McMaster Digital Transformation Research Centre

Digital Skills Training and Older Adults: A Scoping Review

McMaster Digital Transformation Research Centre (MDTRC)
DeGroote School of Business, McMaster University

MDTRC Working Paper No. 103

July 2025

DeGroote School of Business | McMaster University

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Working Paper

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July 2025

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Abstract

This working paper reports the results of a comprehensive scoping review of the academic literature over the last ten years concerning digital literacy training and older adults, yielding valuable recommendations for practice. As digital technologies become increasingly embedded in everyday life, the ability to navigate online environments has become essential to social inclusion, independence, and well-being in later life. Yet older adults—particularly those facing systemic barriers related to income, language, health, or geography—continue to experience digital exclusion. This scoping review synthesizes the academic literature between 2014 and 2024 to examine how digital skills training is delivered to older adults, what contextual and individual factors shape participation, and what outcomes are most frequently reported. Guided by Arksey and O'Malley's (2005) scoping review methodology and the Joanna Briggs Institute's Manual for Evidence Synthesis (2024), this scoping review applies a structured codebook adapted from Detlor et al. (2022, 2024) to analyze 200 documents and organize findings across three domains: learning context, learner attributes, and learning outcomes. A multilevel model from Kärnä et al. (2022) informs the study's recommendations by situating training strategies within macro (policy), meso (institutional), micro (instructional), and nano (interpersonal/ interface) environments. The scoping review's findings highlight the importance of learner-centered design, sustained funding, trusted delivery environments, and inclusive pedagogies. While many digital skills training programs for older adults report positive cognitive, emotional, and behavioral impacts, gaps in equity, coordination, and evidence persist. Importantly, the scoping review provides a foundation for future discussions on ways to improve the accessibility, effectiveness, and sustainability of digital skills training for older adults, especially those who are marginalized.

Keywords: Digital Literacy, Digital Skills, Older Adults, Training.

Acknowledgements: This paper was kindly supported by a knowledge synthesis grant from the MIRA | Dixon Hall Centre, a unique partnership between the McMaster Institute for Research on Aging (MIRA) and Dixon Hall.

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1. Introduction

This working paper reports the results of a comprehensive scoping review of the academic literature over the last ten years concerning digital literacy training and older adults, yielding valuable recommendations for practice.

There is a need to understand how best to deliver digital skills training to older adults. As digital technologies become increasingly embedded in everyday life, the ability to access and use these tools is now essential for full participation in social, economic, and civic domains. Yet many older adults, particularly those facing intersecting forms of marginalization such as low income, racialization, disability, or social isolation, remain excluded from the digital world. This exclusion not only limits access to information and services but also exacerbates feelings of disconnection and loneliness. Studies have long established the relationship between social isolation and adverse mental and physical health outcomes in later life (Goodarzi et al., 2023; Wherton & Prendergast, 2009), while access to digital tools has been shown to alleviate loneliness by supporting regular communication with loved ones and increased autonomy (Zaine et al., 2019; Amichai-Hamburger & Schneider, 2013; Jongenelis et al., 2004; Czaja et al., 2018).

Digital literacy—the ability to navigate, evaluate, and use digital technologies effectively—has emerged as a critical determinant of well-being for older adults. Research shows that digital skills can support greater independence, social connection, cognitive engagement, and quality of life (Khosravi et al., 2016; Khoo & Yang, 2020; Tsai et al., 2017; Zhang & Zheng, 2022). This is particularly true for marginalized older adults, where digital access can reduce isolation and foster a stronger sense of belonging (Barrie et al., 2021; Berkowsky et al., 2018; Tsai et al., 2017; Wynia Baluk et al., 2023). However, systemic barriers such as financial hardship, limited education, lack of peer support, and restricted mobility, continue to hinder digital inclusion (Barrie et al., 2021; Dalmer & Mitrovica, 2022; Elgamal et al., 2024; Kumar et al., 2013; Lam & Lee, 2006; Steelman et al., 2017; Wynia Baluk et al., 2021). These challenges are compounded by a lack of tailored training programs and difficulty accessing ongoing support, resulting in persistent disengagement from digital environments (Barrie et al., 2021; Ma et al., 2020; Shapira et al., 2007).

Previous inquiries into the promotion and sustainability of digital literacy skills among older adults are scattered and disconnected. Efforts have been made by academics across a variety of disciplines, including nursing, library science, social work, and information systems, but these are largely conducted and reported in outlets that are in isolation from one another. Private organizations who have interests in promoting corporate social responsibility have also made efforts in this area, as well as public sector organizations

such as public libraries and social service agencies, but insights and findings from this work are siloed and reported in venues not largely read or accessed by other groups. A robust synthesis of the efforts and recommendations is lacking and much needed to guide practitioners who service older adults and wish to develop digital literacy skills among this population as a means of addressing their loneliness, social isolation, and emotional well-being.

In response, this scoping review aims to identify knowledge gaps and opportunities in the promotion (i.e., marketing, training) and sustainability of digital literacy skills for older adults published in the academic literature, synthesize findings, and then mobilize this knowledge to practitioners and stakeholders with interests in digital skills training for older adults. This scoping review aligns with the MIRA | Dixon Hall Centre's mandate to reduce loneliness and social exclusion among older adults, and aims to support the design of accessible, sustainable, and equity-driven training programs.

This scoping review was guided by the methodological frameworks of Arksey and O'Malley (2005) and the Joanna Briggs Institute Manual for Evidence Synthesis (2024), which informed the scoping process from search and selection to data extraction and synthesis. To analyze and organize findings, the scoping review applied a tripartite framework adapted from Detlor et al. (2022; 2024), which categorizes themes into three interrelated domains: ***teaching context*** (e.g., program settings, delivery structures, teaching methods), ***learning context*** (e.g., motivation, digital proficiency), and ***training outcomes*** (e.g., confidence, satisfaction). This framework supported the development of a codebook used for thematic analysis of the collect document dataset. Recommendations from this analysis are provided. However, to further support translation into practice, the scoping review also drew on a multilevel model developed by Kärnä et al. (2022), which situates digital inclusion efforts across macro, meso, micro, and nano levels, spanning policy, institutional, instructional, and interpersonal dimensions.

Through this process, the scoping review aims to provide both a conceptual and practical roadmap for improving the delivery of digital skills training for older adults, especially those who are marginalized. In doing so, this working paper contributes to the development of evidence-informed strategies for organizations like Dixon Hall and other community partners working to develop digital literacy training opportunities that bridge the digital divide in aging populations.

2. Methodology

This scoping review was designed to provide a comprehensive and rigorous synthesis of digital literacy training for older adults. To achieve this, two widely recognized frameworks for conducting scoping reviews were utilized: i) Arksey and O'Malley's (2005) foundational methodology; and ii) the Joanna Briggs Institute (JBI) Manual for Evidence Synthesis (2024). Arksey and O'Malley's six-stage process provided a flexible but systematic scaffold for our review, while the JBI Manual offered enhanced guidance for ensuring transparency and consistency, particularly in search strategies, inclusion criteria, and data synthesis.

While grounded in these established methodologies, this review also incorporated a couple of novel adaptations. These were the integration of AI-assisted tools (particularly for data charting) and the use of a structured conceptual framework adapted from Detlor et al. (2022; 2024) to guide data coding and synthesis. Together, these components enabled the management of a large and interdisciplinary body of literature while maintaining methodological rigor and a focus on the theoretical factors impacting successful delivery of digital literacy training delivery for older adults to guide the identification of high-impact recommendations for practice.

According to Arskey and O'Malley's (2025) methodology for scoping reviews, a scoping review comprises six stages as follows:

1) Identifying the Research Question: This stage centers around developing a broad but focused research question shaped by a previous literature search and stakeholder consultation.
2) Identifying Relevant Studies: This stage involves systematically locating published studies potentially relevant to the scoping review. The goal is to capture a comprehensive body of evidence that reflects the breadth of research related to the research question identified in the previous stage.
3) Study Selection: This stage focuses on assessing and screening the collected literature to determine which documents meet the review's inclusion criteria. It involves reviewing titles, abstracts, and full texts to identify studies that are relevant for analysis.
4) Charting the Data: This stage refers to the process of systematically extracting and organizing key information from the included studies into a structured format.
5) Collating, Summarizing, and Reporting the Results: This stage involves synthesizing the extracted data to present a comprehensive overview of the evidence, while remaining aligned with the scoping review's objectives.

6) Consultation: This stage is an optional but valuable component of scoping reviews, intended to enhance relevance, interpretation, and uptake of the scoping review's findings by consulting with stakeholders about the accuracy and validity of the findings produced in the previous stage.

This working paper covers the first five stages, with the sixth stage (consultation) to be carried out after dissemination of the working paper has occurred. During this consultation process, the research team hopes to not only validate findings with community partners, practitioners, and older adult learners, but also to enrich the scoping review's practical impact by identifying gaps and priorities that may not have emerged through literature review alone.

The following sections delve more deeply into each of the first five stages identified above.

2.1 Identifying the Research Question

According to the methodological frameworks provided by both Arksey & O'Malley (2005) and the Joanna Briggs Institute (2024), formulating a research question (RQ) is a foundational step in conducting a scoping review. A carefully constructed RQ is important because it helps establish inclusion criteria and define the scope of the review. However, both frameworks allow for flexibility in how this stage is approached, recognizing that the process may vary depending on the purpose and context of the study.

According to Munn et al. (2018), it is important to clearly establish the purpose of a scoping review from the outset, as this purpose will help shape not only the RQ, but also the overall direction of the review. Scoping reviews are often conducted for several reasons, including identifying the key characteristics related to a concept and analyzing gaps in the knowledge base. This review aligns with both aims. It seeks to identify the core components, delivery models, and learner needs within digital literacy programs for older adults, while also mapping gaps and inconsistencies in the current evidence base.

From a review of best practices from several scoping studies, academic papers, and guides, this project employed the following structured process in identifying the research question for this project:

- Conducting a preliminary literature search (Mak and Thomas 2022)
- Consulting relevant stakeholders (Pollock et al. 2018)
- Utilizing an established framework (Harris et al. 2018, UTA Libraries 2024, Cornell University Library 2024)
- Defining inclusion criteria (Peters et al. 2015)

Conducting an initial preliminary literature search allowed for an assessment of the breadth and depth of research in digital literacy and older adults. This step was particularly useful in identifying gaps in the literature and confirming that a scoping review would in fact be appropriate. It also helped clarify the boundaries of the review and informed the development of a comprehensive and well-targeted RQ. The initial scan suggested that research on the promotion and sustainability of digital literacy skills among older adults is often fragmented across academic disciplines and practice settings, making synthesis both timely and needed.

In addition to reviewing the literature, stakeholder consultation played an important role in refining the scope and direction of the review. While traditionally positioned later in the review process (Arksey & O'Malley, 2005; Mak & Thomas, 2022; Aromataris et al., 2024), more recent studies have highlighted the benefits of involving stakeholders earlier (Pollock et al., 2018). Stakeholder input can help clarify the intended purpose of a review, identify knowledge user priorities, and strengthen the relevance and uptake of findings. For this project, stakeholders included the MIRA-Dixon Hall team and older adults from Dixon Hall's Community Advisory Group. These early discussions provided valuable context and guidance that helped shape the review's RQ.

It has been widely accepted that the development of a research question will benefit from the structure of an established framework. Numerous frameworks have been developed to guide researchers in structuring their reviews (Booth et al. 2023). The choice of framework, however, is dependent on the topic of study as well as the discipline it falls under. It should be noted that the type of review (i.e., systematic or scoping) will also influence this selection. Because scoping studies are broader in nature than systematic reviews, a framework with flexible boundaries is the suggested choice.

To this end, the PCC (Population, Concept, Context) framework was used. This framework is well suited for scoping reviews, particularly those with broad research aims (Peters et al., 2015; Micah et al., 2020; Aromataris et al., 2024). The PCC framework encourages researchers to clearly define the population of interest, the central concept being explored, and the context in which it is situated. It also supports the development of inclusion criteria and helps establish a rationale for the review. For example, the population of interest in this review—older adults (especially those who are marginalized)—was defined in terms of age, income, access to services, and other social determinants of digital exclusion.

Based on the above process, the following research question was developed for this scoping review:

> ***What factors enable or deter the promotion and sustainability of digital literacy skills of older adults in general, and marginalized older adults specifically?***

2.2 Identifying Relevant Studies

The second stage of a scoping review involves systematically searching for literature that is relevant to the research question and aligned with the review's objectives. This is a critical step that directly shapes the breadth and depth of the documents collected. As Arksey and O'Malley (2005) emphasize, the goal is to be as comprehensive as possible in identifying sources that may contribute to answering the research question. The JBI Manual (2024) similarly highlights the importance of developing a clearly defined and replicable search strategy to support transparency and minimize bias.

While both frameworks offer general guidance, the specific procedures for conducting this stage are intentionally left flexible to allow researchers to tailor the search strategy to the topic and context of the review. Key considerations include the time span, language, geographical scope, and selection of appropriate databases. The search strategy should also be iteratively developed and tested to ensure adequate coverage.

For this stage, a multi-step strategy was utilized:

1. Identifying Databases
    - Selecting academic platforms and discipline-specific databases
    - Applying appropriate filters and parameters to each database
2. Building the Search String
    - Extracting key concepts and synonyms from the research question
    - Testing and refining the search string to maximize relevance and sensitivity
    - Tailoring the final search strings to the syntax of each database
3. Collecting and Organizing Results
    - Exporting retrieved documents into EndNote
    - Using EndNote to manage citations, remove duplicates, and prepare for screening

This structured approach supported the creation of a transparent, comprehensive, and replicable search process appropriate for a scoping review. The following sections expand further on this strategy.

2.2.1 Identifying Databases

The selection of academic databases was closely guided by the research question and the thematic scope of this review. As emphasized in the JBI Manual (2024), a comprehensive search should be developed in collaboration with a research librarian, which was followed in this study. The librarian provided expert guidance on platform and database selection, ensuring that the chosen sources would capture both breadth and depth across disciplines relevant to digital literacy in older adults.

The process began by trialing initial search strings across multiple platforms to assess relevance and coverage. Databases that produced a high proportion of irrelevant results or offered minimal yield were excluded. This iterative process helped refine the database list to include only those most aligned with the research objectives. This step aligns with guidance from Arksey and O'Malley (2005), who suggest tailoring the scope of a search to the practical realities of the review while still aiming for comprehensive coverage.

The final list of platforms and databases included:

- ProQuest Platform
    - APA PsychInfo
    - ERIC
    - ProQuest One Business
    - ProQuest Dissertations & Theses Global
    - Publicly Available Content Database
    - Sociology Collection
        - Applied Social Science Index and Abstracts (ASSIA)
        - Social Services Abstracts
        - Sociological Abstracts
        - Sociology Database
- Web of Science Platform
    - WOS Core Collection
- EBSCO Platform
    - AgeLine
    - Business Source Premier
    - Communications Source
    - Library, Information Science and Technology Abstracts (LISTA)
    - Social Work Abstracts
- Scopus

Once these databases were identified, appropriate filters and parameters were selected to keep the search within boundary. These included articles published within a ten-year time span, and articles in English only. Other specific exclusions were identified depending on the database. For example, in the ProQuest platform, wire-feeds were excluded from the search results because through trial and error it was found that these were not pulling relevant documents.

Search fields were also customized to improve precision, and each database had its own options for selecting these. But in general, full-text searches were avoided to reduce irrelevant hits. Search fields such as NOFT (Not Including Full Text) for ProQuest or Topic as in Web of Science were used to conduct the search.

2.2.2 Building the Search String

Once the databases were identified, the next critical step was development of the search string, the primary tool for retrieving relevant literature. A well-constructed search string is essential not only for maximizing the relevance and breadth of results, but also for supporting the transparency and replicability of the scoping review process. As such, considerable attention was given to its structure and conceptual alignment with the review's objectives.

Guided by the research question and the PCC (Population, Concept, Context) framework, a structured brainstorming process was undertaken to identify key concepts and their corresponding search terms. Five core conceptual categories were identified:

1. Digital literacy
2. Older adults
3. Facilitators and barriers
4. Promotion
5. Sustainability

For each category, a list of keywords, synonyms, and related terms was developed to ensure coverage of diverse terminology across disciplines and study types. These terms were then refined through trial searches and consultation with the research librarian. Table 1 below presents a list of initial keywords used.

