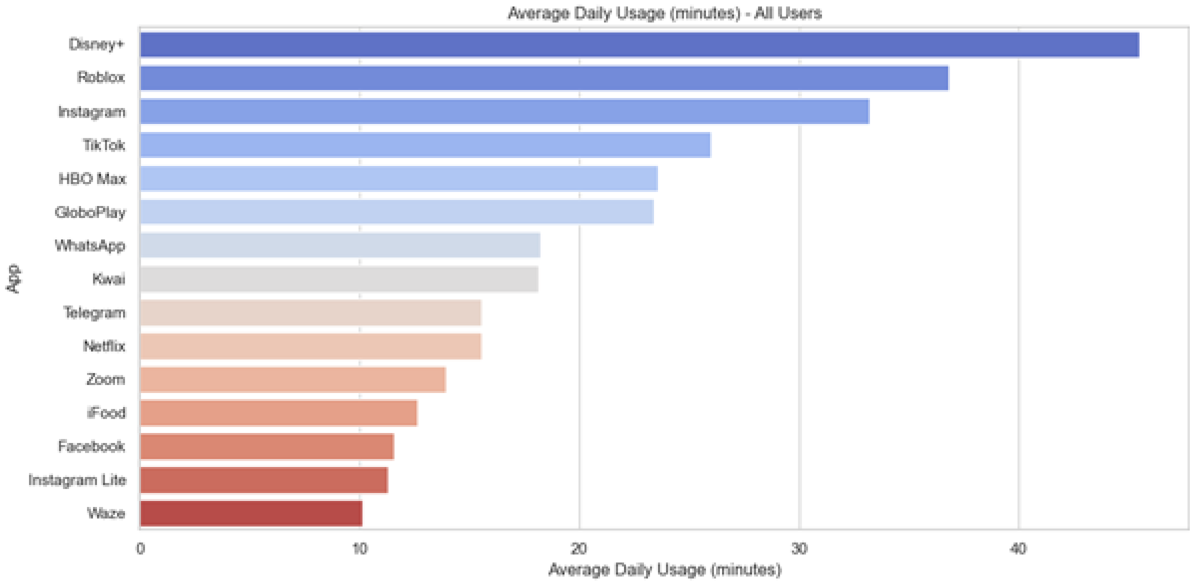
5.2.3.1.1 Figure 20 -Top 15 apps with the highest daily average use - All participants



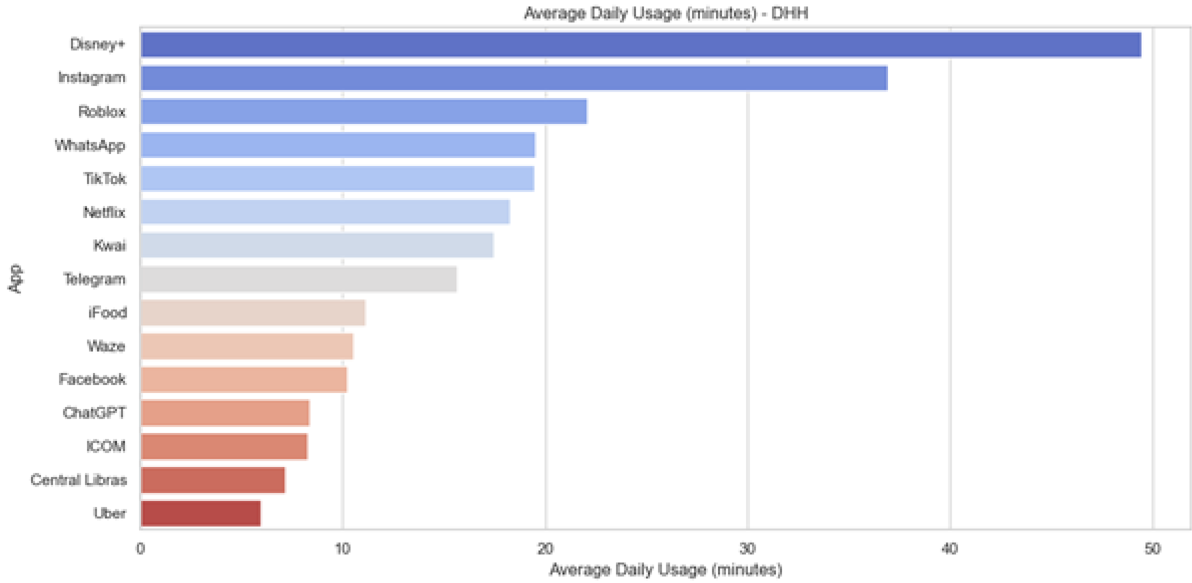
5.2.3.2 DHH Participants

For "DHH participants", the top 3 social apps are Instagram (2nd, 36.92), WhatsApp (4th, 19.52) and TikTok (5th, 19.47), and the top accessibility tool is Central de LIBRAS (14th, 7.16) (Figure 21).

Funded by:

Led by:

5.2.3.2.1 Figure 21 -Top 15 apps with the highest daily average use - DHH participants



5.2.3.3 BPS Participants

For "BPS participants", the top 3 social apps are TikTok (1st, 39.50), Instagram (3rd, 20.67) and Kwai (4th, 19.47), and the top 2 accessibility tools are the Magnifier (13th, 3.25) and TalkBack (15th, 3.11) (Figure 22).

