





# A Survey of the Availability and Suitability of Mobile Applications for Digital-Skills Learning Among Older Adults in Nigeria

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Abstract	Article History
<p>Digital skills have become essential for social participation, access to communication services, financial transactions, healthcare management, government services, and broader economic inclusion. Mobile applications present a promising platform for flexible and self-paced digital-skills acquisition; however, most commercially available applications were not developed with ageing learners in mind. This study surveyed the availability and suitability of mobile applications that support digital-skills learning and assessed their responsiveness to age-friendly design principles. A needs-assessment survey was adopted to determine whether existing applications adequately accommodate the sensory and usability needs of older adults, involving structured analysis of ten (10) mobile applications and supplementary interaction feedback from twenty (20) older adults aged 58–79 years. Quantitative findings demonstrate high availability of general-purpose digital-literacy applications but limited evidence of intentional age-friendly design, with most lacking font adjustability, voice assistance, simplified navigation, or cultural and linguistic localization. Qualitative feedback further revealed visual strain, menu anxiety, and uncertainty about interaction steps as barriers to adoption. Only 22.5% of older adults expressed willingness to use the evaluated apps. The study concludes that current applications insufficiently support ageing users and recommends inclusive development guidelines as in interface design, localization strategies, and policy actions to reduce Nigeria’s senior digital-inclusion gap.</p> <p><b>Keywords:</b> Mobile learning, older adults, usability, accessibility, Nigeria, digital skills.</p>	<p>Received: 01 Feb 2026 Accepted: 03 Mar 2026 Published: 08 Mar 2026</p> <p>Scan QR code to view*</p>  <p>License: CC BY 4.0*</p>  <p>Open Access article</p>
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## 1. Introduction

Rapid digitization has transformed how individuals communicate, access services, and participate in economic and civic life (Schneider & Sting, 2020). Studies indicate that activities that once required physical presence such as financial transactions, healthcare consultations, government service enrolment, and social communication are now routinely mediated through digital platforms. As a result, the ability to use digital tools has become a prerequisite for inclusion in contemporary society. While global investments in digital-literacy initiatives have expanded opportunities for younger and technologically active populations, ageing adults remain disproportionately excluded from these advances (Radovanović *et al.*, 2020).

It is widely acknowledged that ageing populations face distinct barriers to technology adoption arising from changes in vision, motor coordination, memory, and confidence, as well as reduced exposure to ICTs during their working years (Iluno *et al.*, 2024). According to Pilotto *et al.* (2023), studies in gerontology and human–computer interaction show that

many digital interfaces privilege speed, visual acuity, and multitasking features aligned with younger users but disadvantageous for seniors. Without appropriately designed learning environments, older adults risk further marginalization in digital economies.

Scholarly consensus supports the view that mobile applications offer a flexible and self-paced approach to digital-skills acquisition, especially in environments where access to formal training centres is limited. The widespread penetration of smartphones in Nigeria suggests that mobile-learning solutions could facilitate digital empowerment among older citizens. However, the design logic behind most commercial applications does not reflect age-friendly principles such as large and adjustable text, high-contrast displays, simplified navigation, or voice-guided assistance (Nimmanterdwong *et al.*, 2022; Okeke & Ezenwegbu, 2024). As a result, many older adults experience cognitive overload, interaction anxiety, and usability failures that discourage continued engagement.

Within the Nigerian context, research into the digital divide has focused predominantly on youths, tertiary students, and skill-based workforce development (Adeleke, 2021; Martens *et al.*, 2020; Azubuike *et al.*, 2021 and Uba *et al.*, 2025). Little empirical evidence exists on whether mobile applications for digital-skills learning are available, suitable, or accessible to ageing Nigerians. Likewise, the extent to which such applications incorporate localization features such as local language support, cultural relevance, affordability, offline functionality, and low-data consumption remains underexplored.

This gap is particularly concerning given the Federal Government's ongoing digital-economy agenda, which emphasizes financial inclusion, e-government services (Lawan *et al.*, 2020; Uba *et al.*, 2023), digital-health delivery (Ibeneme *et al.*, 2020), and social-welfare systems (Shadare, 2022). Without targeted support, older adults may be unable to participate meaningfully in these reforms, reinforcing generational inequalities.

Mobile learning, if appropriately designed, offers a flexible vehicle for senior empowerment. However, commercially available mobile-learning applications rarely integrate accessibility features such as voice prompts, adjustable fonts, simplified navigation cues, or culturally adapted content. The extent of these limitations in Nigerian-accessible applications remains unclear (Ehirim & Okeke, 2025).