Table 1: Initial Keywords Used to Build a Search String

Digital Literacy	Older Adults	Facilitators and Barriers		Promotion	Sustainability
		general	*specific*		
digital fluency, digital skills, technology skills, technical competencies, internet skills, internet usage, computer literacy, online proficiency	older people, elderly, seniors, aged, aging, ageing, retired	social economic, socio-economic, income, health	marginalized, disadvantaged, vulnerable, at-risk, underserved, low-income, poor, poverty, homeless, houseless, newcomers, migrants, immigrants, refugees, minorities, disabilities, disease	marketing, advertising, outreach, recruitment, training, program, instruction, intervention, teaching	viability, continuity, durability, longevity, stability, retention, maintenance

With a comprehensive list of keywords in place, the next step involved translating these into a structured search string. This process was iterative and involved multiple rounds of testing, refining, and tailoring the string across several databases to ensure relevance to the research question while managing the volume of results retrieved.

The initial search string focused on the relationship between digital technologies and skill-related terms:

> (digital OR tech* OR internet OR computer* OR online OR "social media" OR ICT OR mobile) **NEAR/1** (literac* OR fluenc* OR skill* OR competenc* OR proficienc*)

Truncation symbols (*) were used to capture variations of root words (e.g., tech* retrieves "technology," "technological," etc.). The proximity operator (NEAR/1 in ProQuest & Web of Science, N1 in EBSCO, and W/1 in Scopus) was used to ensure that a digital-related term appeared within one word of a skills-related term, thereby increasing flexibility while maintaining precision. For example, this operator would capture instances of "**digital literacy,**" "**digital** senior **literacy**," and "**literacy** with **digital** tools" Table 2 below lists combinations of the two sets of keywords, and by using the NEAR operator (or its equivalents) these keywords can be separated by up to one intervening word, in any order.

Table 2: Keyword Combinations based on the Search String

• Digital literacy • Digital fluency • Digital skills • Digital competency • Digital proficiency • Technological literacy • Technological fluency • Technological skills • Technological competency • Technological proficiency	• Internet literacy • Internet fluency • Internet skills • Internet competency • Internet proficiency • Computer literacy • Computer fluency • Computer skills • Computer competency • Computer proficiency	• Online literacy • Online fluency • Online skills • Online competency • Online proficiency • Social media literacy • Social media fluency • Social media skills • Social media competency • Social media proficiency	• ICT literacy • ICT fluency • ICT skills • ICT competency • ICT proficiency • Mobile literacy • Mobile fluency • Mobile skills • Mobile competency • Mobile proficiency

While this version generated conceptually relevant results, it produced an overwhelming number of records—exceeding 30,000 in some databases. To make the results more manageable and tailored to the review, the string was refined by adding a population filter using the AND operator to narrow results to literature concerning older adults:

> (digital OR tech* OR internet OR computer* OR online OR "social media" OR ICT OR mobile) **NEAR/1** (literac* OR fluenc* OR skill* OR competenc* OR proficienc*) **AND** ("old* adult*" OR "old* people" OR aging OR ageing OR elder* OR senior* OR retire*)

Although this version improved specificity, it still returned a large volume of results. To further narrow the scope and increase the relevance to digital literacy programs, a third component was added to the search string: terms reflecting promotion, instruction, or learning environments. This version looked as follows:

> (digital OR tech* OR internet OR computer* OR online OR "social media" OR ICT OR mobile) **NEAR/1** (literac* OR fluenc* OR skill* OR competenc* OR proficienc*) **AND** ("old* adult*" OR "old* people" OR aging OR ageing OR elder* OR senior* OR retire*) **AND** (promot* OR train* OR program* OR instruct* OR teach* OR learn* OR educat*)

Although this version did present a good set of workable documents, it was decided to broaden this slightly to include descriptors pertaining to facilitators and barriers. And this led to the final version of the search string:

> (digital OR tech* OR internet OR computer* OR online OR "social media" OR ICT OR mobile) **NEAR/1** (literac* OR fluenc* OR skill* OR competenc* OR proficienc*) **AND** ("old* adult*" OR "old* people" OR aging OR ageing OR elder*

OR senior* OR retire*) **AND** (promot* OR train* OR program* OR instruct* OR teach* OR learn* OR educat* OR facilitat* OR barrier* OR challenge* OR gap* OR divide)

2.2.3 Collecting and Organizing Results

Using the finalized search string, each database was searched in a stepwise and methodical manner. This incremental approach was used to ensure accuracy, manage search scope, and facilitate documentation. It also allowed for clear tracking of how each component of the search string influenced the volume of results. The ProQuest platform is presented below as an example of this process, where S1, S2, and S3 represent distinct components of the final string:

S1 – Digital and skill-related keywords: → 32,262 results

(digital OR tech* OR internet OR computer* OR online OR "social media" OR ICT OR mobile) NEAR/1 (literac* OR fluenc* OR skill* OR competenc* OR proficienc*)

S2 – Population-related terms: → 345,849 results

"old* adult" OR "old* people" OR aging OR ageing OR elder* OR senior* OR retire*

S3 – Program and barrier-related descriptors: → 7,247,794 results

promot* OR train* OR program* OR instruct* OR teach* OR learn* OR educat* OR facilitat* OR barrier* OR challenge* OR gap* OR divide

These strings were entered into ProQuest separately, saved, and then combined using Boolean operators:

S1 + S2: Combined digital skills and population filters → 934 results

S1 + S2 + S3: Full combined search string → 772 results

This incremental strategy was applied in all databases that allowed for saved query steps (e.g., ProQuest). In platforms that did not support incremental querying, the full search string was entered and tested as a single command.

To ensure transparency and replicability, all searches were documented, including the date of search, filters applied, and platform-specific details. Below is the documentation for the ProQuest platform:

ProQuest Search Details

- Date of search: Monday July 22, 2024
- Databases searched:
    - ProQuest One Business
    - ProQuest Dissertations & Theses Global
    - APA PsychInfo
    - Sociology Collection
        - Applied Social Science Index and Abstracts (ASSIA)
        - Sociological Abstracts
        - Sociology Database
        - Social Services Abstracts
    - ERIC
    - Publicly Available Content Database
- Filters: Last 10 years (2014-2024), English only, Exclude wire-feeds
- Search fields: NOFT (Anywhere except full text)
- Total obtained results: 772

Table 3 below lists the number of documents collected for each selected database/platform

Table 3: Total Documents Retrieved per Database/Platform

Platform/Database	Documents Retrieved
ProQuest	772
EBSCO	311
Web of Science	1644
Scopus	1878
Total:	***4605***

All documents were imported into the citation manager **EndNote**, where they were organized into groups based on the source database. Colour-coding and tagging features were used to distinguish entries by platform, aiding in downstream screening and reference management. Figure 1 below presents a screenshot of the EndNote 21 interface.

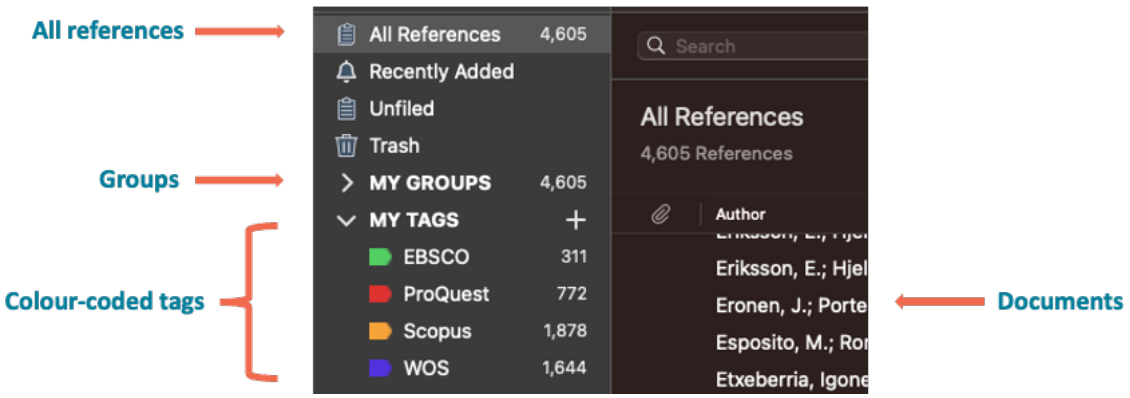

Figure 1: Screenshot of the Endnote 21 Interface

EndNote automatically flags potential duplicate records across imported databases. In total, **1,932 entries** were identified as potential duplicates. These were manually reviewed by the research team to confirm duplication, and confirmed duplicates were subsequently removed from the dataset.

2.3 Study Selection

The third stage of the scoping review involved a systematic screening process to assess the relevance of retrieved documents against the study's inclusion criteria. As noted previously, 4,605 records were initially collected across all databases. Using EndNote, 1,932 potential duplicates were flagged, manually reviewed, and removed, resulting in a refined set of 3,493 records.

These records were then imported into **Covidence**, a web-based platform designed to support systematic and scoping review workflows. Covidence conducted a secondary duplicate check and flagged an additional 380 duplicate records, which were also removed. This yielded a final dataset of 3,113 records for screening.

In this review, as in accordance with JBI guidelines, screening was carried out in two stages: title/abstract screening followed by full-text review. The process was managed using Covidence, a web-based platform that supports blinded dual screening and tracks reviewer decisions. Eligibility criteria were developed based on the research question and refined through calibration exercises. All studies were independently screened by two reviewers, with disagreements resolved through consensus.

Screening was conducted in two phases as described below:

2.3.1 Title and Abstract Screening

Each of the 3,113 records was screened based on title and abstract. This phase was carried out by a team of six researchers, with each article screened independently by two reviewers to ensure consistency and minimize bias. Prior to formal screening, a pilot exercise was conducted to calibrate the team and ensure shared understanding of the inclusion criteria.

Any conflicts between reviewers were resolved by an appointed member of the research team who reviewed discrepancies and made final inclusion decisions. As a result of this phase, 2,651 records were excluded for not meeting the inclusion criteria, and 462 records were retained for full-text screening.

2.3.2 Full-Text Screening

The 462 remaining articles were then subjected to full-text screening to assess whether they directly addressed the research question. This phase was also divided among the six researchers and began with another pilot screening round to ensure clarity and alignment with the refined criteria.

Following full-text review, 262 articles were excluded based on irrelevance or failure to meet eligibility criteria. This resulted in a final set of 200 articles included for full data extraction and synthesis in the scoping review (see Appendix A).

2.4 Charting the Data

Data charting is a key step in the scoping review process. It involves systematically collecting and organizing important information from each included study to help answer the review's research questions. As Arksey and O'Malley (2005) describe, this step is about "sifting, charting and sorting" findings in a way that makes it easier to identify patterns and themes (p. 27). Charting helps transform a large, diverse group of studies into structured, usable data for analysis.

This process is not fixed—it is meant to evolve over time. Both Arksey and O'Malley (2005) and the Joanna Briggs Institute (JBI, 2024) emphasize that researchers should refine the charting form as they become more familiar with the literature. For example, new categories may need to be added, or definitions clarified, based on what appears in the studies. This flexibility is especially important in scoping reviews, which often include a wide range of study types, formats, and findings. According to JBI, charting should go beyond just recording basic study details—it should also capture relevant findings, context, and concepts that are meaningful to the review's purpose.

Because scoping reviews often include both quantitative and qualitative studies, charting can be complex. Reviewers must decide what information is most relevant and how to

organize it consistently across all studies. This often involves piloting the charting form and revising it based on feedback and experience. The goal is to be both systematic and flexible, ensuring all key data are captured, while allowing space for unexpected or emerging insights.

In this review, we followed established protocols but also incorporated new tools to support the process. Specifically, we used **Elicit**, an AI-powered research assistant, to help extract key data points. This created efficiencies in navigating high volumes of literature but also introduced new challenges that shaped our iterative process. In the sections that follow, we describe how the charting form was developed, how AI tools were used, and how we ensured the process remained rigorous and transparent.

2.4.1 Development of Data Extraction Form

An essential foundation of any rigorous scoping review is a well-constructed data extraction form. The purpose of this form is to guide the systematic charting of data from included documents and ensure that all relevant information is captured consistently and accurately. The development of the form involves systematically organizing key information from eligible studies in a way that supports both description and interpretation.

In accordance with best-practice guidelines, the extraction form was carefully designed to align with the study's overarching research question and was organized into two main components:

- General fields which recorded standard bibliographic and study details (e.g., authors, year, country, population, study design), and
- Specific content fields which focused on elements directly relevant to digital literacy interventions. These included variables such as delivery mode, training content, learning context, instructional strategies, barriers, facilitators, and reported outcomes.

The specific fields were designed to extract data relevant to three core thematic areas:

- Types of Digital Literacy Programs (e.g., mode, structure, content, delivery)
- Effectiveness and Impact (e.g., skill development, confidence, participant satisfaction)
- Design Considerations for Older Adults (e.g., accessibility, barriers, facilitators, cultural inclusion)

These themes were not arbitrarily selected, rather, they were distilled from the overarching research question. The extraction fields were tailored to ensure that each element of this question was addressed through multiple data points.

Importantly, the development of the form was not static. It underwent three iterative pilot phases before being finalized. In each pilot, a small batch of articles was processed using the AI tool Elicit, and the results were reviewed independently by three researchers. Feedback from each round was used to assess how well the fields captured relevant data and improve the form as needed. These refinements ensured that fields were phrased clearly, captured meaningful variation across studies, and minimized ambiguity. This iterative approach, consistent with JBI guidance, helped clarify field definitions, expose gaps, and ensure that the form could be used effectively across diverse study types.

A distinctive feature of this review was the integration of Elicit to support the data extraction process. Once the extraction fields were finalized, each one was translated into a prompt that could be input into Elicit to generate preliminary structured summaries from full-text articles. These prompts needed to be carefully calibrated, as small changes in wording had significant effects on the quality and scope of the AI's responses.

For instance, asking “What were the learning outcomes?” often resulted in vague or high-level summaries, while rephrasing the prompt to “Describe how confidence, skills, or behavior changed as a result of the digital literacy program” generated more targeted and relevant output. In some cases, simply changing the verb or the level of specificity (e.g., from “describe” to “list specific outcomes related to digital confidence”) led to entirely different responses. This level of prompt sensitivity meant that the team had to iteratively test, adjust, and re-validate prompts to ensure they matched the intent of each field.

Additionally, prompt design had to balance two competing priorities: (1) guiding the AI clearly enough to generate focused content, and (2) avoiding overly narrow phrasing that might exclude relevant information. These challenges highlight a key limitation in using large language models for structured extraction—namely, their responsiveness to subtle linguistic cues and contextual ambiguity.

Despite these limitations, Elicit offered valuable time-saving benefits, especially in helping reviewers locate key descriptive elements within longer articles. However, the final extraction for each article was always reviewed and edited by human coders to ensure accuracy, completeness, and consistency across studies. This hybrid approach enabled the team to retain methodological transparency while leveraging the scalability and efficiency that AI tools can offer.

2.4.2 Data Extraction Process

Once the data fields were finalized, the review team proceeded with the formal data extraction process. This stage involved systematically applying the structured fields to each included source to chart relevant data. The approach combined AI-assisted extraction with careful manual validation to maintain both efficiency and rigor.

In accordance with Arksey and O'Malley (2005), data extraction was treated as an iterative process, allowing the team to remain responsive to the diversity of study designs and levels of reporting. JBI (2024) similarly notes that extraction should not be considered a one-size-fits-all exercise; rather, the form should be applied with interpretive flexibility while ensuring consistency across the dataset.