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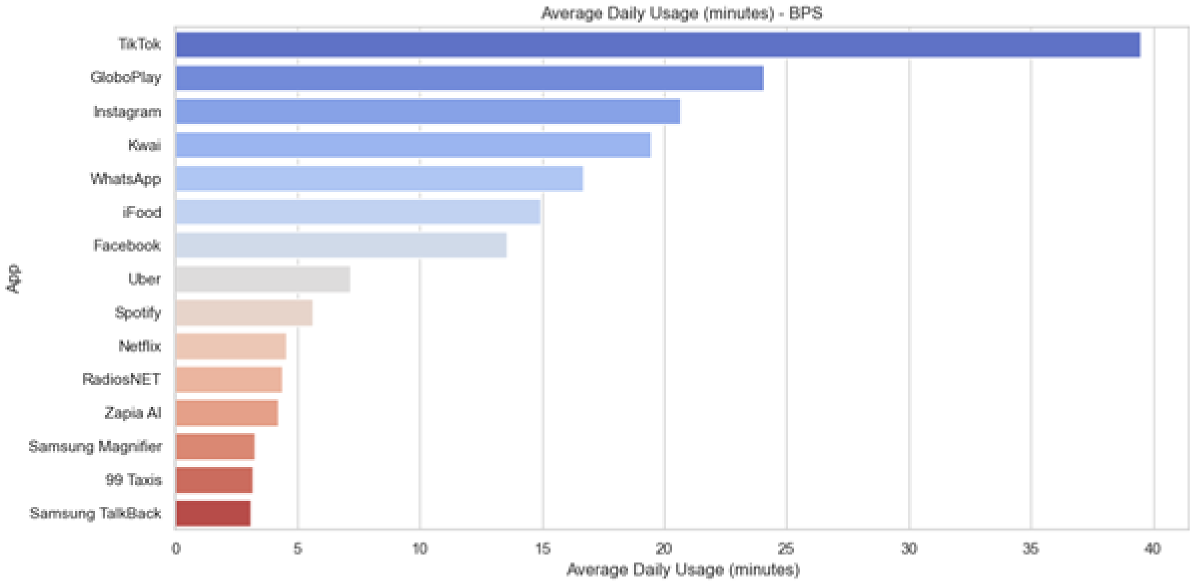
5.2.3.3.1 Figure 22 - Top 15 apps with the highest daily average use - BPS participants



5.2.4 Top 10 apps with the highest increase in average use

Score in this section represents minutes.

5.2.4.1 All participants

For all participants, the top 3 social apps are TikTok (2nd, 0.1403), X/Twitter (8th, 0.0324) and Instagram Lite (9th, 0.0324), and the top 2 accessibility tools are the Magnifier (6th, 0.0456) and Central de LIBRAS (7th, 0.0396) (Figure 23).

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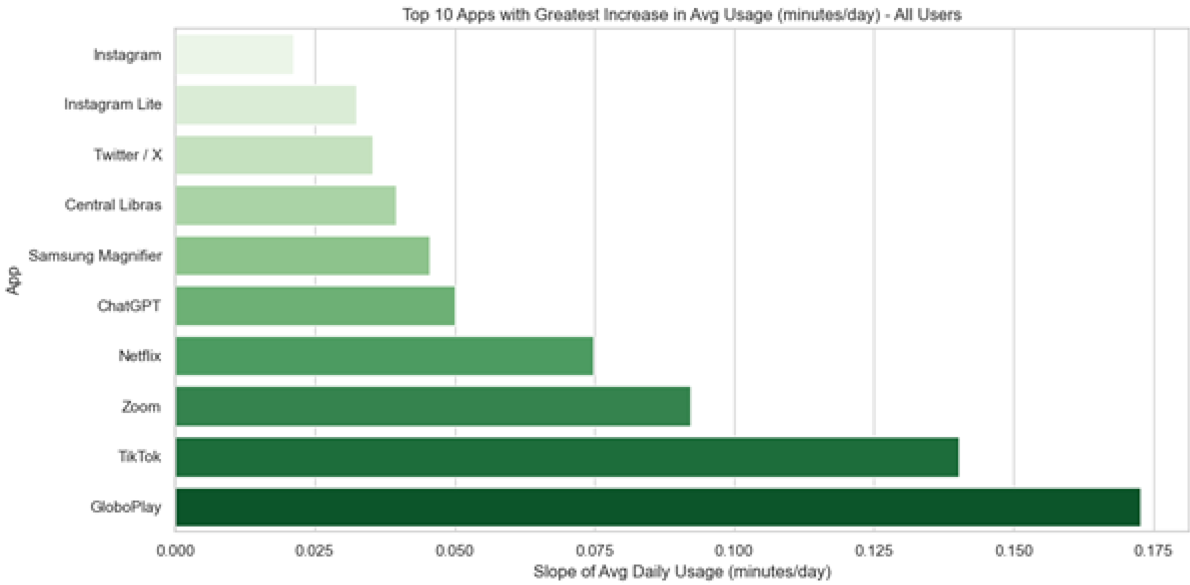
5.2.4.1.1 Figure 23 - Top 10 apps with the highest increase in average use - All participants



5.2.4.2 DHH Participants

For DHH participants, the top 3 social apps are TikTok (2nd, 0.0806), Instagram (4th, 0.0496) and X/Twitter (5th, 0.0424), and the top accessibility tool is Central de LIBRAS (7th, 0.0396) (Figure 24).