This study therefore investigates the availability and suitability of mobile applications for digital-skills learning among older adults in Nigeria. The study evaluates whether current applications demonstrate age-friendly usability and accessibility features, accommodate the sensory needs of ageing users, and provide localized support appropriate to Nigerian socio-economic realities. By identifying deficiencies and opportunities, the study contributes evidence to guide inclusive interface design, senior-focused digital-literacy interventions, and national digital-inclusion policy.

### 1.1 Objectives

To examine the availability and suitability of mobile applications for digital-skills learning among older adults in Nigeria.

- i. Identify mobile applications offering digital-skills training accessible within Nigeria.
- ii. Evaluate age-friendly usability and accessibility features in the selected applications.
- iii. Assess cognitive, visual, motor, and linguistic suitability for ageing users.
- iv. Examine localization attributes including cost, language, relevance, and offline capability.
- v. Recommend strategies for designing inclusive mobile-learning solutions for older Nigerians.

## 2. Related Works

Several studies have shown that age-related cognitive, sensory, and motor changes, together with limited exposure to digital technologies, significantly constrain older adults' ability to adopt and use digital tools effectively (Li *et al.*, 2021). Building on this perspective, Haase *et al.* (2025)

demonstrate that older adults engage with digital technologies in ways that differ from younger users. These findings underscore the importance of involving older adults in the design and development of digital applications to ensure usability, relevance, and user-friendly interaction aligned with their everyday needs. Older adults remain significantly affected by limited digital skills, resulting in reduced access to information, social interaction, and essential services. These challenges often manifest as anxiety toward technology use, reduced confidence, and a reliance on external assistance, which can further diminish independence.

### 2.1 Mobile Learning as an Inclusion Strategy

Mobile learning offers flexibility, affordability, and accessibility. It can support step-wise instruction, multimedia presentation, and personalized learning pathways. However, accessibility guidelines emphasize features such as large typography, voice-over capability, simplified menus, and error tolerance all uncommon in mainstream apps.

Scholarly consensus supports the importance of age-appropriate digital literacy interventions for older adults, noting that conventional digital training programs are often insufficient. Nimmanterdwong *et al.* (2022) argue that effective digital literacy initiatives for aging populations must account for usability, learning pace, and motivational factors. Without deliberate design considerations, digital learning platforms may inadvertently exclude older users rather than empower them.

Amouzadeh *et al.* (2025) provide systematic evidence that age-friendly mobile application design significantly improves usability, satisfaction, and engagement among older adults. Their review identifies simplified navigation, enlarged interface elements, voice-based interaction, and error-tolerant design as critical features, while emphasizing that participatory and user-centered design approaches are essential for addressing persistent challenges related to cognitive load, digital literacy, and accessibility barriers. Blažič and Blažič (2020) demonstrate that older adults' difficulties with digital technologies are primarily attributable to limited digital literacy rather than age-related incapacity. Their findings further indicate that interactive and structured learning approaches can significantly enhance older adults' ability to use smartphones and access digital services, thereby underscoring the need for age-appropriate and supportive digital skills training.

Kebede *et al.* (2022) provide comprehensive evidence that older adults' digital engagement is shaped by interconnected factors related to capability, opportunity, and motivation across different stages of technology use. Their findings highlight that barriers such as limited digital skills, unsuitable technological features, and reduced confidence significantly hinder adoption and sustained use, underscoring the need for tailored, age-appropriate interventions that support meaningful and continuous digital engagement among older adults.

Tieu *et al.* (2025) develop and validate a reliable self-report scale for assessing digital skills among older adults,

demonstrating that a significant proportion of this population lacks the competencies required to effectively use digital health tools. Their findings underscore the importance of accurately identifying digital literacy gaps in older adults to enable timely, targeted interventions that support meaningful engagement with digital systems.

Pan *et al.* (2024) demonstrate that digital skills among older adults are significantly associated with positive health-related outcomes, including improved self-rated health and increased use of digital technologies for health promotion. Their findings indicate that skills related to information navigation, social interaction, and mobile technology use play a critical role in supporting healthy aging, underscoring the importance of strengthening digital competencies to promote both digital inclusion and well-being among older adults.

Mubarak and Suomi (2022) highlight that digital exclusion among older adults persists despite widespread access to ICT, largely due to insufficient digital skills and inadequately designed hardware and software. Their review shows that this “grey digital divide” limits older adults’ ability to access essential services and participate in social life, emphasizing the need for age-friendly digital systems and skill development initiatives to reduce exclusion in both developed and developing contexts.