The data extraction process followed a defined workflow:

- Document Upload and Organization: All included full-text articles were organized in a shared folder system and named consistently. Each article was uploaded individually into a new Elicit "notebook."
- AI Prompt Execution: For each article, prompts corresponding to the specific charting fields were entered into Elicit. These prompts had been tested and refined earlier during the form development phase to ensure clarity and alignment with the review's objectives.
- Initial Output Capture: Elicit generated text responses for each prompt, which were reviewed immediately. The AI output was copied into a structured Excel file, with each charting field occupying its own column.
- Manual Review and Correction: Each Elicit-generated extraction was then carefully verified by a reviewer. This involved reading the full article to confirm the accuracy of the AI output and filling in any missing, unclear, or misinterpreted content. This step ensured alignment with JBI's emphasis on human oversight during data collection.
- Final Formatting and Cleaning: After review, each extraction was revised and formatted for consistency.
- Consolidation into Master Dataset: Finalized extractions were moved into a central master file. This file housed all extracted data in a structured format, ready for qualitative coding and synthesis.

This hybrid extraction model provided a scalable and replicable workflow. Elicit accelerated the identification of key content, while manual review preserved interpretive accuracy and accounted for the variability in study reporting styles. The process was time-intensive but necessary, especially for nuanced fields such as "learning context," "barriers," and "program structure," which often required synthesis across multiple parts of a document.

Overall, this method allowed for a systematic and transparent approach to charting the data, ensuring that each study contributed meaningfully to the review's thematic synthesis and findings.

2.5 Collating and Summarizing the Results

This stage of the scoping review involved moving from data charting to a structured coding and analysis process using **Dedoose**, a cloud-based qualitative data analysis platform. This process was informed by Arksey and O'Malley's (2005) recommendation to move beyond simply describing the data and the Joanna Briggs Institute Manual (2024), which stresses the importance of conceptual synthesis and mapping of themes in scoping review projects.

Following document extraction, 200 records were compiled into a single Excel Masterfile, with each row representing one extracted record derived using the Elicit AI tool and the structured data extraction form. This Masterfile was uploaded to Dedoose, where each record was treated as a distinct case (or document ID). Researchers then manually applied codes to relevant portions of text within each case. These text segments became excerpts and formed the basis of all analysis. In total, 5,951 excerpts were generated, and codes were applied 15,993 times.

The data was coded according to a multi-tiered codebook that was developed iteratively and refined in alignment with both theoretical foundations and practical program insights. The full process is detailed below.

2.5.1 Data Coding

A structured codebook was developed to support a rigorous and consistent coding process. Initially, the codebook was formed based on theoretical constructs sourced from Detlor et al.'s (2022) conceptual framework of community-led digital literacy training initiatives and Detlor et al.'s (2024) national survey to administrators and instructors of public library-led digital literacy training programs across Canada. This initial codebook identified two primary categories influencing program success: i) the learning environment, which encompasses institutional supports such as funding, infrastructure, instructional staffing, and program evaluation; and ii) program components, which include instructional design elements such as content, delivery format, session length, and outreach practices. As well, the initial codebook identified a range of learning outcomes, including skill development, learner confidence and satisfaction.

Recognizing the impact learners themselves have on training program success, this initial codebook was then extended by introducing another analytical domain: learner attributes. These are individual characteristics, such as a person's level of digital proficiency, motivation to learn, and demographics that may impact a person's training outcomes. Unlike the learning environment or program components identified above, learner attributes reflect the lived experiences of learners and often intersect with broader dimensions of marginalization, including ageism, income insecurity, racialization, and social isolation.

The codebook was then reviewed collaboratively by all members of the research team. When reviewing the codebook, the team also considered relevant frameworks (e.g., Arksey & O'Malley, 2005; JBI, 2024), and early document screening insights from other scoping review studies conducted in this area (e.g., Kebede et al.'s (2022) scoping review entitled "Digital Engagement of Older Adults").

In the end, the codebook included six Level 1 categories, as follows: i) study methods, ii) geographic location, iii) learning environment, iv) program components v) learner attributes; and vi) learning outcomes. ***Study methods*** pertained to the research methods used in the document under review. ***Geographic location*** dealt with the physical location where data collection occurred in the paper. ***Learning environment*** pertained to general contextual factors surrounding the delivery of digital literacy training. ***Program components*** dealt with specific features of the training itself. ***Learner attributes*** pertained to the personal characteristics, demographics or attributes of learners who take digital literacy training and/or use information technologies. ***Outcomes*** dealt with the outcomes of any digital literacy training taken by the learners.

Each Level 1 code contained associated Level 2 codes (subcategory clusters), which in some cases were broken down further into Level 3 descriptors. Codes were designed to capture both barriers and facilitators under each category. The balance between specificity and manageability was carefully maintained: core thematic areas (e.g., support, motivation, teaching staff) were broken into several subcodes, while more peripheral concepts were kept streamlined.

Table 4 below provides a detailed breakdown of the Level 1, 2, and 3 codes that comprised the final version of the codebook.

Table 4: Final Codebook Used to Code the Data

LEVEL I	LEVELS 2 and 3
STUDY METHODS – The research method used	
	QUALITATIVE – Predominantly qualitative (e.g., interviews; focus groups)
	QUANTITATIVE – Predominantly quantitative (e.g., Likert-scaled surveys)
	MIXED METHODS – Both qualitative and quantitative
GEOGRAPHICAL LOCATION – The physical location where data collection occurred	
	NORTH AMERICA
	EUROPE
	ASIA
	AFRICA
	SOUTH AMERICA
	AUSTRALIA
	OTHER
LEARNING ENVIRONMENT – General contextual factors surrounding the delivery of digital literacy training	
	PROGRAM FUNDING – Deals with the funds used to support the training
	• Facilitator
	• Barrier
	CLASSROOM RESOURCES – Pertains to the structural classroom resources available to deliver the training
	• Facilitator
	• Barrier
	TEACHING STAFF – Deals with the instructors who provide the training
	• Facilitator
	• Barrier
	KNOWLEDGE SHARING – Pertains to the sharing of knowledge about how best to deliver the training
	• Facilitator
	• Barrier

LEVEL I	LEVELS 2 and 3
	PERFORMANCE MEASUREMENT – Pertains to the performance measures used to evaluate and assess the training (i.e., course evaluations by learners; self-assessments by instructors)
	• Facilitator
	• Barrier
	LEARNER INPUT – The extent to which learners themselves influence the design or delivery of the training
	• Facilitator
	• Barrier
PROGRAM COMPONENTS – Specific features of the training itself	
	SCHEDULING – Deals with the timing of the instruction
	• Facilitator
	• Barrier
	PROGRAM DURATION – Deals with the length of the training program
	• Facilitator
	• Barrier
	SESSION DURATION – Deals with the length of an individual training session taught within a training program
	• Facilitator
	• Barrier
	DELIVERY MODE – Deals with how the training is delivered
	• In-Person (training sessions are delivered face-to-face, in-person)
	• Online (training sessions are delivered online)
	• Blended (training sessions are mix of in-person and online)
	• Facilitator
	• Barrier
	CLASS SIZE – The number of learners taking the digital literacy training
	• Facilitator
	• Barrier
	CLASSROOM ENVIRONMENT – The physical aspects of the classroom setting in which the training is provided (e.g., noise, seating configuration, temperature)

LEVEL I	LEVELS 2 and 3
	• Facilitator
	• Barrier
	SKILLS TAUGHT – The level and type of digital literacy skills taught in the training
	• Basic (pertains to the teaching of basic digital literacy skills in the training)
	• Advanced (pertains to the teaching of advanced digital literacy skills in the training)
	• Web Navigation (instruction pertains to how to use Web search engines)
	• Social Media (instruction pertains to how to use social media applications such as X, Facebook, TikTok, Instagram)
	• Security/Privacy (instruction pertains to how to safe using a digital device)
	• Device Specific Training (instruction pertains to how to use a specific digital device such as a tablet, smart phone)
	• Other Skills Taught (another type of skill taught in the training not covered above)
	• Facilitator
	• Barrier
	PEDAGOGICAL APPROACH – The approach or pedagogy used to deliver the training
	• One-on-One Tutoring (one instructor teaches a single learner; individual instruction)
	• Classroom Training (traditional formal instruction where information is presented in front of a group of learners)
	• Intergenerational Learning (children, teenagers, young adults or grandchildren teach older adults how to use IT)
	• Peer-to-Peer Learning (older adults teach other older adults)
	• Games-Based Learning (learning digital skills by gameplaying)
	• Indirect Learning (learning by doing online activities such as digital storytelling, genealogy, online transactions)
	• Other Pedagogical Approach (another type of pedagogical approach used in the training not covered above)
	• Facilitator
	• Barrier
	LEARNING MATERIALS – Pertains to the materials used in the training
	• Printed Materials (deals with the use of printed materials (handouts) in the training)
	• Slides (deals with the use of PowerPoint slides in the training)
	• Videos (deals with the use of videos for instruction)

LEVEL I	LEVELS 2 and 3
	• Virtual Repository (deals with the availability of a virtual repository to store learning materials)
	• Other Learning Materials (another type of learning material taught in the training not covered above)
	• Facilitator
	• Barrier
	LEARNING TECHNIQUES – The mechanisms employed during the training to facilitate learning
	• Exercises / Hands-On Activities (deals with the use of exercises or hands-on activities in the training)
	• Homework (deals with the use of homework in the training)
	• Review of Material from Prior Instruction / Repetition of Training (deals with the reviewing of learning content from past instruction or a repetition of the training already given in the training)
	• Q&A Sessions (deals with the use of question & answer opportunities in the training)
	• Personalized Pacing (deals with the personalization of the pace of which learning content is taught in the training)
	• Slow Paced Delivery (deals with the delivery of the instruction at a slow pace)
	• Simple Vocabulary / Non-Jargon Terminology (deals with the use of simple vocabulary or the use of non-jargon terminology in the training)
	• Non-Ageist / Inclusive Language (deals with the use of non-ageist and/or inclusive language in the training)
	• Multilingual Support (deals with the use of multiple languages in the delivery of the training)
	• Use of Culturally Tailored / Inclusive Examples (deals with the use of use of culturally tailored examples and/or inclusive examples in the training)
	• Incentives to Learn (deals with the use of learner incentives in the training, e.g., cash; keep their tablets; earn a certificate)
	• Food / Drink (deals with the provision of food and drink during the training)
	• Opportunities to Socialize (deals with opportunities for learners to socialize amongst themselves during the training)
	• Other Learning Techniques (another type of learning technique used in the training not covered above)
	• Facilitator
	• Barrier
	MARKETING – The advertising used to promote the training program to potential learners
	• Facilitator

LEVEL I	LEVELS 2 and 3
	• Barrier
LEARNER ATTRIBUTES – The personal characteristics, demographics or attributes of learners who take the digital literacy training	
	RACE – The race of learners
	• Facilitator
	• Barrier
	AGE – The age of learners
	• Facilitator
	• Barrier
	SEX – The biological sex of learners (e.g., male, female)
	• Facilitator
	• Barrier
	GENDER – The identify and expression of learners within the spectrum of gender identities (e.g., man, woman, non-binary)
	• Facilitator
	• Barrier
	MOTIVATION – Factors that motivate or discourage learners from taking the training in the first place
	• Facilitator
	• Barrier
	DIGITAL PROFICIENCY – The level of digital proficiency (expertise) learners have using information technologies
	• Facilitator
	• Barrier
	SUPPORT – The access learners have to others who can provide help on how to use information technology (IT) or troubleshoot IT problems
	• Family (learners have access to family to provide IT support)
	• Friends (learners have access to friends to provide IT support)
	• Peers (learners have access to peers to provide IT support)
	• Staff (learners have access to staff to provide IT support)
	• Volunteers (learners have access to volunteers to provide IT support)

LEVEL I	LEVELS 2 and 3
	• Other Support (another type of IT support that learners have access to that is not covered above)
	• Facilitator
	• Barrier
	MOBILITY – The degree to which learners are able to physically move and/or leave their place of residence easily to participate in the training
	• Facilitator
	• Barrier
	PHYSICAL AND COGNITIVE IMPAIRMENT – The extent to which learners suffer from physical and cognitive constraints that may impact their learning (e.g., cognitive decline, hearing impairment, vision loss)
	• Facilitator
	• Barrier
	PERSONAL INCOME – The amount of income learners have to cover essential and discretionary personal living expenses
	• Facilitator
	• Barrier
	ACCESS TO DIGITAL DEVICES – The extent to which learners have physical or financial access to information technologies
	• Facilitator
	• Barrier
	ACCESS TO TRAINING - The extent to which learners have physical or financial access to digital literacy training
	• Facilitator
	• Barrier
OUTCOMES – Deals with outcomes of the training	
	PSYCHOLOGICAL LEARNING OUTCOMES –The psychological impacts of the training on older adult learners after delivery of the training (e.g., changes in confidence using IT; changes in competence using IT, changes in understanding the importance of IT in everyday life)
	• Skills Confidence – Decreased
	• Skills Confidence – Increased
	• Skills Confidence – No Change

LEVEL I	LEVELS 2 and 3
	• Skills Competence – Decreased
	• Skills Competence – Increased
	• Skills Competence – No Change
	• Information Technology Importance – Decreased
	• Information Technology Importance – Increased
	• Information Technology Importance – No Change
	BEHAVIORAL LEARNING OUTCOMES –The behavioral impacts of the training on older adult learners after delivery of the training (e.g., ability to apply skills learned; intentions to pursue future digital skills training)
	- Ability to Apply Skills Learned - Decreased
	- Ability to Apply Skills Learned – Increased
	- Ability to Apply Skills Learned – No Change
	- Intention to Pursue Further Training - Decreased
	- Intention to Pursue Further Training – Increased
	- Intention to Pursue Further Training – No Change
	BENEFIT LEARNING OUTCOMES – The benefit impacts of the training on older adult learners after delivery of the training (e.g. the ability to create, evaluate and find digital information; changes in overall wellbeing)
	- Information Behavior - Decreased
	- Information Behavior – Increased
	- Information Behavior – No Change
	- Well-Being – Decreased
	- Well-Being – Increased
	- Well-Being – No Change
	SATISFACTION WITH THE TRAINING – How satisfied older adult learners were with the training they received
	- Unsatisfied
	- Satisfied
	- Neutral
	OTHER OUTCOMES – Other outcomes of the training not covered above

All researchers were trained in the Dedoose platform and the finalized codebook. The team initiated the coding process with a pilot round, where a sample of excerpts was double-coded to test reliability and consistency. Discrepancies were discussed in team meetings and code definitions were refined accordingly. Once alignment was reached, researchers applied codes to individual excerpts within each document. Each excerpt could receive multiple overlapping codes if warranted. This flexibility allowed for more accurate representation of complex narratives. The resulting coded dataset contained 5,951 excerpts with a total of 15,993 code applications, indicating that many excerpts reflected intersecting themes. Dedoose's built-in features—such as tagging, colour-coding, and document tracking enabled the research team to systematically manage large volumes of qualitative data while maintaining the ability to fact-check. Figure 2 presents a sample screenshot of the coding of data that occurred using Dedoose's coding functionality.