5.2.4.2.1 Figure 24 - Top 10 apps with the highest increase in average use - DHH participants

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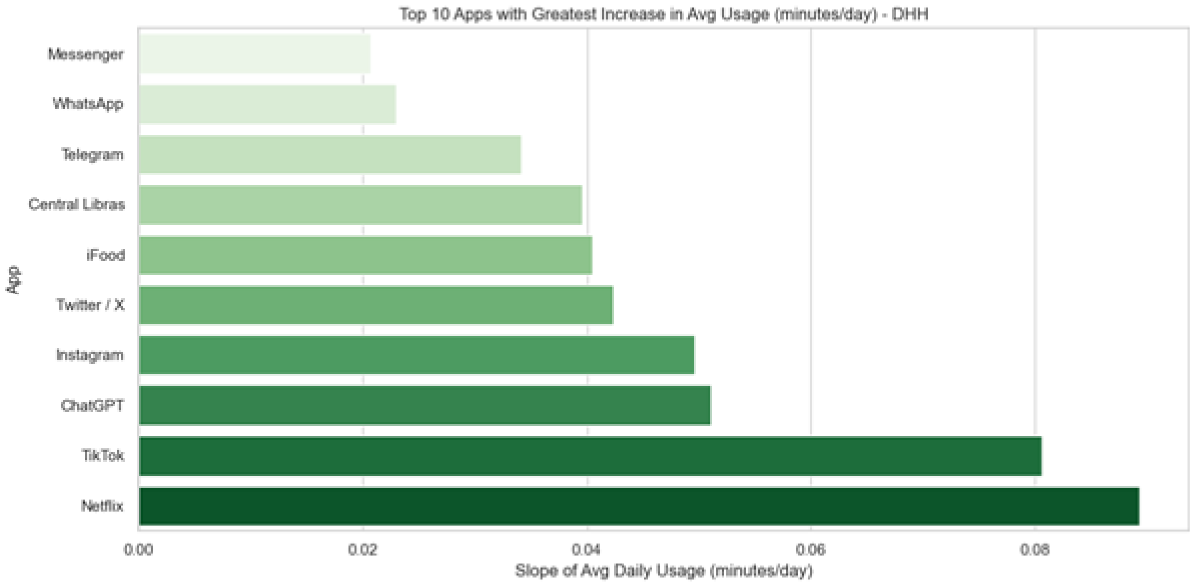

5.2.4.3 BPS Participants

For BPS participants, the top social apps are TikTok (1st, 0.2132), Kwai (3rd, 0.0893) and WhatsApp (6th, 0.0231), and the top accessibility tool is the Magnifier (5th, 0.0456) (Figure 25).

5.2.4.3.1 Figure 25 - Top 10 Apps with the highest increase in Average Use - BPS Participants

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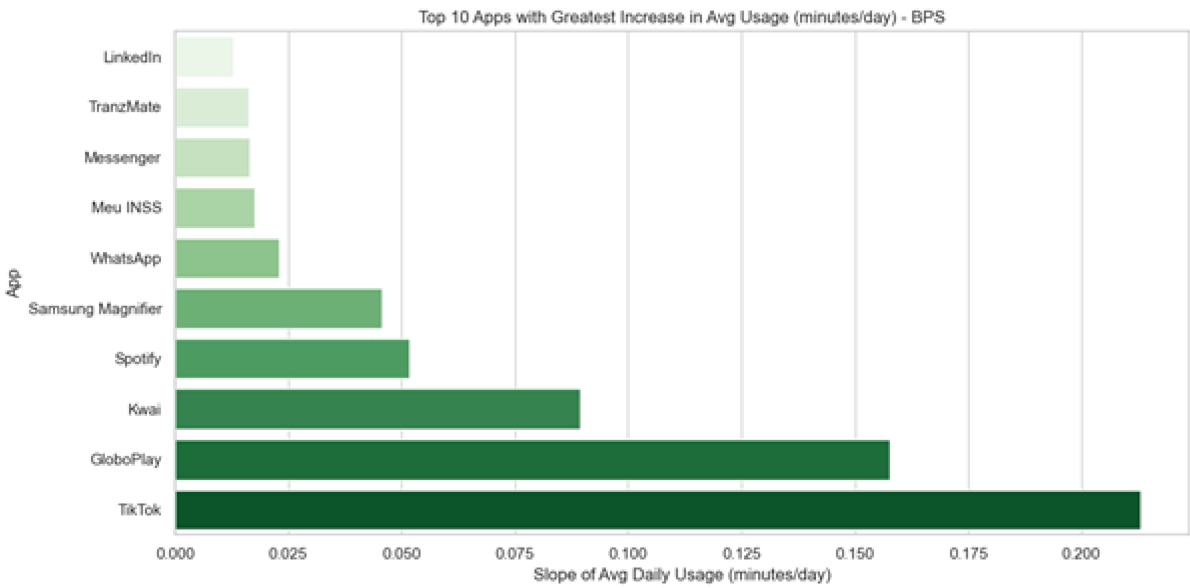

5.2.5 Top 10 apps with the highest decrease in average use

Score in this section represents the decrease in average daily use (in minutes) over the course of the project.

5.2.5.1 All participants

For all participants, the top 2 social apps are Threads (6th, -0.0506) and Pinterest (8th, -0.0355), with no accessibility feature figuring in the top 10 (Figure 26).

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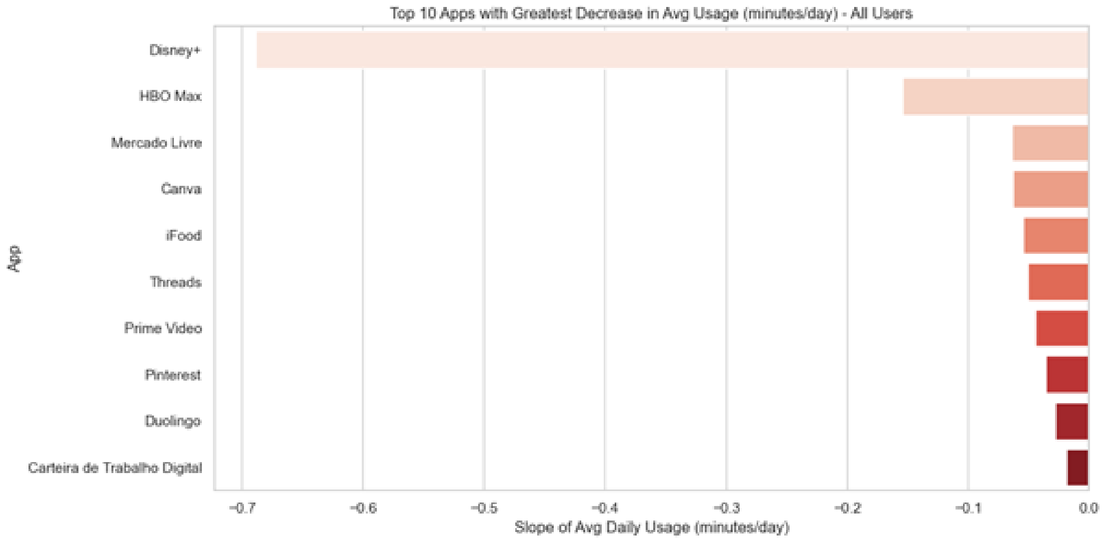
5.2.5.1.1 Figure 26 - Top 10 Apps with the highest decrease in average use - all participants