## 2.2 ICT Exclusion in Nigeria

Studies of digital inclusion in Nigeria focus mainly on youths, tertiary students, and urban professionals. Research on ageing digital-skills adoption is sparse. Socio-economic constraints, linguistic diversity, and infrastructural challenges further undermine participation.

## 2.3 Knowledge Gap

Although prior studies have extensively explored digital literacy challenges and usability barriers among older adults (Criollo-C *et al.*, 2021; Amouzadeh *et al.*, 2025; Li *et al.*, 2021; and Pan *et al.*, 2024), important gaps remain in the existing literature. Most research focuses on identifying adoption barriers or evaluating isolated digital literacy interventions, with limited attention to the design and empirical evaluation of integrated mobile learning applications specifically tailored for older adults.

Furthermore, despite widespread recommendations for age-friendly design features, age-based access control mechanisms for ensuring safe and appropriate use of digital learning platforms are largely underexplored. Existing applications often assume correct user targeting without enforcing systematic access restrictions.

In addition, while digital skills are linked to improved health and well-being (Li *et al.*, 2021), digital literacy training (Blažič & Blažič, 2020) and health-related advisory content (Tieu *et al.*, 2025) are commonly treated as separate interventions. There is limited research on unified mobile platforms that combine digital skills education with health and lifestyle guidance within a single, accessible learning environment.

## 3. Methodology

### 3.1 Research Design

An evaluative survey design was adopted to examine the extent to which existing mobile applications accommodate the sensory, cognitive, and usability needs of older adults in Nigeria. The study combined a structured mobile-application audit with supplementary user-experience feedback from older participants. This design was appropriate because it enabled systematic identification of relevant applications, objective scoring of age-friendly usability criteria, and triangulation of quantitative indicators with qualitative user feedback.

### 3.2 Sampling Procedure

A purposive sampling strategy was used to identify eligible mobile applications on the Google Play Store. Search terms included: “digital skills,” “learn computer,” “ICT basics,” “smartphone training,” and “technology for beginners.” Inclusion criteria comprised:

- i. relevance to digital-skills learning;
- ii. accessibility for download within Nigeria; and
- iii. availability of instructional content.

A total of twelve (12) applications met these criteria and were retained for analysis.

A complementary convenience sample of forty (40) older adults was recruited from community centres and social support groups within southeastern Nigeria. Participants ranged from 58 to 79 years of age (mean = 66.4); 22 (55%) were female and 18 (45%) male. Most participants (85%) owned smartphones, while 15% relied on borrowed devices. Participants provided experiential evaluations after brief interaction sessions.

### 3.3 Data Collection Instruments

Two primary instruments were employed:

#### 1. Structured App-Audit Checklist

Applications were evaluated along seven usability dimensions derived from age-responsive HCI and accessibility guidelines. Each criterion was scored on a five-point Likert scale (1 = Very Poor; 5 = Excellent):

- i. font adjustability;
- ii. voice assistance;
- iii. navigation simplicity;
- iv. localization (e.g., language and cultural relevance);
- v. cultural familiarity;
- vi. error tolerance; and
- vii. affordability.

#### 2. User-Evaluation Survey

After guided hands-on interactions with selected applications, older adults completed a short structured survey measuring:

- i. perceived ease of use,
- ii. visual clarity,
- iii. confidence during interaction, and
- iv. willingness to adopt the application for continued learning.

Open-ended prompts allowed participants to describe barriers not captured in the structured ratings particularly those relating to anxiety, visual comfort, and navigation.

### 3.4 Data Analysis

Data analysis followed a descriptive and interpretive approach suitable for small-sample evaluations. Responses from the application audit were reviewed comparatively to identify recurring patterns in accessibility, usability, and localization features. Instead of applying formal statistical tests, the scoring patterns across applications were examined to determine whether features such as font adjustment, voice assistance, and simplified navigation were generally present, inconsistent, or largely absent.

Feedback from older users was also summarized in terms of dominant tendencies rather than numerical significance. Particular attention was given to whether participants described an application as easy, manageable with assistance, or difficult to navigate. Expressions indicating discomfort, hesitation, or uncertainty were grouped together to form an overall impression of interaction challenges.

Qualitative comments were analyzed thematically. Statements were read repeatedly and coded into emerging categories such as visual strain, interface complexity, lack of instructional guidance, anxiety about making errors, reliance on external help, and language or cultural unfamiliarity. These themes were then compared with observations from the app-audit checklist to determine areas of alignment or divergence.