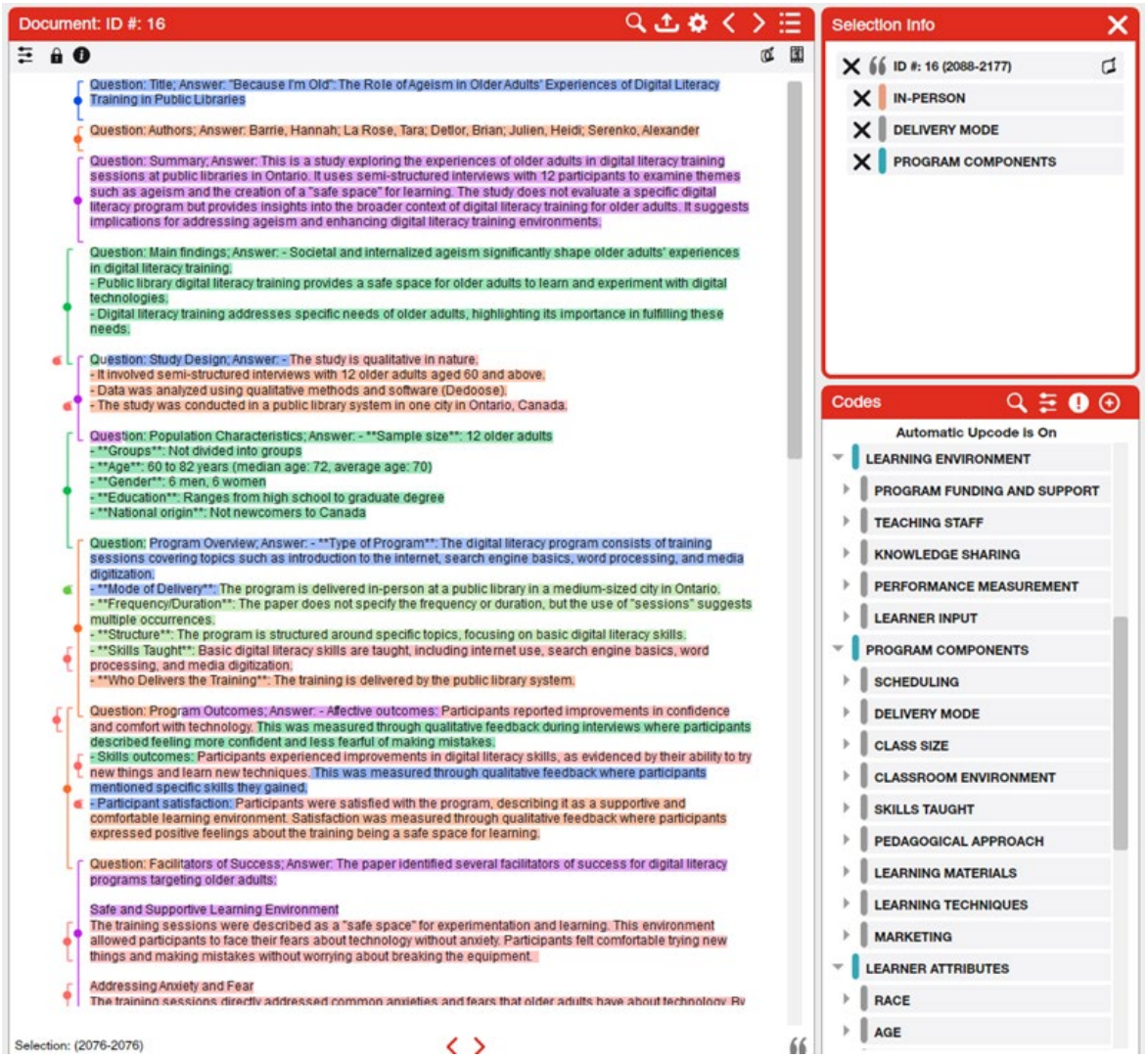

Figure 2. Sample Screenshot of Data Coding in Dedoose

2.5.2 Data Analysis

Following the coding stage, the team moved into the analytic synthesis of excerpts. Each Level 2 and 3 code and its corresponding excerpts were exported from Dedoose into Word documents. These excerpts were then analyzed to generate structured summaries which included:

- A clear definition of the code and its boundaries (e.g., what counts as a facilitator or barrier).
- A breakdown of coding frequency (i.e., number of excerpts and unique documents per code).
- Thematic insights and illustrative quotes
- ID # references to documents to ensure traceability to source data.

This analysis allowed the team to move beyond frequency counts to interpretive depth. While code frequency guided attention, it was treated as a signal of thematic saturation—not statistical significance.

Some Level 2 codes may be underreported despite their relevance, reflecting gaps in the 2014–2024 literature. Still, for many primary constructs, higher frequency often aligned with their centrality to effective digital literacy training.

This phase aligned with Arksey and O'Malley's (2005) emphasis on moving beyond description to thematic mapping and JBI's (2024) call for extracting practical insights. Each summary thus served as both a thematic narrative and a contribution to a larger, action-oriented synthesis aimed at improving the promotion and sustainability of digital literacy training for older adults.

3. Findings

The following section presents the core findings of the scoping review derived through a rigorous and iterative data analysis process. As described in the previous section, a structured codebook and Dedoose software were used to identify and code 5,951 excerpts from the 200 documents that comprised the scoping review's document dataset. These coded excerpts were then analyzed into a series of thematic summaries using the codebook's Level 2 and 3 code labels. Within each thematic summary, common facilitators and barriers were examined in relation to recurring patterns, participant experiences, and contextual factors. Subthemes were identified where relevant, and illustrative quotes were used to ground the analysis in the original source material. This approach enabled a rich, layered understanding of how digital literacy training programs are experienced, implemented, and sustained across diverse contexts.

The following sections report on the thematic summaries produced. As commonalities existed across some Level 2 and 3 codes, some thematic summaries reported these codes together in one single summary. Specifically,

- "Classroom Resources" and "Classroom Environment" were combined together into a summary called "Classroom Environment" and reported as a "Program Components" summary.

- "Scheduling," "Program Duration," and "Session Duration" were combined together into a summary called "Scheduling" and is reported below as a single "Program Components" summary.

For some Level 2 and 3 codes, there was an insufficient number of coded excerpts and/or a lack of substance in the excerpts coded to warrant analysis to produce a summary. For example, very few excerpts were coded for "Knowledge Sharing" and "Performance Measurement" yielding no summaries for those two Level 2 "Learning Environment" codes. Several documents reported the number of men and women who took part in the training under investigation, but few reported on the number of males and females. Thus a "Gender" summary was produced, but no summary was generated for "Sex". Last, as no significant analysis could be formulated from the Level 2 code "Satisfaction with the Training", the Level 1 code "Outcomes" was relabeled to "Learning Outcomes" to better reflect the psychological, behavioral and benefit learning summaries that were generated.

To support the analysis of the coded data, the summaries below provide document identifiers (IDs) which reference documents in the scoping review's dataset. These IDs help establish evidence and support statements made in the summaries. Each of the 200 documents in the scoping review has a unique document ID number (see Appendix A).

3.1 Study Methods

Of the 200 documents analyzed, over half (n=103) were studies that predominantly used qualitative methods (e.g., interviews, observations). About one-fifth (n=44) used quantitative methods (e.g., surveys, experiments). About one-quarter (n=53) used mixed methods where some combination of qualitative and quantitative approaches were utilized. Figure 3 below illustrates this breakdown.

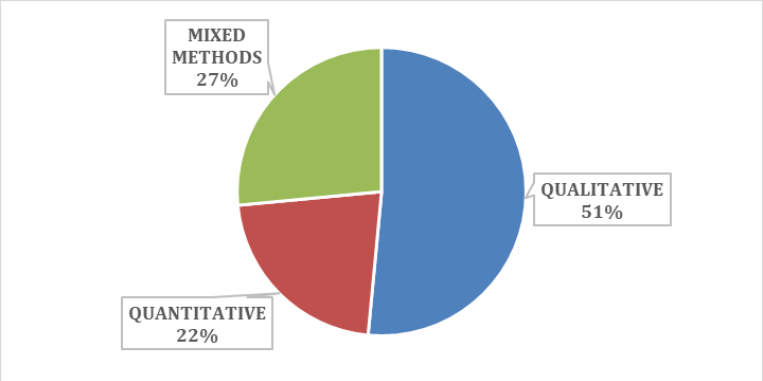

Figure 3: Breakdown of Study Methods (N=200)

3.2 Geographical Location

Figure 4 shows the breakdown of the document dataset by geographical location. As five documents covered more than one geographical location, the total number of locations reported is 205 (rather than 200). The majority of documents pertained to Europe (n=88), followed by North America (n=68), Asia (n=30), Australia (n=10), and South America (n=9).

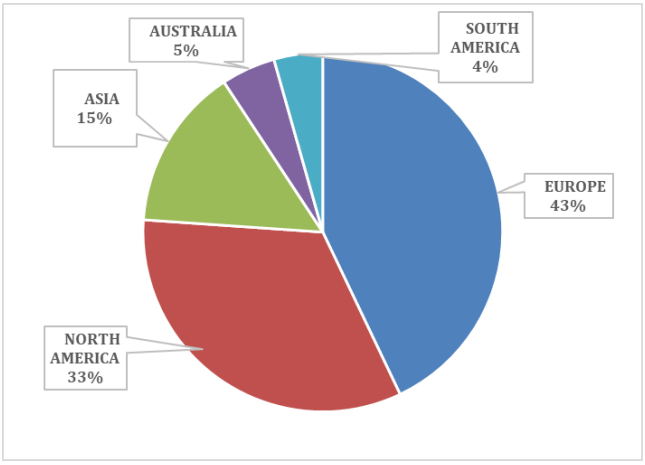

Figure 4: Breakdown by Geographical Location (N=205)

3.3 Learning Environment

3.3.1 Program Funding

Program funding refers to the funds used to support the training. As a facilitator, program funding is an enabler or success factor in the delivery of training—enabling provision of resources, staffing, infrastructure, and delivery. As a barrier, program funding is a challenge or obstacle to the delivery of training—when it is limited, unstable, or not dedicated to digital literacy.

Out of the 200 documents reviewed, 70 (35%) addressed program funding:

- 69 of these 70 documents (98.6%) described program funding as a facilitator.
- 6 of these 70 documents (8.6%) described program funding as a barrier.
- 5 of these documents (7.1%) included both.

Many facilitators and barriers were direct opposites—for example, when funding enabled the purchase of tablets (ID: 121), lack of it prevented outreach or staff hiring (ID: 163).

Public funding and government support were frequently cited as the foundation for large-scale or long-term digital literacy programs. Initiatives that received funding from municipal, provincial, or federal sources were better positioned to deliver sustainable programming (IDs: 9, 21, 46, 91, 120, 124, 144, 201). During the COVID-19 pandemic, emergency government funds enabled several programs to expand outreach, distribute devices, and implement digital training (IDs: 91, 98, 103). However, there were concerns around sustainability where funding was limited to pilot projects or one-time grants (IDs: 13, 136, 198).

Provision of devices, internet, and incentives was another major area where funding served as an enabler. Programs that allocated resources toward subsidizing tablets, internet connectivity, or small participation incentives were more successful in reaching lower-income older adults and boosting enrollment (IDs: 30, 45, 91, 98, 103, 121, 125, 126, 145, 189). However, inconsistent or short-term funding made it difficult to maintain these supports over time (IDs: 13, 163), leaving some participants without ongoing access to essential tools.

Some programs effectively leveraged institutional and community infrastructure—such as libraries, universities, and senior centers—to reduce delivery costs and extend their reach (IDs: 54, 87, 95, 106, 122, 182, 199). In several cases, internal collaborations within universities helped pool resources and reduce overhead (IDs: 59, 112, 182). This strategic use of shared spaces and services improved program scalability. However, a lack of

infrastructure or limited funding for digital upgrades posed challenges, particularly in under-resourced venues (IDs: 112, 198).

Cross-sector partnerships and collaboration also played a key role in expanding program reach and adaptability. Collaborations between government agencies, non-profits, telecom providers, and community organizations led to more responsive and well-resourced delivery models (IDs: 13, 15, 23, 59, 83, 88, 103, 121, 140). These partnerships were especially effective in targeting underserved populations (IDs: 77, 144, 164). However, programs without stable or ongoing partnerships reported limitations in sustaining outreach and delivery (IDs: 15, 198).

To manage costs, many programs relied heavily on volunteer labor, including student facilitators, retirees, and community members (IDs: 59, 83, 112, 126, 145). When well-supported, these volunteers contributed to program flexibility and scale. However, overreliance on unpaid labor raised concerns around burnout, inconsistency, and the inability to recruit or retain skilled instructors (IDs: 112, 136, 163).

Finally, the issue of sustainability, scale, and long-term planning emerged as a consistent theme. Programs with stable, multi-year, or renewable funding were more likely to expand services, particularly in rural areas, and maintain continuity over time (IDs: 83, 121, 145, 201). Programs embedded within broader community mandates or organizational missions demonstrated greater resilience and long-term viability (IDs: 126, 140, 182). By contrast, those reliant on temporary grants or emergency COVID-19 funding often struggled to continue operations beyond the initial funding window (IDs: 13, 15, 136, 198).

3.3.2 Teaching Staff

Teaching staff refers to the individuals who deliver digital literacy training to older adults, including volunteers, students, family members, community professionals, and educators. As a facilitator, teaching staff support successful training when they demonstrate empathy, patience, age-appropriate instruction, and familiarity with older learners' needs. As a barrier, teaching staff hinder training when they lack pedagogical preparation, make incorrect assumptions about learners' abilities, or provide instruction that is rushed, impersonal, or poorly matched to the learner.

Out of the 200 documents reviewed, 74 (37%) included excerpts on teaching staff:

- 61 of these 74 documents (82%) referenced facilitators.
- 22 of these 74 documents (30%) referenced barriers.
- 9 of these 74 documents (12%) included both.

A key facilitator identified across the literature was the presence of instructors who demonstrated patience, empathy, and respect. These qualities helped create a safe and

welcoming learning environment for older adults, reducing anxiety and encouraging active participation (IDs: 12, 16, 25, 30, 43, 48, 57, 64, 91, 93, 124, 128, 145, 153, 154, 161, 185). On the other hand, rushed or dismissive instruction—often from family members or younger volunteers—discouraged learning and diminished motivation (IDs: 19, 115, 143, 173, 185, 188).

The importance of instructor experience with older adults was frequently emphasized. Educators with prior experience working with seniors were more effective at adapting their instruction to accommodate age-related cognitive and physical challenges. These instructors tended to use repetition, adjust pacing, and employ more accessible communication strategies (IDs: 29, 44, 55, 87, 95, 102, 106, 111, 134, 137, 152, 174, 182, 199). In contrast, those without experience often left learners feeling overwhelmed or unsupported (IDs: 146, 156, 175, 176, 198).

Programs that allowed for personalized and flexible delivery—such as smaller class sizes, one-on-one support, and self-paced formats—were especially successful in tailoring instruction to individual learner needs. These accommodations were particularly valuable for participants facing memory issues, confidence challenges, or physical limitations (IDs: 43, 55, 63, 91, 102, 115, 128, 145, 160, 174). Conversely, large or impersonal instructional settings were less effective; participants in these environments often struggled to absorb information, especially when the pace was too fast or opportunities to ask questions were limited (IDs: 124, 176).

The use of peer and volunteer instructors also played an important role. Volunteers such as university students, older mentors, and community members were often praised for their approachability and relatability (IDs: 17, 21, 31, 59, 83, 103, 155, 157, 192, 201). However, challenges emerged when these volunteers lacked teaching training or offered overly directive or rushed help, which could reduce learner confidence and engagement (IDs: 115, 143, 156, 173, 175, 185, 198).

Building trust and familiarity between learners and instructors also contributed to program success. Older adults were more likely to engage when facilitators were already known to them—such as local librarians, senior center staff, or long-term community volunteers. Pre-existing relationships helped reduce embarrassment and encouraged help-seeking behaviors (IDs: 13, 31, 88, 106, 137, 145, 188). Where this trust was absent—due to generational gaps or unfamiliarity—communication often suffered, and assumptions about prior digital knowledge created barriers (IDs: 146, 166, 175, 178, 179).

Finally, instructor training and program support were critical. Programs that invested in structured onboarding and pedagogical preparation saw more consistent learner success. Effective training covered areas like scaffolding lessons, addressing learner frustration, managing different ability levels, and using clear, accessible communication (IDs: 87, 88,

102, 106, 115, 128, 145, 198). In contrast, programs that recruited volunteers or retail staff with strong digital skills but little teaching experience often faced challenges in learner engagement and instructional quality (IDs: 100, 156, 158, 163, 175, 176).

3.3.3 Learner Input

Learner input refers to the general approach of including learner input into the design of digital skills training in terms of the content taught and the teaching approach utilized. Learner input facilitators are factors or aspects of digital literacy training where the input from older adults serves as an enabler or success factor in the delivery of the training. Conversely, learner input barriers are factors or aspects of digital literacy training the input from older adults poses challenges or obstacles to the delivery of training.

Of the 200 documents collected for this scoping review, 33% (i.e., 65 out of 200 documents) contained excerpts referencing learner input. Of these 65 documents,

- 89% (i.e., 58 out of 65 documents) contained facilitator excerpts.
- 15% (i.e., 10 out of 65 documents) contained barrier excerpts.