5.2.5.2 DHH participants

For DHH participants, the top 2 social apps are Pinterest (4th, -0.0356) and Threads (9th, -0.0152), with no accessibility feature figuring in the top 10 (Figure 27).

5.2.5.2.1 Figure 27 -Top 10 apps with the highest decrease in average use - DHH participants

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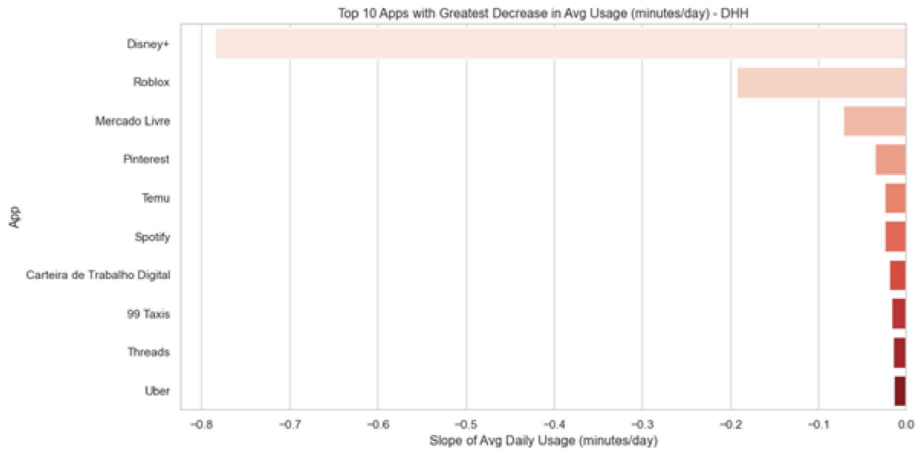
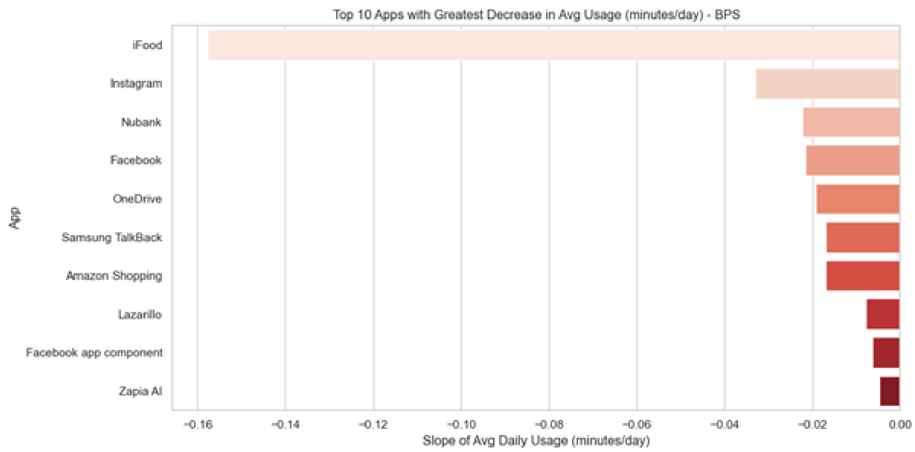


5.2.5.3 BPS participants

For BPS participants, the top 2 social apps are Instagram (2nd, -0.0330) and Facebook (4th, -0.0215), and the top accessibility tool is TalkBack (6th, -0.0169) (Figure 28).

5.2.5.3.1 Figure 28 - Top 10 apps with the highest decrease in average use - BPS participants



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5.3 Qualitive Findings from Monthly Follow-Up Interviews

After transcribing and analyzing the monthly follow-up interviews, several key themes emerged that provide deeper insight into participants' experiences with the smartphones, data plans, and digital skills training.

5.3.1 Theme: the foundational role of digital skills training

5.3.1.1 Subthemes

Need for continued training; importance of sign-language delivery for DHH participants; misconceptions about smartphone accessibility due to lack of training; absence of prior formal digital skills training.

5.3.1.2 Central outcome

A central finding across interviews was the critical role of digital skills training in enabling participants to use their smartphones meaningfully. For many participants, the training unlocked features they had previously been unaware of or unable to access, transforming the device from a basic communication tool into a broader assistive resource.

Participants frequently emphasized that without guided instruction they would not have discovered many of the accessibility features built into the smartphone. Even after the training, several participants expressed a desire for additional learning opportunities, suggesting that the initial sessions served primarily as an entry point into a much broader set of digital skills. As one participant explained:

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"It's baby steps, but it's going. That's because I don't have the proper training yet." — BPS user

For DHH participants in particular, the delivery of training in sign language was described as essential. Participants highlighted that prior technology learning opportunities were often inaccessible due to communication barriers. The use of sign language during training enabled clearer understanding and greater engagement:

"It did change my life, because no one had taught me about all these functions. I was able to make the most of this moment, which was in sign language and they explained everything clearly so I could use the cell phone (...) I didn't know about all this assistive technology on the cell phone." —DHH user.