The combined narrative from the app reviews and user feedback formed the basis for judging overall suitability. An application was considered broadly supportive of ageing users only when participants reported comfort and independence during interaction, and when the checklist indicated the presence of key accessibility provisions. Where these two indicators conflicted, greater weight was given to user experience as the practical determinant of usability. This non-statistical analytical approach allowed for a grounded interpretation of whether mobile applications are realistically usable by older adults within Nigerian contexts.

### 3.5 Ethical Considerations and Study Justification

Participation was voluntary, anonymous, and non-invasive. Individuals provided informed consent and could withdraw at any stage without penalty. Because the study involved older adults, instructions were delivered slowly and clearly, ensuring comprehension before participation. This study is justified on the following grounds:

- i. Older adults increasingly require digital skills to access essential services, yet remain one of the most digitally excluded groups in Nigeria.
- ii. Many mobile applications lack core accessibility features such as text-to-speech, enlarged fonts, simplified navigation, and multimodal instruction that support visual, motor, and cognitive limitations associated with ageing.
- iii. Findings can inform community-based digital-literacy initiatives and guide the development of senior-focused mobile-learning environments.
- iv. Evidence from this study can support institutional planning and national digital-economy policy by highlighting structural barriers affecting ageing populations.

## 4. Results and Findings

### 4.1 App Usability Audit Results

Table 1 presents the usability audit scores for the ten evaluated mobile applications based on the seven age-friendly usability criteria defined in the methodology. Each feature was rated using a five-point Likert scale (1 = Very Poor, 5 = Excellent).

Table 1: Age-Friendly Usability Audit of Selected Mobile Applications

App ID	Font Adjustability	Voice Assistance	Navigation Simplicity	Localization	Cultural Familiarity	Error Tolerance	Affordability	Average Score
App 1	2	1	3	2	2	3	3	2.29
App 2	3	1	3	2	2	2	3	2.29
App 3	2	1	2	2	1	2	3	1.86
App 4	3	2	3	2	2	3	3	2.57
App 5	2	1	2	1	2	2	2	1.71
App 6	3	1	3	2	2	2	3	2.29
App 7	2	1	2	1	2	2	2	1.71
App 8	3	2	3	2	2	3	3	2.57
App 9	2	1	2	1	2	2	2	1.71
App 10	3	2	3	2	2	3	3	2.57

The results show that font adjustability and voice assistance were consistently weak across the evaluated applications, while affordability and basic navigation features scored moderately higher. Overall, the average scores indicate that most applications fall within the poor-to-moderate usability range for ageing users.

The average usability performance of the evaluated applications across the seven audit criteria is illustrated in **Figure 1**. Navigation simplicity and affordability recorded relatively higher average scores compared with other criteria. However, voice assistance and localization features recorded the lowest scores, indicating significant gaps in accessibility provisions necessary for ageing users.

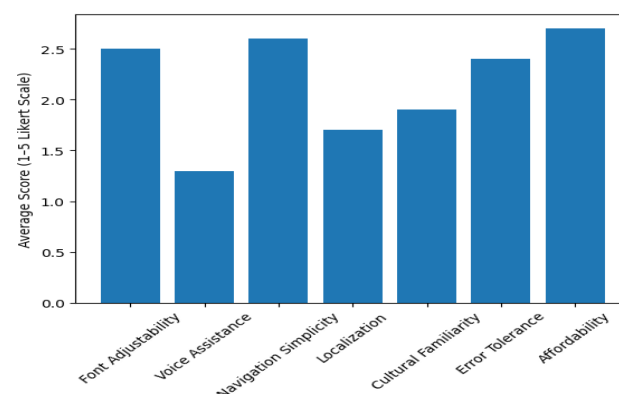
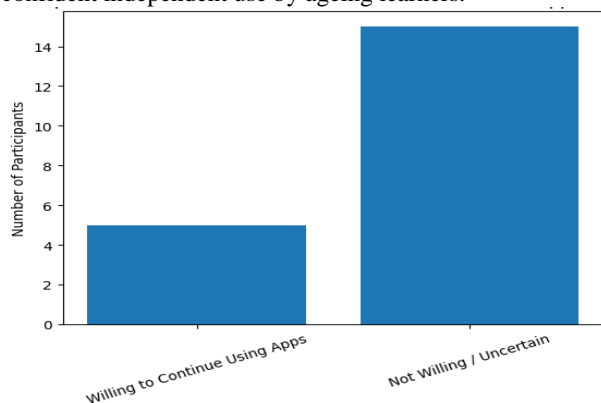


Figure 1: Average Usability Scores across Age-Friendly Evaluation Criteria

## 4.2 Adoption Intent.

The adoption responses of participants are summarized in **Figure 2**. Out of the 20 older adults involved in the interaction sessions, only five participants (25%) indicated willingness to continue using the evaluated applications independently, while fifteen participants (75%) expressed reluctance or uncertainty. This distribution highlights the substantial usability barriers experienced by ageing learners when interacting with currently available digital-skills learning applications.