In terms of learner input, the successfulness of digital literacy training is greater when older adults can provide input on the content and delivery of training in ways that better meet their learning needs and preferences (IDs: 39, 199, 196, 182, 13, 177, 102). This includes providing input on content that is of high relevance, practicality, and usefulness in learners' daily lives (IDs: 117, 42, 190, 14) and content that is culturally appropriate and inclusive (IDs: 103, 146). Co-creation of training between instructors and older adult learners results in training that is more relatable and meaningful to older adults (IDs: 135, 114) and facilitates mutual learning and respect between teachers and students (ID: 184). Instructors who are familiar with learners' needs and preferences are more able to adapt their teaching methods and content to cater to these needs and preferences (ID: 197).

Barriers associated with learner input include: not having adequate current online resources available to incorporate into a training program that meets the needs and preferences of older adults (ID: 179); insufficient time and resources, as well as a lack of desire by instructors, to collect learner input in the first place (IDs: 142, 116); insufficient methods or attempts to collect learner input resulting in a poor understanding of older adult learning needs and preferences (ID: 138); and the extreme diversity in older adults' learning needs and preferences that make it challenging to satisfy everyone's needs and preferences, especially when trying to design a "one-size-fits-all" digital literacy program (ID: 183).

3.4 Program Components

3.4.1 Scheduling

Scheduling refers to the timing of digital literacy instruction, including the overall duration of the program and the length and frequency of individual sessions. As a facilitator, scheduling reflects how timing enables or supports training delivery—such as having enough time to practice, or sessions that fit learners' routines. As a barrier, it reflects when timing poses challenges, such as too-short sessions or inconvenient scheduling.

Of the 200 documents reviewed, 67 (34%) included scheduling excerpts:

- 17 of these 67 documents (25%) included facilitators.
- 18 of these 67 documents (27%) included barriers.

Facilitators related to scheduling reflected a range of strategies that supported learning outcomes. One of the most cited was the importance of providing sufficient time during instruction for learning and practice, which is especially crucial for older adults who may need additional time to adapt to digital technologies (IDs: 47, 164, 107). Several studies emphasized that training sessions should strike a balance between being long enough to maintain engagement while not becoming overly time-consuming, with thirty minutes to one hour frequently cited as an optimal duration (IDs: 123, 79, 107). Opportunities to engage outside the scheduled time—such as having spare time before or after a session—were also noted to support learning retention (IDs: 47, 102).

Another facilitator was designing schedules that allowed for a balance between in-class learning and independent exploration, enabling learners to absorb material at their own pace (ID: 36). Flexible and convenient training times were seen as critical, allowing older adults to participate according to their personal routines and preferences (IDs:182, 102, 156, 58, 107, 188). In some instances, scheduling was adapted to suit instructor preferences as well, ensuring that trainers could deliver sessions when they were most prepared and available (ID: 188). A consistent and regular learning schedule contributed to routine and habit formation (ID: 180), while programs that eliminated fixed schedules entirely in favor of ongoing, drop-in access provided additional autonomy for learners to engage at their own pace (ID: 159).

Extended programs that ran over multiple weeks were particularly effective, not only because they supported long-term technology adoption (ID: 141), but also because they allowed time for repetition, reinforcement, and the development of social bonds among participants (ID: 125, 126, 58).

Conversely, barriers reflected the absence of these facilitators. Many excerpts cited insufficient time allocated for learning and practice within individual sessions, leading to frustration or limited mastery of skills (IDs: 199, 165, 187, 77, 151, 123, 161, 188). Short overall program durations were also problematic, with several programs concluding before learners had fully grasped foundational concepts (IDs: 153, 165, 76, 158, 151, 43, 188). A lack of available digital literacy training programs in certain communities further compounded scheduling challenges, particularly for those with few alternatives (ID: 196). Finally, inconvenient session times and the temporary or inconsistent nature of training availability created additional barriers to participation for many older adults (IDs: 13, 58, 192, 109).

3.4.2 Delivery Mode

Delivery mode refers to how the training is delivered or provided to older adult learners. Examples of different delivery modes include in-person, online, and blended delivery of instruction. In-person delivery pertains to face-to-face, in-person, synchronous training. Online delivery refers to the delivery of training electronically over the Internet, either synchronously or asynchronously. Blended delivery is a mixture of both in-person and online delivery of instruction.

Delivery mode facilitators are factors or aspects of digital literacy training where the delivery mode serves as an enabler or success factor in the delivery of the training. Conversely, delivery mode barriers are factors or aspects of digital literacy training where the delivery mode pose challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 53% (i.e., 105 out of 200 documents) contained excerpts referencing delivery mode. Specifically, the following breakdown of delivery mode excerpts across the 200 documents was identified:

- In-person delivery – 68% (i.e., 71 out of 105 documents).
- Online delivery – 22% (i.e., 23 out of 105 documents).
- Blended delivery – 20% (i.e., 21 out of 105 documents).

Of the 105 documents containing delivery mode excerpts,

- 21% (i.e., 22 out of 105 documents) contained facilitator excerpts.
- 9% (i.e., 9 out of 105 documents) contained barrier excerpts.

In terms of in-person delivery, several facilitators promote the delivery of digital literacy training to older adults. These include making it easier for instructors to motivate students (ID: 39) and provide personalized guidance (ID: 47). In general, older adults prefer traditional in-person classroom training (IDs: 157, 83, 46, 183). The only barrier identified

in the scoping review for in-person training was when instructors wore face masks during training sessions. These masks muffled instructors' voices making it difficult for older adults, especially those with hearing impairments, to understand what was being said and to follow along with the training (ID: 83).

Regarding online delivery, digital learning platforms provide access to learning materials to older adults living in remote locations (ID: 71) and is a viable option for older adults with mobility issues (ID: 114). The accessibility and convenience of online learning facilitates participation by older adults (IDs: 56, 189). In terms of barriers, many older adults struggle with autonomous online learning at home (ID: 48). Delivery of training over the phone is challenging for older adults as there is limited visual guidance making it difficult for participants to follow instructions (ID: 145). Current online resources for digital literacy training are often not designed with the capabilities of older adults in mind (ID: 179). Sometimes older adult learners in online courses feel overwhelmed by the amount of information presented (ID: 42) and feel fatigued (ID: 83). Communication barriers can arise in online learning (ID: 83). Maintaining participation rates in online learning can be a challenge as the online learning environment can make it difficult for older adult learners to interact with the material and with others in the course (ID: 83). Troubles with adapting to new technology, lack of immediate peer support, and issues with Internet connectivity and access all serve as barriers to the delivery of online digital skills training to older adults (ID: 189).

Blended delivery has been shown to yield greater learning outcomes than traditional face-to-face instruction alone as blended learning extends the benefits of in-person training through: i) provision of continuous access to learning materials (e.g., older adult learners can review topics and concepts out of class time as much as they want which reinforces learning); and ii) flexibility (e.g., older adult learners who miss classes due to illness or appointments can catch up on missed material) (IDs: 112, 114, 111, 113, 29). Blended learning works more effectively when there is adequate support available to assist older adult learners with online learning technologies (ID: 111). Combining digital and non-digital approaches to learning can help mitigate barriers to technology use in older adults (ID: 183).

3.4.3 Class Size

Class size refers to the number of learners in a digital literacy training program or session. Class size facilitators are factors or aspects of digital literacy training where the class size serves as an enabler or success factor in the delivery of the training. Conversely, class size barriers are factors or aspects of digital literacy training where the class size poses challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 7% (i.e., 14 out of 200 documents) contained excerpts referencing class size.

Of the 14 documents containing classroom environment excerpts:

- 100% (i.e., 14 out of 14 documents) contained facilitator excerpts.
- 0% (i.e., 0 out of 14 documents) contained barrier excerpts.

Only one class size facilitator was identified and that was the preference for small class sizes (i.e., small group learning) (IDs: 81, 182, 180, 95, 198, 54, 169, 49, 77, 156, 137, 53, 46, 85). Having a small class size allows for a low instructor-to-learner ratio, thus ensuring more personalized attention during training.

3.4.4 Classroom Environment

Classroom environment refers to physical aspects of the classroom setting in which the training is provided (e.g., noise, seating configuration, temperature) as well as the computing infrastructure used to deliver the training (e.g., computers, tablets, data projectors, microphones, learning management systems). Classroom environment facilitators are factors or aspects of digital literacy training where the classroom environment serves as an enabler or success factor in the delivery of the training. Conversely, classroom environment barriers are factors or aspects of digital literacy training where the classroom environment poses challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 27% (i.e., 53 out of 200 documents) contained excerpts referencing classroom environment.

Of the 53 documents containing classroom environment excerpts:

- 85% (i.e., 45 out of 53 documents) contained facilitator excerpts.
- 30% (i.e., 16 out of documents) contained barrier excerpts.

Classroom environment facilitators were varied. Programs benefited from having sufficient classroom resources already in place, minimizing the need for additional setup (ID: 39). Online training platforms that supported peer learning and provided access to instructors and course materials were also noted as effective (ID: 199). Partnering with community organizations, such as libraries, proved valuable by bringing resources like instructors, materials, tablets, and internet access into the learning environment (IDs: 110, 81, 165, 164, 198, 102, 114, 90, 201, 163).

The use of large computer monitors helped with demonstrations (ID: 44), while senior-friendly interfaces—including large fonts, vivid colors, clear icons, and adaptable

hardware—were reported to increase accessibility for those with physical limitations (IDs: 159, 156, 158, 43). Locating classrooms near where older adults lived, such as community centers, nursing homes, or learners' homes, improved accessibility and provided a familiar setting for learning (IDs: 132, 106, 31, 120, 173, 94). Other environmental supports included good lighting and air conditioning (ID: 156), strong financial backing to equip classrooms effectively (ID: 174), and the provision of personal tablets or Wi-Fi access, enabling learning beyond the classroom (IDs: 30, 189, 124). A combination of large classroom spaces for instructor demonstrations and small breakout seating for collaborative sessions also supported engagement (IDs: 37). Additionally, having up-to-date hardware and software enhanced the training experience (ID: 178).

On the other hand, several environmental barriers were identified. Limited financial resources restricted program development and the availability of adequate classroom infrastructure (IDs: 13, 163), while poor internet quality undermined the effectiveness of digital instruction (IDs: 165, 95, 163, 156, 192). Fixed seating arrangements led to discomfort, especially when chairs could not accommodate older adults' posture needs (ID: 95). Room temperature fluctuations, caused by weather or equipment, also detracted from comfort (ID: 95). In online settings, technical glitches like screen freezes, insufficient equipment (e.g., limited computers, courseware, or digital textbooks), and complex multi-platform use frustrated both learners and instructors (IDs: 54, 174, 9, 188, 155).

Other challenges included poor speech-to-text functionality, which negatively impacted learners who relied on voice input (ID: 159), and space constraints, which limited the number of participants per session (ID: 15). Additionally, some digital interfaces used in training were described as too small or lacking visible cues, making them difficult for older adults to navigate (IDs: 160, 173).

3.4.5 Skills Taught

Skills taught refer to the level and type of digital literacy skills taught in a digital literacy training program. Examples of skills taught include basic, advanced, web navigation, social media, security/privacy, and device specific training. Basic pertains to the teaching of basic digital literacy skills in the training. Advanced refers to the teaching of advanced digital literacy skills in the training. Web navigation pertains to the instruction of how to use Web search engines. Social media refers to the instruction of how to use social media applications such as X, Facebook, TikTok and Instagram. Security/privacy pertains to the instruction of how to safely use a digital device. Device specific training refers to instruction on how to use a specific digital device such as a tablet or smart phone. Other skills taught refers to any other type of skills taught not mentioned above.

Skills taught facilitators are factors or aspects of digital literacy training where the skills taught serve as an enabler or success factor in the delivery of the training. Conversely,

skills taught barriers are factors or aspects of digital literacy training where the skills taught pose challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 60% (i.e., 119 out of 200 documents) contained excerpts referencing skills taught. Specifically, the following breakdown of skills taught excerpts across the 200 documents was identified:

- Basic – 46% (i.e., 91 out of 200 documents).
- Advanced – 10% (i.e., 20 out of 200 documents).
- Web navigation – 10% (i.e., 20 out of 200 documents).
- Social media – 10% (i.e., 19 out of 200 documents).
- Security/privacy – 14% (i.e., 27 out of 200 documents).
- Device specific training – 12% (i.e., 24 out of 200 documents).
- Other skills taught – 39% (i.e., 78 out of 200 documents) pertaining to general factors affecting the teaching of digital skills to older adults.

Of the 119 documents containing skills taught excerpts:

- 38% (i.e., 45 out of 119 documents) contained facilitator excerpts.
- 19% (i.e., 23 out of 119 documents) contained barrier excerpts.

In terms of basic skills taught, older adult learners preferred curriculums that covered basic essential digital skills that support participant independence and deal with everyday tasks (IDs: 182, 157, 123). Examples of basic digital literacy skills taught were internet use, email, online communications, privacy and security (ID: 188). Barriers to the teaching of basic skills included some older adults perceiving the material taught as being too vague and lacking depth (ID: 199), teaching skills that many older adults already possessed (ID: 195), and not providing sufficient coverage of more advanced digital skills necessary for full digital participation in society (ID: 140). These barriers can cause older adults to feel bored and disengaged, as well as discourage older adults from participating in future training programs (IDs: 195, 116).

With respect to advanced skills taught, older adults preferred training curriculums that start out with the teaching of basic skills and then progress to more advanced skills as they provide a means for older adults to gradually acquire more sophisticated digital skills (IDs: 103, 181, 113, 136). Recognizing that older adults have different levels of digital literacy expertise, there is utility and benefit in offering training programs that have separate classes or courses for beginners and advanced learners, creating a more personalized approach to learning and reducing frustration among older adult learners with the content taught (IDs: 105, 136, 180). Barriers to teaching advanced skills include: i) a lack of courses that teach advanced skills (ID: 157), ii) making those who lack basic digital skills feel overwhelmed and frustrated (IDs: 147, 142), and iii) some older adults underestimating the complexity

of certain advanced topics before taking the training leading to learner frustration and discouragement when the material presented proves more challenging than expected (ID: 127).

The teaching of web navigation skills was considered useful as it provides older adults with a practical skill that is relevant to everyday situations (ID: 136). Some older adults find it difficult to understand the structure of the Internet, what it is, how to navigate it, and differentiating between search engines and browsers (ID: 181).

In terms of teaching social media skills, older adult learners were very interested in learning and using applications for social connection, such as staying in touch with family, friends, and community groups (ID: 53) and found the teaching of social media skills to be practical and relevant to everyday situations (ID: 136).

Teaching skills pertaining to digital security and privacy were found to be very important to older adults. Older adults are worried about protecting personal and financial information (ID: 102) and need to understand the importance of regular software updates to maintain the security and privacy of information (ID: 181). Interestingly, the teaching of privacy and security protection can be an effective hook for introducing information technologies to older adults and alleviating fears about going online (ID: 201, 138), as well as fostering confidence using digital technologies (IDs: 152, 14, 136). Barriers to digital literacy among older adults are fear of digital fraud, identity theft, and unsafe online banking and card payments (ID: 144). Teaching older adults about how to be safe online can overcome these barriers.

With respect to teaching device specific training, many older adults appreciate receiving instruction on digital devices that they use in everyday life. Tablets are generally easy for older adults to learn and use (IDs: 176). Hands-on experimentation with personal digital devices makes it easier for older adults to ask practical questions and resolve doubts about technology (ID: 151). Structuring training around specific devices and software (e.g., Apple iPads vs. Samsung Android tablets) facilitates learning as it simplifies and streamlines the people who enroll in the training, focuses the content taught, and reduces learner confusion (ID: 192). Device specific training is also practical and relevant to everyday situations that older adult learners experience (ID:136).