The interviews also revealed that many participants previously assumed smartphones were inaccessible because they lacked awareness of built-in accessibility tools. Exposure to these features during training often challenged this assumption and shifted perceptions of what the devices could do. As one participant noted:

"Yes, when you showed the tools, there were some that I didn't know about. If you hadn't shown them, how would I have known? It was a great opportunity. I was able to explore the functions. Before, I would just say that it was not accessible, because no one had helped me. So I'm very grateful." —DHH user

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In several cases, participants reported that they had previously relied on external applications, sometimes paid ones, to perform functions that were already available within the phone's native accessibility tools. Discovering these built-in capabilities during training was therefore perceived as both empowering and practical:

> *"It helped me understand how all the tools worked, because I didn't know (...) Before, I had to download and use other apps, sometimes even paid ones, to be able to translate. I didn't know that there was accessibility on my cell phone itself." —DHH user*

The findings highlight that access to devices alone is insufficient to ensure meaningful use. Structured, accessible training played a foundational role in enabling participants to discover and adopt assistive features that significantly expanded how they used their smartphones.

5.3.2 Theme: the impact of training on participants' lives

5.3.2.1 Subthemes

Shortcuts improving accessibility for BPS users; greater efficiency in technology use; increased digital literacy; growing confidence in digital skills; expanded independence; improved communication and social participation.

5.3.2.2 Central outcome

A central outcome reported by participants was a significant increase in independence and self-confidence in using digital technology. The combination of the smartphone and

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the digital skills training enabled participants to perform tasks that previously required assistance from others, fostering a strong sense of autonomy.

For BPS participants, this impact was often expressed through improvements in usability and navigation. Features such as accessibility shortcuts and screen-reading tools made smartphones easier to control and reduced barriers to interaction. As one participant explained:

> *"The shortcuts on this phone are very good. They make access and control much easier, and the side buttons help me to make shortcuts easier. Turning off, restarting, turning on and off TalkBack is very easy to access using the side buttons." —BPS user*

Participants also described how improved digital skills increased efficiency in their professional activities. Accessibility tools such as magnification and screen reading allowed them to work more comfortably and productively. One participant noted:

> *"I use my cell phone a lot for work and these tools allowed me to deliver better results using these accessibility resources. (...) Because I need to read many documents and the font is very small, the magnifier allows me to read in a better and more accessible way." —BPS user*

Beyond practical tasks, the training expanded participants' ability to engage in communication and social interaction. For DHH participants in particular, tools such as

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Live Transcribe enabled greater participation in conversations at work and in social settings. One participant described how this changed their workplace experience:

"I noticed that things started to change mainly because of Live Transcribe (...) ***Before I felt very excluded, now I'm able to work together with other people.*** *I had a meeting at work and I was able to use my cell phone and feel more included." —DHH user*

Greater access to communication tools also increased participants' autonomy in navigating everyday situations. Some reported that they could attend appointments, interact with services, or manage personal tasks without relying on family members for interpretation or assistance. As one participant explained:

"I feel freer. I don't need to call my mother or a friend to interpret. With the cell phone I can do things alone, I go wherever I want and I have communication." —DHH user

For many participants, these changes extended to broader aspects of daily life, including financial management, online services, and social communication. One participant described how the smartphone enabled them to manage their own affairs independently:

"Now I can do things without depending so much on other people like my husband. Everything is on my phone. I can pay bills, access my bank account, send messages and make video calls." —BPS user

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Overall, participants described the training and smartphone as enabling a shift from dependence to autonomy. Increased digital literacy not only improved access to specific tools but also strengthened participants' confidence in exploring new applications and technologies independently.

5.3.3 Theme: proper smartphone and mobile data

5.3.3.1 Subtheme

Hardware improvements; software improvements; the role of mobile data; accessibility features for DHH and BPS users.

5.3.3.2 The impact of hardware

The interviews highlighted that the effectiveness of the intervention depended not only on training but also on the quality of the device and the availability of mobile data. Participants frequently compared the new smartphone with their previous devices and described noticeable improvements in usability, reliability, and accessibility.

Many participants emphasized hardware improvements such as stronger vibration, larger screens, and improved overall device performance. For DHH participants in particular, stronger vibration and clearer notifications were important accessibility features. One participant explained:

> *"The quality of the vibration is very good, because it's very strong, so I wake up easier in the morning. My old cell phone was very weak so I ended up being late." —DHH user*

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Connectivity and camera quality also played a role in enabling communication. Participants reported that improved stability during video calls made it easier to interact with colleagues, friends, and family:

> *"It is better because I can make video calls (…) my old cell phone disconnected a lot, in this one the connection and the image are better." —DHH user*

Participants also highlighted improvements in software usability and accessibility interfaces. Some noted that the operating system and accessibility settings were easier to configure than on their previous phones. As one participant described:

> *"I noticed more changes in relation to the manufacturer (…) I found it easier. The font on this cell phone is stronger. Better to see." —BPS user*

For several participants, the new device represented a more complete and accessible technology package, combining built-in accessibility features with improved hardware performance. One participant summarized this experience:

> *"The Samsung cell phone has a simple and basic way of having accessibility that is very important and helps (…) I preferred to use this one that is better, more complete." —DHH user*

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These findings suggest that the effectiveness of assistive smartphone interventions depends not only on digital skills training but also on providing devices with reliable hardware, accessible software interfaces, and stable connectivity.

5.3.4 Theme: Difficulties of using smartphones similar to non-disabled people

5.3.4.1 Sub-themes

Spam calls; balancing online and offline life; risk of excessive use; security concerns.