These results reinforce the qualitative observations that the existing applications lack usability features required for confident independent use by ageing learners.



**Figure 2:** Adoption Intent of Older Adults toward Evaluated Mobile Applications

## 4.3 Application Availability

The review of the Google Play Store indicated that digital-skills learning applications are readily accessible to the Nigerian public. However, none of the evaluated applications explicitly identified older adults as an intended user group.

A small number described themselves as suitable for “beginners,” but this designation did not translate into design considerations for ageing users. Several applications also restricted access to full learning content through paid subscription models, limiting sustained use for individuals on fixed incomes.

Overall, availability did not equate to suitability, and the absence of senior-focused positioning suggested that ageing users were not a primary consideration during product development.

## 4.4 Qualitative Insights from User Interaction.

Narrative feedback from participant sessions revealed recurring usability challenges. Many adults experienced **visual strain when attempting to read instructional text**, particularly where small fonts or low-contrast backgrounds were used. Screens were often described as “**crowded**” or “**too busy**,” and several users struggled to interpret abstract icons.

Uncertainty during navigation was another common theme. Participants expressed concern about making irreversible errors and reported being “**overwhelmed**” by multi-layered menus. The absence of voice prompts or step-by-step audio guidance posed additional barriers, particularly for individuals with limited English literacy or reduced reading stamina.

These usability frustrations heightened anxiety and reduced motivation, reinforcing the perception that digital learning applications were not designed with older users in mind.

## 4.5 Overall Interpretation

Taken together, the findings indicate a marked misalignment between available mobile-learning products and the sensory,

cognitive, and cultural requirements of ageing adults in Nigeria. While applications were technically accessible for download, they did not provide the clarity, reassurance, or guidance needed to support older users.

The results therefore suggest the presence of a persistent senior-oriented digital-skills gap—one not caused by lack of mobile technology, but by the absence of intentional age-friendly design practices.

## 5. Conclusion

The findings demonstrate that although mobile applications for digital-skills learning are widely available within the Nigerian mobile ecosystem, they are largely unsuitable for older adults due to limited accessibility and age-friendly design features. The evaluated applications rarely incorporate adjustable typography, voice guidance, simplified navigation, or culturally localized instructional content.

User interaction feedback further revealed that visual discomfort, navigation uncertainty, and anxiety about making mistakes significantly hinder adoption among ageing learners. As a result, the majority of participants expressed reluctance to continue using the applications independently.

These findings indicate that the current ecosystem of digital-skills learning applications does not adequately address the sensory, cognitive, and usability needs of older adults. Without deliberate design adjustments, such tools may unintentionally reinforce the senior dimension of Nigeria’s digital divide.

## 5.1 Recommendations

In view of the identified gaps, mobile-learning developers are encouraged to integrate age-friendly accessibility standards that support visual comfort and simplified interaction. These should include adjustable and large-print typography, high-contrast displays, large icons with generous touch-targets, and shallow menu structures that reduce navigation stress. Step-by-step instructional sequencing, voice prompts, and text-to-speech options can help minimize cognitive strain, particularly for users with limited literacy or declining visual capacity. Features that reassure users such as error-recovery cues and clear undo functions are also essential for reducing anxiety during interaction.

Localization efforts are equally important, requiring developers and stakeholders to incorporate culturally familiar examples, offline learning modules to reduce data costs, and compatibility with low-spec devices. Beyond application design, community-based digital-literacy programmes can help older adults develop confidence through guided practice, early skill reinforcement, and support for those with visual or literacy limitations.

At the policy level, government and industry partnerships should incentivize senior-focused learning technologies, embed accessibility expectations into ICT procurement guidelines, and align national digital-literacy strategies with demographic ageing priorities.

## 5.2 Future Work

Future studies will extend the proposed system by incorporating additional digital skills modules such as mobile communication applications, video conferencing tools alongside multilingual support to address the needs of a broader and more diverse user

population. Further enhancements may include adaptive learning mechanisms and personalized content delivery based on individual user performance and engagement patterns.

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