A few barriers exist in providing device specific training. This includes: i) physical difficulties interacting with digital devices (e.g., locating and using buttons, connecting cables and adapters; ii) using different input devices (such as keyboards, mice, touchscreens); iii) typing on keyboards for those without previous computer experience; and iv) using hand and finger gestures (such as tapping, swiping, and pinching) (IDs: 181, 192). Inconsistent or multiple ways of doing things on a digital device, hidden features that are not immediately apparent (such as hidden menus), and difficulties adjusting device

settings (such as display brightness, font size, and screen orientation) can be confusing and challenging to older adult learners (IDs: 192, 91). Device variability (such as different phone models, different button locations, different application interfaces, and different storage availabilities) pose significant obstacles as well (ID: 12). In addition, there is also a general lack of device specific training available (such as training on specific devices such as tablets, laptops and smartphones) (ID: 163).

Regarding other skills taught, a variety of factors affecting the teaching of digital skills taught to older adults were identified in the scoping review and led to the following insights:

- The teaching of digital skills used frequently in everyday life are more likely to be retained or improved (ID: 122).
- Teaching practical skills which are directly applicable to seniors' daily needs, make the training both relevant and engaging for older adult learners (IDs: 47, 45, 157, 201, 42, 195, 35, 83, 151, 192, 200, 189, 41, 25, 160, 14, 194, 136).
- Focusing on teaching how to access and find health information is relevant and immediately useful to older adult learners and increases their interest and engagement with the training (ID: 95).
- Teaching skills that are of high interest to older adult learners helps foster a personalized approach to learning that ensures the content taught is relevant and motivating to the learner (IDs: 179, 195, 190).
- Focusing on teaching digital skills which are the weakest among older adult learners, or where the older adult learners feel least confident, helps improve these learners' overall digital literacy skill levels (IDs: 159, 195).
- Offering digital skills training specifically just for older adults is beneficial (IDs: 132).
- Programs should prioritize skills that support active ageing and daily living rather than traditional computer skills (IDs: 195, 194).
- Training programs for older adults should focus on teaching information literacy skills as programs often focus more on operational skills rather than critical information evaluation skills and how to detect online misinformation (IDs: 195, 123).
- Training courses for older adults should focus on social connection with others. This can go beyond teaching social media skills and include activities such as online shopping for grandchildren, finding tutorials for crafts, and joining virtual religious services (ID: 53).
- Useful digital skills training appreciated by seniors includes how to celebrate commemorative days, how to share life stories and traditions, and how to exchange recipes and crafts (ID: 130).

General barriers to teaching digital skills exist:

- When trying to teach relevant content, not all content is perceived as equally relevant by all older adults making it challenging to figure out what relevant content to teach (ID: 199).
- Libraries who teach digital literacy training to community members face challenges in meeting the diverse and sometimes conflicting needs of various groups, including older adults (ID: 13).
- More complex digital skills (like how to connect to a Wi-Fi network) often require direct one-on-one assistance that are not amenable to group class instruction (ID: 92).
- There can sometimes be a mismatch between i) the digital skills taught and ii) the digital competency of older adult learners and/or their interest in the material taught, thus making the digital skills challenging to teach (IDs: 163, 195).
- Information provided to older adult learners during training sessions can be overwhelming causing learners to get lost or sidetracked (IDs: 42, 161).
- Seniors sometimes underestimate the complexity of certain topics before learning about them. This underestimation can lead to frustration or discouragement when the material proves more challenging than expected (ID: 127).

3.4.6 Pedagogical Approach

Pedagogical approach refers to the general approach or pedagogy used to deliver digital literacy training to older adults. Examples of pedagogical approaches include one-on-one tutoring, classroom training, intergenerational learning, peer-to-peer learning, games-based learning, and indirect learning. One-on-one tutoring pertains to individual instruction where one instructor or tutor teaches a single learner. Classroom training refers to the traditional approach of teaching where a single teacher provides instruction to a group of learners in a classroom setting (whether this be in-person or online). Intergenerational learning pertains to having adult children, grandchildren, or young adults teach older adults how to use information technology. Peer-to-peer learning refers to having older adults teach digital skills to other older adults. Games-based learning pertains to learning digital skills through game playing. Indirect learning refers to learning digital skills indirectly by doing online activities (e.g., creating digital stories, researching family trees, conducting online transactions). Other pedagogical approaches refer to any other type of general teaching approach not mentioned above.

Pedagogical approach facilitators are factors or aspects of digital literacy training where the approach serves as an enabler or success factor in the delivery of the training. Conversely, pedagogical approach barriers are factors or aspects of digital literacy training where the approach poses challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 94% (i.e., 187 out of 200 documents) contained excerpts referencing pedagogical approaches. Specifically, the following breakdown of pedagogical approach excerpts across the 200 documents was identified:

- One-on-one tutoring – 24% (i.e., 47 out of 200 documents).
- Classroom training – 16% (i.e., 31 out of 200 documents).
- Intergenerational learning – 29% (i.e., 57 out of 200 documents).
- Peer-to-peer learning – 22% (i.e., 43 out of 200 documents).
- Games-based learning – 8% (i.e., 16 out of 200 documents).
- Indirect learning – 2% (i.e., 4 out of 200 documents).
- Other pedagogical approaches – 76% (i.e., 151 out of 200 documents) referenced several key items:
    - teaching relevant, practical skills that older adults can use in daily life.
    - delivering structured, graduated instruction.
    - raising awareness about the benefits of being digitally literate.
    - accommodating different learning paces and styles.
    - addressing learner needs.
    - fostering a welcoming learning environment.
    - practicing good pedagogy.

Of the 187 documents containing pedagogical approach excerpts,

- 91% (i.e., 171 out of 187 documents) contained facilitator excerpts.
- 25% (i.e., 47 out of 187 documents) contained barrier excerpts.

In terms of one-on-one tutoring, older adults emphasized the value of individualized, one-on-one learning experiences as being a facilitator of teaching success. The approach was described as beneficial and "easy," allowing for personalized tailored instruction that meets specific needs, preferences and interests (IDs: 153, 125, 50), ensures cultural sensitivity and relevance (ID: 103), and allows for flexibility (ID: 73) and individualized pacing (ID: 70). One-on-one tutoring helps reduce anxiety, fear, and self-consciousness, especially for novice IT users who may be apprehensive or fearful of looking ridiculous when using computer tools during group learning sessions (IDs: 156, 30). Barriers to one-on-one tutoring include the need to rely on a significant number of volunteer tutors to deliver personalized instruction (ID: 103), the tendency of volunteer tutors to be prescriptive in their teaching rather than collaborative (ID: 166), and time constraints that impose limits on the availability of tutors and access to classroom resources to schedule and run one-on-one training sessions to a high number of learners (ID: 188).

Regarding classroom training, the benefits include the provision of training in settings that facilitate interaction and learning among participants (ID: 28), as well as to structured learning environments that provide access to learning resources and teaching experts (ID: 80). A lack of formal class structure or curriculum is a barrier, as it leads to dissatisfaction among participants, particularly women, who prefer more structured learning (ID: 198), and poses challenges to accommodating different learning needs and paces that could hinder effective learning for some participants (ID: 24).

Intergenerational learning elicited many benefits to older adult digital literacy instruction. This includes greater likelihood to co-create learning content between grandchildren and grandparents ensuring relevance and engagement (ID: 39), and a supportive and pleasurable learning environment for seniors (IDs: 87, 153, 6). While older adults can benefit from the digital expertise of younger generations, younger family members can benefit from older adults sharing their life experiences and wisdom (IDs: 135, 166). This mutual exchange fosters understanding, respect and tolerance between generations (IDs: 135, 184) and intergenerational bonding (ID: 167). Intergenerational learning can facilitate knowledge transfer and increase the motivation of older adults to learn about technology (IDs: 86, 5, 106), as well as enhance older adults' digital self-efficacy and willingness to use technology (ID: 108). Intergenerational learning can also address the social isolation experienced by many seniors (ID: 25) and can encourage strong social connections between student trainers and older adult trainees (ID: 121).

In terms of barriers, older adults sometimes cannot keep up with the younger generation in the utilization of digital gadgets which can hamper seniors' participation in intergenerational family activities and weaken intergenerational relationships (ID: 186). Often, young family members become impatient with older adults when they fail to comprehend basic instructions or frequently forget what was taught, which discourages older adults from seeking help or continuing to learn (ID: 179). Some older adults have difficulty accepting role reversals where younger generations are instructing them, leading to resistance and a refusal to engage in learning (ID: 28). Communication barriers and linguistic disparities between the generations, for example in the use of computer jargon by younger family members, can hinder knowledge transfer and exchange to older adult learners (IDs: 108, 131). Younger tutors tend not to embrace collaborative teaching approaches (ID: 166) or know how to teach effectively (ID: 109). For example, a younger family member will simply solve technical issues with a digital device without involving the older adult in the learning process and talk or show things too fast when explaining how to carry out tasks on a digital device (ID: 115). The busy lives of young family members can restrict their availability to teach and reduce older adults' willingness to have family members provide training (ID: 115). In some cases, younger family members may lack the necessary knowledge to help older adults with their use of digital technologies (ID: 115).

The use of peer-to-peer learning was found to be beneficial in the provision of digital literacy instruction to older adult learners. The use of older adult tutors can provide empathy, motivation, and a sense of belonging for older adult learners (ID: 44). It also enhances older adult learners' digital self-efficacy and promotes older adult empowerment (ID: 51). Peer-to-peer mentoring sessions provide an informal pedagogical setting that is accessible and less intimidating than traditional classroom instruction (ID: 51), as well as encourage active participation of older adults in the learning process and collaborative goal setting between peers which increases older adult engagement and motivation (ID: 97). Peer-to-peer learning provides enjoyment to both the peer-mentor and peer-learner and offers opportunities for social interaction among older adults (IDs: 72, 93), as well as enhances the learning experience (ID: 50). Some older adults prefer learning about digital technologies from peers of the same age (ID: 27). The use of peer tutors from the same age group and life experiences with participants facilitates a sense of equality and companionship, making it easier for older adults to seek help (ID: 93). One study found that peer-to-peer learning is more effective than intergenerational learning (ID: 108). Peer-to-peer learning creates an informal teaching space among older adults based on mutual interests and a shared understanding of learning needs and challenges (ID: 104). Peer-to-peer learning can effectively be utilized along formal group classroom instruction (ID: 130), especially in later training sessions (ID: 12). The social aspect and support of peer-to-peer learning training helps increase older adults' confidence and comfort with technology (ID: 16). There is utility in providing "train-the-trainer" instruction to older adults who serve as peer-mentors so that they can be effective teachers (IDs: 185, 85).

In terms of games-based learning, integrating games into older adult training sessions makes learning enjoyable, effective, interactive, enjoyable, and less intimidating, which can enhance motivation and retention of learning among older adults (IDs: 196, 92, 154, 146). With games-based learning, the learning is "hidden," low-pressure and immersive (ID: 21). Using familiar games, such as bingo, bridge and cards, as digital learning tools can create a more engaging, more relatable, and less intimidating learning experience (IDs: 105, 40) reducing technology anxiety among older adults (ID: 20). The effectiveness of games-based learning is influenced by the enjoyment of the game being played and can significantly facilitate technology adoption among older adults (ID: 191). Barriers associated with games-based learning include the need for quick reactions and hand-eye motor coordination with some types of games (e.g., video games) that some older adults find tiresome and demanding (ID: 21) and a good understanding of the rules of the game being played which older adults with cognitive decline find challenging (ID: 22).

With respect to indirect learning, having older adults learn digital skills indirectly while carrying out other online activities, such as creating digital stories or conducting online transactions, is beneficial in that older adults are more willing to learn new digital skills when conducting these other activities (IDs: 35, 201).

Regarding other pedagogical approaches, a variety of learning approaches aid in the learning of digital skills by older adults. These include:

- Teaching relevant, practical skills that older adults can use in daily life (IDs: 117, 48, 47, 44, 164, 157, 64, 97, 179, 197, 125, 201, 147, 42, 195, 83, 156, 151, 192).

- Delivering structured, graduated instruction:
    - Providing lessons that build upon what was previously taught (i.e., using a tiered curriculum that starts with the basics and gradually progresses to more complex tasks; step-by-step training) (IDs: 52, 44, 103, 74, 102, 179, 181, 141, 132, 21, 77, 30, 190).

- Raising awareness about the benefits of being digitally literate (e.g., increased independence, reduced loneliness) which increases older adults' motivation to learn more about information technologies and become digitally literate (IDs: 69, 45, 132, 42).

- Accommodating different learning paces and styles which allows for flexibility in the delivery of digital literacy training (IDs: 48, 47, 81, 87, 153, 103, 154, 23, 64, 146, 125, 50, 163, 35, 148, 129, 83, 156, 120, 123, 37).

- Addressing learner needs:
    - Offering personalized (individualized, tailored) teaching to meet older adult learner preferences and needs (IDs: 196, 81, 71, 177, 157, 97, 179, 140, 169, 72, 159, 195, 35, 129, 128, 156, 174, 152, 10, 151, 133, 19, 126, 105).
    - Understanding and incorporating older adult learner needs into the delivery of the training (IDs: 44, 87, 112, 177, 95, 175, 73, 147, 132, 163, 70, 100, 190, 151, 123, 142, 118).

- Fostering a welcoming learning environment:
    - Creating a relaxed, pleasant, and relatable (i.e., culturally relevant, inclusive) learning environment that is positive and empowering (IDs: 154, 184, 73, 132, 83, 120, 10,151, 93, 105).
    - Incorporating a familiar context and the personal experiences of learners into learning materials and activities (IDs: 135, 147).
    - Starting with the teaching of technology already familiar to older adults (IDs: 186).
    - Training instructors how to work with older adults, on what the best practices for teaching digital skills are, and how to troubleshoot digital problems (ID: 112).

    - Building trust and rapport between instructor and students (IDs: 201, 147, 98, 10).

- Practicing good pedagogy:
    - Having clear-cut teaching goals (IDs: 102, 42).
    - Teaching general concepts and key principles of IT to develop transferable digital skills that cut across specific apps, programs, and devices (ID: 45).
    - Teaching learners in groups who share similar levels of digital competency and/or backgrounds (IDs: 48, 157, 90, 50, 132, 195, 142, 105).
    - Using analogies and metaphors to teach abstract digital concepts (IDs: 181, 147).
    - Providing informal learning opportunities (IDs: 134, 139, 94).
    - Utilizing a problem-solving approach to learning (IDs: 134, 68).
    - Using project-based learning (IDs: 153).
    - Utilizing observational learning techniques (ID: 108).
    - Using self-directed learning techniques (ID: 195).
    - Learning by doing (IDs: 148)
    - Give learners freedom to explore and experiment (IDs: 128, 133).
    - Leveraging community resources (like libraries, academic institutions) (IDs: 110, 165, 163, 70).
    - Providing immediate or frequent feedback to older adults on their learning progress, especially positive reinforcement (IDs: 52, 132, 37).
    - Going beyond the teaching of basic digital skills (ID: 140).
    - Offering continuous training or booster sessions (ID: 180).
    - Providing support to older adult learners before, during and/or after digital literacy classes (IDs: 71, 154, 76, 140, 83, 174, 78, 68).
    - Modifying the training to address older adults' physical and cognitive limitations (IDs: 141, 50).

Barriers for other pedagogical approaches were for the most part the inverse of those reported as facilitators of pedagogical success. These include:

- Self-directed learning being challenging for some older adults who have little interest in using IT at home (ID: 47).
- Receiving instruction on digital literacy topics of little interest or relevance to older adults (IDs: 153, 120, 127).
- A lack of structured, graduated instruction (IDs: 165, 198, 173).
- A lack of consideration of learner needs in the training provided (IDs: 146, 93, 111, 136).
- A lack of flexibility in accommodating individual learning styles and paces (IDs: 146, 43, 36).