5.3.4.2 Daily integration

As participants became more integrated into digital life, they began to encounter challenges similar to those experienced by the broader population. These included concerns about spam calls, online security, and maintaining a healthy balance between digital engagement and offline relationships.

Some participants reflected on the importance of limiting smartphone use to preserve time with family and avoid excessive screen time. One participant explained:

> *"Having a smartphone is quite important, but I recognize that it can be an obstacle, such as when you spend too much time on the device and end up not paying attention to your family. On Sundays, I usually step away from my cell phone a little to value the people around me." —DHH user*

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Others highlighted practical concerns related to device safety in public spaces, particularly in large urban environments such as São Paulo. Participants described using their phones selectively and cautiously when outside their homes:

> *"I use it very carefully when I'm on the street (...) If I need to talk to someone from HR or my boss, I take out my Samsung cell phone for communication at certain times and then put it away again." —DHH user*

These reflections suggest that increased digital inclusion also exposes users to common challenges associated with smartphone use, requiring individuals to develop strategies for managing safety, attention, and online engagement.

5.3.5 Theme: Combined use with other assistive products and services

5.3.5.1 Sub-themes:

Integration with interpreting services; hearing aids; artificial intelligence tools.

5.3.5.2 Personalised ecosystems

Participants frequently used their smartphones alongside other assistive products and services, creating a personalized ecosystem of support. Rather than replacing existing assistive tools, the smartphone often acted as a central platform that connected and enhanced multiple accessibility solutions.

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For many DHH participants, on-demand sign language interpreting services remained an important communication tool, particularly in situations where automated transcription was less reliable. One participant explained:

> *"[Interpreting services] help me more, because many times the transcription tool is not accurate. When there is no interpreter, I sometimes use Google to transcribe speech, but I prefer interpreting services (…) especially in situations like medical appointments." —DHH user*

Participants also described using smartphones in combination with hearing aids, with the phone functioning as the primary communication interface in many contexts:

> *"I use a hearing aid because of communication and ambient sounds, but what I really depend on is my cell phone because of accessibility in communication when using written Portuguese." —DHH user*

The interviews also revealed participants' adaptability in using emerging digital tools. Several reported using artificial intelligence applications to support communication and language comprehension. For example, one participant described forwarding audio messages to an AI tool to generate written transcripts:

> *"On WhatsApp, when I receive audio, I usually send it to an AI contact to do the translation." —DHH user*

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Others used AI to assist with written communication and language learning:

"I use AI to help me with doubts regarding Portuguese (…) it makes it easier when I need to write emails correctly." —DHH user

These findings highlight how smartphones can function as a flexible accessibility hub, enabling users to combine multiple assistive technologies and digital services to meet their individual needs.

5.3.6 Theme: Difficulties with Live Transcribe and built-in captioning

5.3.6.1 Sub-themes:

Poor quality Portuguese transcription; challenges with multiple speakers; distance from the speaker.

While transcription tools such as Live Transcribe significantly improved communication for many participants, interviews also highlighted important limitations in current automated captioning technologies. DHH participants frequently reported that captions generated on social media platforms and video services were inconsistent or inaccurate,

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particularly in Portuguese. One participant described issues with automated captions on Instagram:

"I noticed that the captions on some Instagram videos have some flaws (...) I ended up choosing not to use this feature often and I look for other ways to access information." —DHH user

Similar concerns were raised regarding subtitles on YouTube:

"Sometimes on YouTube the subtitles are faulty, delayed, not perfect (...) YouTube is good, but the subtitles don't always work or the Portuguese is very bad." —DHH user

Participants also noted that transcription tools worked best in controlled situations with a single speaker. In conversations involving multiple people, the tools often struggled to accurately capture speech. As one participant explained:

"If there's one person talking, I can use accessibility. If there's more than one person, it gets in the way. I can't keep up." — DHH user

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Distance between the device and the speaker also affected the quality of transcription, requiring users to position their phones very close to the speaker to capture audio effectively:

"The distance is often a problem. I need to be very close to the person so the phone can capture the sound and transcribe it." — DHH user

These findings suggest that while automated transcription tools significantly improve accessibility, their effectiveness remains dependent on environmental conditions and language quality, highlighting areas for further technological improvement.

5.3.7 Theme: Findings Regarding the "Minha Claro" App

Two additional interview questions were included to explore participants' experiences with the "Minha Claro" app, which allows users to monitor data usage and manage their mobile plans.

At the beginning of the study, few participants had downloaded or used the application. However, adoption gradually increased as participants became more familiar with their data plans and began using the app to track data consumption and manage their accounts.

Among DHH participants, feedback on the app's usability was generally positive. However, one participant highlighted an accessibility limitation related to the lack of integration with ICOM, a live sign language interpreting service:

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"I have it on my personal cell phone, which is from Vivo, but compared to Claro, Vivo is better because it has a partnership with ICOM (…) With Claro, we can't access it. This is a problem." —DHH user

This comment suggests that accessibility partnerships between telecommunications providers and interpreting services may significantly influence usability for DHH users.

Among BPS participants, fewer individuals reported using the app regularly. Some preferred contacting customer support by phone rather than managing their accounts through the application. While some participants noted that the app could be used with accessibility tools such as TalkBack or Magnifier, others still found traditional phone support easier to navigate.

These findings indicate that while data management apps can support greater user autonomy, their accessibility and integration with assistive services remain important considerations for inclusive design.

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5.4 Digital Skills Training

Digital skills training sessions took place between September and December 2024. Group sizes ranged from 6 to 26 participants. Several observations emerged during the delivery of the training sessions.

First, groups composed of participants with mixed levels of prior digital proficiency tended to progress more efficiently than groups where participants had similar skill levels. These mixed groups encouraged interaction and peer learning, with participants frequently exchanging tips and helping each other navigate accessibility tools and smartphone features.