- A lack of support during training and post-training (IDs: 154, 124).
- Course participants having mixed digital skill levels (IDs: 157, 195, 142, 136).
- A lack of targeted courses aimed specifically at older adults (ID: 157).
- A lack of training that takes into consideration the cognitive and physical limitations of older adults and/or the needs of older adults (IDs: 146, 141).
- Feeling pressured or ashamed in group learning settings (ID: 157).
- Instructors not adequately explaining how to troubleshoot technical problems (IDs: 198, 93).
- The use of a problem-solving approach to learning rather than a skills-building approach (ID: 198).
- A lack of trust and rapport between instructor and students (ID: 184).
- Instructors providing too much information upfront, especially to older adults with limited digital literacy skills (information overload) (ID: 147).
- Technological tools used in the delivery of digital literacy training are too difficult or advanced for some older adults (IDs: 159, 176, 190, 20).
- Difficulties integrating standardized educational resources into training that is more informal (IDs: 163, 170).
- A lack of clear learning objectives or goals (ID: 156).
- A lack of learning activities and exercises that engage older adult learners (ID: 120).
- A dependence on rote memorization of steps and lack of opportunity for older adult learners to experiment and play with technology (ID: 162).
- Instructors not having sufficient teaching skills amenable to an older audience (ID: 166).
- An overreliance on the use of notes and step-by-step instructions limits the ability of older adults to learn how to use technology on their own (ID: 161).
- Challenges with older adults expressing problems they are experiencing with information technology (ID: 161).
- A lack of practical examples given in the training on how to use information technology (ID: 127).

3.4.7 Learning Materials

Learning materials refer to the materials used in the digital literacy training sessions provided to older adults. Examples of learning materials include printed materials, slides, videos, and virtual repositories. Printed materials pertain to the use of paper handouts in the training, either before, during, or after the training is delivered. Slides refer to the use of PowerPoint slides. Videos pertain to the use of videos for instructional purposes. Virtual repositories refer to the use of a digital platform (e.g., a website) where learning materials are stored and where older adult learners can access them before, during or after the

training. Other learning materials refer to any other type of learning material not mentioned above.

Learning material facilitators are factors or aspects of digital literacy training where the learning materials serve as an enabler or success factor in the delivery of the training. Conversely, learning material barriers are factors or aspects of digital literacy training where the learning materials pose challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 45% (i.e., 90 out of 200 documents) contained excerpts referencing learning materials. Specifically, the following breakdown of learning material excerpts across the 200 documents was identified:

- Printed materials – 16% (i.e., 32 out of 200 documents).
- Slides – 0% (i.e., zero out of 200 documents).
- Videos – 6.5% (i.e., 13 out of 200 documents).
- Virtual repository – 4% (i.e., 8 out of 200 documents).
- Other learning materials – 35% (i.e., 70 out of 200 documents) mainly referenced the use of digital learning environments (e.g., learning management systems), and digital group communication tools.

Of the 90 documents containing learning material excerpts,

- 83% (i.e., 75 out of 90 documents) contained facilitator excerpts.
- 40% (i.e., 36 out of 90 documents) contained barrier excerpts.

Facilitators and barriers were often the opposite of one another. For example, facilitator excerpts extolled the benefits of providing older adults with printed materials, videos, virtual repositories, digital learning environments and digital group communication tools, while barrier excerpts commented on the disadvantages of not providing older adults with these resources and/or difficulties older adults have using them.

In terms of printed materials, older adult learners have a strong desire for paper instructions, such as manuals, to facilitate and reinforce learning, and most importantly to assist older adults in reviewing the material learned and practicing on their own after the training sessions are over (IDs: 145, 177, 45, 164). A lack of printed materials makes it difficult for older adults to understand what is being taught, retain information, and practice skills outside of class (ID: 198). Printed materials ensure older adults have access to necessary resources, especially to those who may not be comfortable with digital formats, and access to learning materials that they can review at their own pace ID: 32). Printed materials need to be well-written, easy-to-follow, comprehensive, and provide useful and clear instruction (IDs: 45, 19). Step-by-step written instructions are often preferred,

especially during class training (ID: 37). To accommodate the older adult learner population, printed materials need to include large images (e.g., screenshots with arrows pointing to relevant content), large fonts, avoid technical jargon (i.e., use informal and straightforward language) (IDs: 53, 19). Older adults often write notes on the printed materials provided to them (ID: 91). These hand-written notes aid learning and provide a reference for older adults on how to do things that were taught during the training sessions (ID: 91).

Overall, the provision of videos was found to enhance learning (IDs: 129, 111). This was true not only of older adults learning digital skills, but also of instructors (e.g., youth volunteers, family members) who wanted to prepare themselves to train older adults in general or on specific skills (ID: 97). To ensure videos are effective, they should be short and direct (i.e., not rambling) and simple in design (ID: 148). An advantage of using videos is that older adults can view the videos at their own pace and at their own time (ID: 113). Learners also can fast forward through sections of the video not of relevance, and utilize learning aid tools, such as closed captions and transcriptions, increasing the accessibility and effectiveness of this specific type of learning material. The videos allow learners to see and follow steps and where "exactly to press" on a digital device or within a particular software application (ID: 119). Despite these benefits, there are challenges associated with using videos. Some older adults are unfamiliar with videos (how to use them) and may not be initially comfortable with the technology (ID: 129).

Regarding virtual repositories, these were found beneficial in terms of improving accessibility to learning materials prior to and after training is provided and facilitating self-study (IDs: 48. 157, 102). Advanced virtual repositories, such as e-learning platforms, ideally accommodate the potentially limited digital skills of older adults (i.e., with simple, intuitive interfaces), encourage continued engagement, and support peer-to-peer contact and knowledge sharing (ID: 114). Digital group communication tools, such as WeChat or email, can facilitate convenient interaction between learners and between learners and instructors elevating the learning outside of an e-learning platform (ID: 39). Collectively, virtual repositories, e-learning platforms, and digital group communication tools provide mechanisms to keep absentee learners informed and engaged in the training, facilitate group learner discussions during and outside of training sessions, and allow learners to review learning content and practice what was taught (IDs: 156, 194). Given the diversity of older users' needs and capabilities, digital learning materials that can be adapted and personalized to match individual preferences, learning styles, and abilities are more likely to facilitate learning success (ID: 45). Barriers to the use of virtual repositories, e-learning platforms and digital group communication tools include continuous updating of technology and software, non-intuitive interfaces, and the inadvertent advertisements from free software that can confuse older adult learners (IDs: 52, 48, 112).

3.4.8 Learning Techniques

Learning Techniques are specific teaching mechanisms employed during the training to facilitate learning. Learning technique facilitators are factors or aspects of digital literacy training where the technique serves as an enabler or success factor in the delivery of the training. Conversely, learning technique barriers are factors or aspects of digital literacy training where the technique poses challenges or obstacles to the delivery of training.

Of the 200 documents collected for this scoping review, 33% (i.e., 163 out of 200 documents) contained excerpts referencing learning techniques. Specifically, the following breakdown of learning technique excerpts across the 200 documents was identified:

- Exercises / hands-on activities – 28% (i.e., 56 out of 200 documents).
- Homework – 3% (i.e., 6 out of 200 documents).
- Review of material / repetition of training – 11% (i.e., 21 out of 200 documents).
- Q&A sessions – 3% (i.e., 5 out of 200 documents).
- Personalized pacing – 37% (i.e., 74 out of 200 documents).
- Slow paced delivery – 13% (i.e., 25 out of 200 documents).
- Simple vocabulary / non-jargon – 15% (i.e., 30 out of 200 documents).
- Non-ageist / inclusive language – 3% (i.e., 6 out of 200 documents).
- Multilingual support – 10% (i.e., 19 out of 200 documents).
- Culturally-tailored inclusive examples – 18% (i.e., 35 out of 200 documents).
- Incentives to learn – 15% (i.e., 30 out of 200 documents).
- Food / drink – 0.5% (i.e., 1 out of 200 documents).
- Opportunities to socialize – 22% (i.e., 44 out of 200 documents).
- Other learning techniques – 40% (i.e., 79 out of 200 documents) referenced specific techniques not listed above to improve the teaching of digital skills to older adults.

Of the 163 documents containing learning technique excerpts,

- 93% (i.e., 152 out of 163 documents) contained facilitator excerpts.
- 27% (i.e., 44 out of 163 documents) contained barrier excerpts.

The ability to incorporate exercises and hands-on activities in the delivery of digital literacy training facilitates the learning and retention of digital skills. Specifically, gaining first-hand experience with digital tools helps overcome hesitations about technology complexity (ID: 110), enhances learner engagement (IDs: 196, 132), reinforces learning (IDs: 112, 28), and instills learning by doing (ID: 148). It encourages the experimentation and exploration of digital tools (ID: 179), allows older adults to interact with technology themselves without excessive interference from instructors (ID: 64), enhances motivation to learn (ID: 97), and builds learner confidence (ID: 179). Direct practice with digital tools enhances

digital literacy skills (IDs: 129, 123, 89) and makes it easier for seniors to ask practical questions and resolve real-life doubts about information technology (ID: 151). Challenges or barriers associated with the use of exercises and hands-on activities include the difficulty of designing these exercises and activities to include an appropriate amount of interactivity (ID: 163) and allocating sufficient time during a class or training session for older adult learners to carry out these exercises and activities (IDs: 165, 115).

The assigning of homework to older adult learners helps reinforce concepts and skills taught in training sessions (IDs: 37, 161) and give opportunities for older adults to apply knowledge taught in daily life contexts, thus promoting deeper learning and skill integration (ID: 36). A lack of homework between training sessions hinders digital skill retention among some older adult learners (ID: 161).

The review of material and repetition of training is very helpful in reinforcing learning and building confidence among seniors (IDs: 1, 47, 37, 111, 113). Having training sessions build on knowledge taught in previous sessions helps older adults understand and retain information (ID: 44). Repetition of training and review of previously taught materials are especially helpful to older adults with cognitive impairments (IDs: 64, 74, 73, 35). Challenges with reviewing material and repeating training include providing ample time for practice and repetition during the training (ID: 85) and ensuring that enough review and repetition is provided (ID: 165).

Holding Q&A sessions offers instructors an opportunity to check-in with older adults about their learning progress and helps instructors identify any difficulties students may be experiencing so that the training program can be adjusted accordingly (ID: 102). Q&A sessions also provide older adult learners an opportunity to gain a better understanding about what is being taught; this increases learner engagement and makes the training more relevant to those being taught (ID: 144).

There are many benefits of offering personalized pacing in a digital literacy training program to older adults. Personalized pacing allows learners to learn at their own pace building confidence and competence (IDs: 48, 179, 102, 176, 16) and provides flexibility in the training (IDs: 48, 81, 125). Many older adults prefer self-paced learning over traditional group classes due to attention and memory issues older adults may face (ID: 179). Self-paced learning also allows older adults to practice and experiment on their own without relying heavily on formal educators, which accommodates the need for this demographic to have more time to absorb knowledge and make mistakes without feeling pressured (IDs: 179, 123). A barrier to the use of personalized pacing is that some older adults have difficulties with self-regulated learning strategies and prefer more guided instruction (ID: 148).

Many older adults prefer slow paced delivery of the training they receive. Slow paced delivery allows more time for older adults to process new material and complete lessons (ID: 44, 194). Older adults prefer learning one concept at a time which is seen as one of the most important instructional practices for this demographic (IDs: 132, 119). A rapid pace of instruction can be a significant barrier to learning for older adults (IDs: 178, 93, 80), especially to those with cognitive impairments (ID: 91, 2).

The use of simple vocabulary and the use of non-jargon is a facilitator of digital literacy training success. When teaching older adults, instructors need to provide clear and accessible explanations and use simple terminology (IDs: 102, 64, 73, 148, 62, 14, 18, 2). Doing so can reduce confusion and frustration and make the content more accessible to older adults (IDs: 179, 10, 107). Overall, the use of technical language by instructors is a barrier to learning as the use of such language makes it difficult for many older adults (especially novice learners and those whose first language is not the language of instruction) to understand what is being said (IDs: 145, 45, 26, 181, 187, 139, 148, 94, 10, 192, 91, 14, 12). The use of jargon and complex vocabulary discourages information technology adoption (IDs: 28, 173), leads to misinterpretation and divergences in understanding (IDs: 161, 173), and causes the need for extra explanations by the instructor (ID: 91).

The utilization of non-ageist and inclusive language promotes digital literacy learning success as it addresses and dispels common misconceptions about technology use being important and relevant to only the young (preventing negative attitudes from spreading among older adult learners) (ID: 188). Also, it creates a welcoming learning environment for all. Both societal and internalized ageism are significant barriers to learning that affects older adults' confidence and willingness to learn about information technologies (ID: 16).

Providing multilingual support in the delivery of digital literacy training promotes learning success for those who are not totally fluent in the language of instruction. Multilingual support makes the training more accessible to a diverse audience (IDs: 199, 143, 22), more culturally inclusive (IDs: 199, 13, 104, 12) and leads to improved learning outcomes (IDs: 103). Barriers to the inclusion of multilingual support include incorrect translations and unclear translations hindering comprehension and learning (IDs: 199, 159). Overall, language barriers in the delivery of digital literacy training hinder older adults from fully engaging with digital tools and learning new digital skills (IDs: 185, 12, 131, 163, 181, 186).

The incorporation of culturally tailored inclusive examples in the delivery of digital literacy training is a facilitator of success in that it makes the training more accessible (especially to speakers of different languages) (IDs: 199, 110, 12, 29) and reachable to underrepresented or marginalized populations within the older adult community (e.g.,

indigenous groups and those with disabilities) (ID: 164). Incorporating gender and empowerment perspectives in the training boosts greater female engagement and promotes inclusivity (ID: 114). Instructors who use familiar analogies in their training materials (e.g., cars for men, household appliances for women) to make the discussion of technology more relatable to specific audiences have been shown to be successful and well received (ID: 147). Not including cultural tailored inclusive examples in the delivery of digital literacy training may cause confusion or misunderstanding of training content among some older adult learners or serve as demotivator to some members of this demographic to embrace digital tools and become digitally literate.

Providing incentives to learn promotes digital literacy training success among older adults as incentives encourage participation and motivate learners to engage and complete a training program. Incentives include: financial compensation (e.g., gift cards, honorariums) or reimbursement for expenses to attend the training (IDs: 52, 98, 24, 91, 12); providing learners with free or borrowed digital tablets/iPads (or other digital devices) and/or free data plans (IDs: 48, 145, 164, 51, 146, 90, 125, 70, 30, 53, 65, 37, 124, 121, 91, 63, 188); earning badges or certificates upon course completion (ID: 199); access to free training (IDs: 81, 34); invitation to a special event where older adult learners can showcase outputs from their training (e.g., digital stories they created) or receive a certificate of completion (IDs: 76, 77, 29); the opportunity to gain employment skills (ID: 132); draw prizes (ID: 150); and attending a joyful learning experience (such as through the use of humor in the training) (ID: 62). Barriers to the use of such incentives include having access to financial resources to provide free digital devices, free data plans, gift cards, honorariums, draw prizes etc. These financial incentives come at a cost and must be paid for.

Offering food and drink was a facilitator of digital literacy training success as it offered an opportunity to create breaks during training sessions where learners could socialize together (ID: 48). In many respects, the provision of food and drink can also be thought of as an incentive to participate and a source of motivation for learners to attend and complete their training. Offering food and drink also helps foster a welcoming learning environment and forge potential opportunities for peer-to-peer support among older adult learners.

With respect to opportunities to socialize, incorporating socialization components in teaching serves as a significant facilitator (IDs: 72, 146). Digital literacy training events provide older adult learners with opportunities to meet new people (e.g., instructors, helpers, other learners), gain new acquaintances and friends, increasing stimulus and activities in their lives (IDs: 134, 101) and the building of a social support network among older adult learners which can reduce technophobia and encourage engagement with digital technologies (IDs: 164, 86, 168). The social aspects that occur within a training program for seniors contribute to older adult learners' well-being (e.g., larger social networks, reduced loneliness) and motivation to continue learning (IDs: 134, 157, 198, 132, 99, 128,

138) and help foster amicable relationships between instructor and student which increases the likelihood of older adult learners being more receptive to learning new digital skills (ID: 103). The inclusion of social activities in training facilitates interaction and the sharing of experiences, enhancing the learning process (ID: 71). Many older adults prefer learning opportunities that are embedded in social processes (ID: 45, 76) and find the inclusion of social aspects with peers adds an enjoyable element to the learning environment (ID: 54). Barriers to incorporating socialization elements in the training are mainly attributed to the online learning space where it is difficult to facilitate socialization opportunities (IDs: 58, 126).