Second, peer support emerged organically during the training process. In one case, a BPS participant expressed interest in assisting the research team during the sessions. With guidance from the team, this participant became an effective peer trainer, supporting other participants and helping them navigate accessibility features.

Third, the creation of WhatsApp group chats for each training cohort proved to be a valuable support mechanism. Participants used these groups to ask questions, share experiences with accessibility tools, troubleshoot issues, and recommend additional applications they had discovered.

Finally, most training sessions missed by BPS participants were related to medical appointments such as consultations, exams, or surgeries. Given the scheduling constraints of the public healthcare system, participants were often unable to reschedule these appointments, which occasionally affected training attendance.

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5.4.1 Smartphone

5.4.1.1 Exchanges and Replacements

Several device-related incidents occurred during the project. Because not all purchased smartphones had been distributed, the study team was able to replace devices when necessary.

In total, seven participants had their smartphones replaced due to reported hardware or software issues while keeping the same SIM card. One participant required a SIM card replacement after it stopped functioning but retained the same device. Additionally, four participants reported that both their smartphone and SIM card had been stolen. In these cases, police reports were provided and replacement devices and SIM cards were issued.

5.4.1.2 Participants' Considerations

Participants provided a range of feedback regarding the devices throughout the project. One frequently reported issue was the absence of a dedicated option in the Galaxy A15 accessibility menu for pairing hearing aids. After contacting Samsung technical support, the research team was informed that hearing aids must now be connected through the standard Bluetooth pairing process. This requires users to place their hearing aids in pairing mode so that the smartphone can detect them. However, many DHH participants were unfamiliar with how to perform this procedure with their specific devices and reported that they had not needed to do so with previous phones. As a result, several participants were unable to use their hearing aids in conjunction with the new smartphone.

Another issue involved the simultaneous use of the Magnifier and TalkBack accessibility tools. Participants reported that running both features at the same time could cause the

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smartphone to slow down, freeze, or become unresponsive. Troubleshooting was conducted with both the research team and Samsung technical support, but no definitive solution was identified. In some cases, participants reported needing to wait until the device battery fully drained before restarting the phone.

Finally, some participants experienced performance issues after several days of use, including slowdowns, application crashes, and unexpected closing of apps, even after installing the latest system updates. The only mitigation identified by the research team involved asking participants to create a Samsung account and enable all data collection settings associated with Samsung system applications, including optional ones. This appeared to reduce the frequency of performance issues for some users.

5.4.2 Summary of Key Findings

The most relevant findings from the quantitative and qualitative analyses are summarized below.

5.4.2.1 Participants and Recruitment

- Recruiting participants required active follow-up from partner institutions.
- Due to the limited number of DHH partner organizations, recruitment also relied on snowball sampling.
- Most participants (≈66%) already owned or used a smartphone prior to the intervention.
- Around one-third reported not using any assistive product, and about half reported unmet AT needs.

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5.4.2.2 Quantitative Findings

- Age was the most consistent predictor of outcomes, with older participants generally reporting lower digital skills and smartphone usage scores.
- Improvements were stronger among BPS participants, particularly in smartphone usage, digital skills, and quality of life.
- Gender differences were observed in digital skills scores, with female participants reporting slightly lower average scores.
- Individual variation between participants accounted for a large portion of score differences.

5.4.2.3 Smartphone Usage Patterns (Murmuras)

- WhatsApp was the most widely used application across all groups.
- Instagram had the highest total and average daily use among social media apps.
- Among accessibility tools, Text-to-Speech had the most users and Live Transcribe recorded the highest total use time.
- Magnifier showed the largest increase in use over time, while TalkBack showed the largest decrease.

5.4.2.4 Qualitative Insights

- Participants reported increased independence, communication, and access to information after learning to use accessibility features.
- Digital skills training was frequently described as essential for discovering and effectively using built-in accessibility tools.

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5.4.2.5 Implementation Insights

- Mixed-skill training groups progressed more efficiently and encouraged peer learning.
- WhatsApp groups created for training cohorts helped participants share tips and troubleshoot issues after the sessions.
- Missed sessions among BPS participants were most often due to medical appointments within the public healthcare system.

5.4.2.6 Device and Technical Considerations

- The Galaxy A15 lacked a dedicated accessibility option for pairing hearing aids, creating challenges for some DHH participants.
- Simultaneous use of Magnifier and TalkBack sometimes caused device slowdowns or freezing.
- Some participants experienced system instability during regular use.

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6 Recommendations

The following recommendations are drawn from the study's findings and are intended to inform future programs, policies, and research initiatives that use mobile technology to support people with disabilities in Brazil and similar contexts.

6.1 Policy

6.1.1.1 Improve the affordability of smartphones for people with disabilities.

Despite most participants already owning a mobile phone, many were using basic or feature phones with limited accessibility functionality. Governments should consider targeted subsidies or discounts for smartphones for DHH and BPS individuals, in line with existing AT provision frameworks.

6.1.1.2 Introduce differentiated mobile data plans for DHH users

DHH participants consumed significantly more mobile data than BPS participants, with nearly half reporting depletion frequently or always. For this group, video-based communication and transcription tools are the primary means of interaction. Digital inclusion programs should reflect this through larger or subsidized data allocations for DHH users.

6.1.1.3 Fund sustained digital skills training programs

Participants consistently reported that without structured instruction, they would not have discovered or used the accessibility features built into their smartphones.

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Governments, disability organizations, and service providers should treat ongoing digital skills training as a core component of device provision, not a one-off addition.

6.1.1.4 Recognize smartphones as assistive technology platforms

Smartphones increasingly function as multifunctional assistive tools supporting communication, navigation, information access, and daily tasks. AT policies and procurement frameworks should explicitly recognize and support smartphones and mobile data plans within provision programs.

6.2 Practice

6.2.1.1 Reduce group sizes or increase the number of instructors during training

Sessions with two trainers consistently allowed for better individual support without disrupting group progress. Smaller groups and higher instructor-to-participant ratios give participants more time for questions and hands-on practice.

6.2.1.2 Prioritize real-life use cases over comprehensive feature coverage

The features participants adopted were those that were clearly relevant to their daily lives. Training should focus on everyday needs, including communication, accessing services, and navigation, rather than attempting to cover all accessibility features in a single session.

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6.2.1.3 Adopt a two-phase training model

An initial session should introduce core smartphone and accessibility features. A follow-up session approximately one month later, once participants have used the device in their own context, should focus on common issues and practical questions that have emerged from real use.

6.2.1.4 Build in peer learning and support structures

Mixed-proficiency groups progressed more efficiently, and peer support emerged organically throughout the study. WhatsApp groups created for each training cohort continued to be used actively after sessions ended. Programs should be designed for this deliberately rather than leaving it to chance.

6.3 Research

6.3.1.1 Conduct longer follow-up studies on smartphone usage

The four-month follow-up in this study was sufficient to detect early changes but too short to understand how use evolves over time or how smartphones interact with other assistive products as users become more experienced. Extended observation using passive usage monitoring would provide more complete evidence.

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6.3.1.2 Study DHH and BPS participants as distinct groups

The two groups showed meaningfully different outcomes and faced different barriers. Future research should treat them separately rather than combining them under a single disability category, with particular attention to the specific challenges facing DHH users around data consumption, captioning quality, and hearing aid integration.

6.3.1.3 Explore the role of AI-based accessibility tools

Participants spontaneously adopted AI applications for transcription and language support in ways that fell outside the scope of this intervention. How these tools interact with established accessibility features, and how people with disabilities can be supported in using them effectively, is a productive area for future research.

7 Conclusion

This study confirms that smartphones can serve as meaningful assistive tools for people with visual and hearing impairments, but access to a device alone is insufficient to achieve this. The training was the mechanism that made the smartphone genuinely useful. Many participants had owned smartphones for years without knowing that built-in accessibility features existed. Structured instruction was what changed that.

In daily use, participants engaged heavily with communication platforms, particularly WhatsApp, alongside accessibility tools such as Text-to-Speech, Live Transcribe, and TalkBack. Notably, smartphones did not replace existing assistive products but complemented them, functioning as a flexible hub through which participants combined

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multiple tools and services, including hearing aids, sign language interpreting services, and increasingly, AI-based applications.

Measured improvements were clearest among BPS participants, who showed statistically significant gains in smartphone usage, digital skills, and quality of life. Outcomes for DHH participants were more mixed in quantitative terms, though qualitative data describe real changes in their ability to communicate and participate more independently. The divergence likely reflects DHH participants' higher baseline proficiency and the technical challenges they encountered, including hearing aid connectivity, captioning limitations, and the inadequacy of a flat data plan for a group that relies on video-based communication.

Findings should be read as directionally consistent and promising rather than definitive. Nonetheless, the evidence points clearly to what conditions matter in delivery: training in an accessible format, manageable group sizes, peer support, and a technical environment that actually works. The barriers to digital inclusion for people with disabilities are not primarily about hardware. They are about skills, support, affordability, and accessible design, and they need to be addressed together.

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8.1.1 Associação Brasileira de Assistência ao Deficiente Visual (Brazilian Association to Assist People with Visual Impairments, LARAMARA)

LARAMARA is a civil society organization located in São Paulo, Brazil, founded in 1991 by a couple of parents with the collaboration of several practitioners in the field. The organization's mission is to support human development and effective social inclusion of people with visual impairments through the provision of specialized care. Its vision is to be a center of excellence in the care of people with visual impairments. In addition to specialized care, LARAMARA provides social and educational services, offering social protection to people with disabilities of all ages and their families. It works together with families, schools, businesses, and the community at large to promote the development of people with visual impairments, from a sociocultural, socio-educational, psychosocial, and ecological perspective. LARAMARA also works in the training and continuing education of practitioners, students, and family members, and in advocating for the rights of people with disabilities and their families. In 2024, it served 715 people with visual impairments and their families.

8.1.2 Centro de Apoio ao Deficiente Visual (Support Center for the Visually Impaired, CADEVI)

CADEVI, founded in 1984, is a non-profit organization that works to promote Paralympic sports and the social inclusion of people with visual impairments. Over the years, CADEVI has expanded its activities to include social, cultural, educational, sports activities, and vocational training, with the goal of providing more opportunities and improving the quality of life of people with visual impairments.

8.1.3 Centro Profissionalizante e Centro de Educação para Surdos Rio Branco (Rio Branco Vocational Center and Educational Center for the Deaf, Cepro/CES)

Cepro's mission is to transform the lives of young people through vocational training. With the technical support of CES, it promotes the inclusion of deaf youth through specific projects. Since 1947, Cepro has sought to transform talent into performance through education and vocational training for administrative, logistics, commerce and retail, and production assistants. At Cepro, young people receive special attention, with a team of practitioners specialized in supporting their development. It is quality training, youth-centered approach, and mentoring that make all the difference in the performance of young employment apprentices within the company.

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8.1.4 Instituto Luz aos Cegos (Light for the Blind Institute)

The Light for the Blind Institute is a non-profit organization dedicated to promoting social inclusion and autonomy for people with visual impairments. For over 10 years, it has been operating rehabilitation programs, vocational training, inclusive education, and access to assistive technology programs. Its mission is to contribute to building a more accessible society by offering comprehensive support to people with visual impairments and promoting their rights and empowerment.

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