Regarding other learning techniques, a variety of learning techniques aid in the learning of digital skills by older adults. These complement and extend the pedagogical approach facilitators identified earlier. These other learning technique facilitators include:

- Providing older adult learners with good examples of useful apps that have very low learning thresholds (such as voice assistants) which can increase learner motivation and success (ID: 52).
- Having daily communication with a teacher to ensure ongoing learner support and encouragement (ID: 39) and having the instructor stay after class to provide additional support (ID: 152).
- Using tools such as WeChat to facilitate communication between teachers and students (ID: 39).
- Offering collaborative learning activities (ID: 196).
- Having instructors use a talk-aloud strategy when demonstrating how to use a digital device or software program or app to explain their thoughts and actions to older adult learners (ID: 161).
- Utilizing step-by-step instructions (ID: 196, 102).
- Explaining why the material taught is useful and relevant and can facilitate daily life (ID: 44, 71, 73).
- Offering introduction to online teaching tools (e.g., Zoom) prior to the beginning of formal instruction (ID: 71) and preliminary individual training to novice learners prior to group lessons (ID: 156).
- Adopting learner-centered approaches to construct and design training programs (ID: 76).
- Designing learning materials specifically targeted to older adults (ID: 74, 108).
- Using older adults' familiarity with earlier technologies (e.g. tv) to make connections to modern information technologies (ID: 74, 161).
- Using dramatization and audiovisual expression techniques to teach older adult learners about digital technologies (ID: 135).

- Combining various teaching methods into a training program (e.g. observational learning, collaborative learning, step-by-step explanations, learning by trial and error, sandbox techniques, commiseration, wayfinding, exploration) (IDs: 64, 162).
- Using observational (vicarious) learning as a pedagogical approach (ID: 143).
- Repeating instructions as necessary (ID: 169).
- Acknowledging and addressing older adults' anxiety about information technology (ID: 146) and dispelling common misconceptions about technology use by older adults (ID: 188).
- Using interactive materials and encouraging collaborative activities (ID: 50).
- Encouraging older adult learners to use their devices independently without assistance from others to boost learner confidence (ID: 137).
- Incorporating physical activity and conversation circles in the training to increase learner engagement (ID: 137).
- Allowing older adult learners to work and practice on their own digital devices (ID: 151).
- Encouraging older adult learners to articulate what digital skills they already know and explaining to older adult learners that difficulties with information technologies often lie with the technology itself and not the user (ID: 161).
- Using popular, user-friendly digital devices (such as tablets) in the training to facilitate easier learning (ID: 150).
- Offering live and interactive classes as these promote real-time engagement and more personalized learning experiences (ID: 55).

A few barriers for other learning techniques were identified that pose challenges to or limit learning success. These include:

- Too much information presented during a training session (information overload) (ID: 187).
- Break time not seen as important by students (ID: 132).
- The lack of scheduled break times (ID: 132).
- Lack of personalized feedback (ID: 42) and lack of sufficient feedback (ID: 166).
- Some older adult learners finding self-regulated learning strategies difficult (ID: 148).
- Over-helping by tutors, helpers, and instructors prevent independent learning (IDs: 94, 93).
- Excessive use of demonstration by instructors (ID: 166).
- Following step by step instructions limits learners' ability to master why they are doing certain actions (ID: 91).

3.4.9 Marketing

Marketing refers to the advertising used to promote a digital literacy training program to potential learners. Marketing facilitators are factors or aspects of digital literacy training where marketing serves as an enabler or success factor in the delivery of the training. Conversely, marketing barriers are factors or aspects of digital literacy training where marketing poses challenges or obstacles to the delivery of training.

The scoping review identified 200 documents for analysis. Of these, 8% (i.e., 16 out of 200 documents) contained excerpts referencing marketing. Of the 16 documents containing marketing excerpts:

- 63% (i.e., 10 out of 16 documents) contained facilitator excerpts.
- 50% (i.e., 8 out of 16 documents) contained barrier excerpts.

Marketing facilitators were varied. The use of a variety of marketing media in both print and digital formats encourages the promotion of a training program to a diverse group of older adults, including those who may not be digitally literate (IDs: 182, 112, 32, 33, 34, 168). This includes the use of Facebook, local newspapers, city websites, leaflets, local media etc. Additionally, word-of-mouth advertising is effective, especially in combatting potential negative perceptions of a training program (ID: 102). Having community partners help recruit participants for digital literacy training programs is a viable way to promote the training and ensure that those most in need can be reached (ID: 165). Providing potential participants with explicit and detailed training course descriptions helps older adults choose appropriate courses before enrolling (ID: 157). Marketing courses specifically designed for older adults can make the training more appealing and less intimidating (ID: 16).

In terms of marketing barriers, a lack of resources for outreach is often a challenge (ID: 87). Libraries struggle with how best to market training programs directly to older adults as sometimes direct marketing to seniors deters their participation (ID: 13). Older adults are often overwhelmed by the sheer number of course offerings listed in some marketing materials and/or the unclear course descriptions provided which can deter older adults from enrolling in courses altogether (ID: 157). The over-reliance on online advertising for courses can be a barrier to an older population, especially to seniors who rarely seek out information online and who could benefit the most from digital literacy training (ID: 157, 118). Explicitly labelling courses as being designed for seniors can deter some older adults from taking those courses (ID: 16).

3.5 Learner Attributes

3.5.1 Race

Race refers to the racial identity of older adult learners undertaking a digital literacy intervention. Race as a facilitator deals with how race acts as an enabler or success factor in digital literacy training, whereas as a barrier it suggests how race can detract from its success. Out of the 200 documents reviewed, 3 (1.5%) included excerpts coded under race:

- 2 out of the 3 documents (67%) identified race as a barrier.
- 1 out of the 3 document (33%) included race as part of a broader marginalized group discussion.

This small number of excerpts highlights that race was not explicitly addressed or highlighted across the documents reviewed. This suggests a gap in the literature that could be addressed through further academic research and policy intervention.

3.5.2 Age

Age refers to how the chronological age of learners influences their participation in digital literacy training. As a facilitator, age is an enabler or success factor in the delivery of training—such as when older adults recognize the increasing relevance of digital skills or demonstrate strong learning motivation. As a barrier, age refers to the ways in which being older can hinder participation in or outcomes of digital literacy training. This includes age-related cognitive and physical decline, ageist beliefs (both societal and internalized), and learning environments that fail to accommodate age-related needs.

Out of the 200 documents reviewed, 21 (10.5%) included excerpts coded under age:

- 3 of the 21 documents (14%) described age as a facilitator.
- 19 of the 21 documents (90%) identified age as a barrier.
- 1 of the 21 documents (5%) contained both.

Numerous studies reported that age-related cognitive shifts (e.g., memory decline, attention difficulties) and physical impairments (e.g., reduced vision, hearing, motor function) hindered the acquisition of digital skills. These changes made it harder for older adults to retain what they learned and adapt to new tools (IDs: 122, 141, 181, 190). Some excerpts noted that older learners required more time and extended repetition compared to younger peers (IDs: 154, 182) and struggled with digital tasks that required frequent updates or multitasking (IDs: 122, 118).

Age was frequently linked to barriers stemming from ageist beliefs. Societal messages portraying older adults as unable to learn or adapt to technology discouraged participation (IDs: 140, 173, 178). These stereotypes were also internalized by older adults themselves, who often doubted their capacity to learn and viewed digital skills as "for young people" (IDs: 146, 178, 188). Ageism was also reflected in technology design and delivery. Interfaces were often tailored to younger users, and classroom environments sometimes lacked inclusive practices (IDs: 120, 131, 178).

Several documents emphasized that older adults are not a homogeneous group. Variations in age (e.g., 60s vs. 80s), digital exposure, education, and lifestyle led to widely differing learning needs (IDs: 157, 182). Programs that did not tailor to this diversity risked alienating some participants while underserving others.

Program structures sometimes failed to account for age-related needs. This included fast-paced instruction, inaccessible classroom layouts, or materials not adapted for older learners (IDs: 41, 124, 173). Age segregation in learning environments also limited intergenerational exchange, which could otherwise be beneficial (ID: 131).

Though fewer in number, some excerpts highlighted age as a facilitator. Older adults—particularly those over 74—reported a stronger recognition of the relevance of digital skills and institutional support as they aged (ID: 170). Others challenged stereotypes by emphasizing that older learners were highly capable and motivated when instruction was appropriately tailored (IDs: 128, 195). Younger segments within the older population (e.g., 60–69) also showed higher self-rated digital confidence, suggesting a more nuanced relationship between age and digital readiness (ID: 195).

3.5.3 Gender

Gender refers to the identity and expression of learners within the spectrum of gender identities (e.g., man, woman, non-binary). As a facilitator, gender refers to how gender identity enables or supports the success of digital literacy training. As a barrier, gender refers to how gender identity contributes to challenges, limitations, or inequalities in training access, experience, or outcomes.

Out of the 200 documents reviewed, 8 (4%) referenced gender:

- 1 of the 8 documents (12.5%) included a facilitator excerpt.
- 7 of the 8 documents (87.5%) included barrier excerpts.
- 0 of the 8 documents (0%) included both.

Many excerpts pointed to gender gaps in digital engagement, with older men reportedly more likely to possess digital skills or own devices, while older women experienced lower

confidence and usage rates (IDs: 118, 124, 133, 137). However, these differences were not attributed to gender alone. They intersected with other factors such as income and education, particularly compounding digital exclusion among older women (IDs: 124, 133). A single facilitator excerpt (ID: 171) observed that men with higher socioeconomic status were more engaged with digital tools, although regular support could help close these gaps.

Cultural expectations and traditional gender roles also shaped participation. Women were sometimes limited in their ability to access training due to caregiving responsibilities or social norms discouraging digital engagement (ID: 146). In contrast, some older men reportedly withdrew from training if they felt embarrassed about being less skilled than women or younger participants (ID: 120). These dynamics reinforced gendered ideas about who should use technology, limiting participation across both groups.

The influence of gender was also evident in pedagogical fit and satisfaction. In one study, women expressed frustration when training lacked a structured curriculum, suggesting that organized and formal instructional design may better support female learners (ID: 198). When programs failed to account for these gender-based preferences, engagement and completion rates suffered.

Finally, instructional design and device ownership emerged as intersecting issues. The combination of teaching style and content delivery sometimes failed to align with the expectations of female learners. In ID: 124, for instance, a mismatch between instructional format and learner needs led to disengagement. These findings suggest that even subtle design decisions can have gendered impacts on training effectiveness.

3.5.4 Motivation

Motivation refers to the emotional, cognitive, social, and contextual factors that encourage or discourage older adults from enrolling in and participating in digital literacy training. As a facilitator, motivation refers to factors that encourage a learner to participate in a digital literacy intervention. These may include personal goals, desire for connection, enjoyment, or a sense of usefulness or relevance. As a barrier, motivation refers to factors that discourage a learner from participating in a digital literacy intervention. These may include fear, low confidence, anxiety, perceived irrelevance, past negative experiences, or lack of interest.

Out of the 200 documents reviewed, 114 (57%) included excerpts related to motivation:

- 75 out of the 114 documents (66%) included facilitators.
- 85 out of the 114 documents (75%) included barriers.
- 46 out of the 114 documents (40%) included both.

A strong facilitator of motivation was the perceived value and practical relevance of the training. Older adults were more likely to engage when they saw clear connections between digital skills and meaningful goals—such as communicating with family, accessing services, or preserving independence (IDs: 60, 105, 128, 130, 141, 197). Conversely, when digital literacy was seen as irrelevant or unnecessary, especially compared to traditional hobbies or routines, motivation declined (IDs: 27, 139, 177, 201). Some learners simply felt digital tools didn't align with their lifestyle or needs.

Social connection and emotional benefits also played a central role. Many older adults were drawn to training as a way to connect with children, grandchildren, and peers. Group-based formats and intergenerational interactions often increased interest and sustained participation (IDs: 8, 106, 108, 128, 135, 157, 172, 200). However, the same social environments could also be demotivating when learners experienced shame, embarrassment, or anxiety—particularly in mixed-age classes where they feared judgment (IDs: 120, 133, 157).

Feelings of autonomy, self-efficacy, and personal growth emerged as powerful motivators. Learners who believed in their ability to succeed were more likely to persist, driven by an internal sense of competence and control (IDs: 27, 66, 117, 132, 178, 200). In contrast, a lack of confidence, fear of making mistakes, and internalized negative beliefs about aging and technology often led to avoidance and withdrawal (IDs: 27, 44, 134, 139, 146, 196).

Motivation was also enhanced by interest and enjoyment in the learning process. When learners were curious or found learning enjoyable—such as for mental stimulation or keeping cognitively active—they were more engaged and willing to continue (IDs: 74, 110, 191, 116, 172). However, technophobia, anxiety, or past negative experiences with digital tools created apprehension and reduced motivation (IDs: 153, 186, 199, 200).

The learning environment and messaging also influenced motivation. Programs that offered patient instructors, welcoming peers, and personalized instruction helped reduce fear and promote a sense of safety (IDs: 14, 104, 106, 127, 151, 184). On the other hand, environments that felt rushed, rigid, or condescending discouraged participation and eroded trust (IDs: 120, 157).

Concerns around safety, privacy, and digital trust further shaped engagement. Programs that addressed issues like fraud, online security, and safe browsing built trust and increased learners' confidence in participating (IDs: 102, 141, 178, 201). Where these concerns were not adequately addressed, fear of scams or breaches reduced willingness to engage (IDs: 42, 48, 71, 90, 122).

Broader cultural, structural, and societal factors also shaped motivation. Marginalized communities, individuals with limited education, or those unfamiliar with digital contexts

expressed high motivation to learn, but often encountered unique barriers such as stigma, language differences, or exclusion (IDs: 86, 109, 120, 124, 139, 173). In some cases, systemic issues like ageism or economic insecurity further reduced motivation (IDs: 139, 197).

Finally, the perceived effort and complexity of the learning process played a role. When training was hands-on, interactive, and directly linked to daily routines, motivation improved (IDs: 62, 91, 110, 130). However, when tools were outdated, interfaces overwhelming, or support insufficient, learners often disengaged (IDs: 179, 185, 200).

3.5.5 Digital Proficiency

Digital proficiency refers to the level of digital expertise learners have using information technologies to find information, conduct transactions, connect with others, and perform daily activities. As a facilitator, digital proficiency supports successful engagement with digital literacy training and enables learners to apply and retain skills. As a barrier, low digital proficiency impedes access to and benefit from digital training due to unfamiliarity, skill gaps, or anxiety around technology use. Facilitators and barriers in this code were frequently opposites: for example, prior exposure to digital tools enhanced learning, while a lack of such experience led to self-doubt or dropout.

Out of 200 documents reviewed, 79 (39.5%) included excerpts coded for digital proficiency:

- 13 out of the 79 documents (16%) described it as a facilitator.
- 73 out of the 79 documents (92%) described it as a barrier.
- 7 out of the 79 documents (9%) included both.

A prominent facilitator of digital literacy engagement was prior digital experience. Older adults who had previously used digital tools in the workplace, for education, or as part of personal interests often entered training with greater comfort and confidence. These learners demonstrated the ability to retain skills and navigate digital systems more independently (IDs: 56, 104, 116, 118, 122, 132, 178, 180, 195, 200). Some developed proficiency through self-teaching or technology use in former employment settings (IDs: 116, 195). In contrast, individuals with little or no exposure to digital tools encountered significant challenges, such as using a keyboard, switching between screens, or creating passwords (IDs: 38, 71, 91, 110, 112, 186, 181), often requiring high levels of support.

Widespread barriers also stemmed from low foundational skills and rapid technological change. Participants struggled with core digital concepts—such as file management, navigating app environments, or recovering passwords (IDs: 11, 38, 103, 145, 183). Rapid updates to devices and platforms compounded the difficulty, disrupting the learning

process and reinforcing a sense of always lagging behind (IDs: 104, 116, 131, 133, 147, 181). Some expressed frustration when mastered skills quickly became outdated (IDs: 67, 110, 119, 133).

The emotional dimension of digital proficiency also emerged through issues of confidence, anxiety, and fear of mistakes. A number of older learners experienced low self-efficacy and were fearful of "breaking" their devices or making visible errors during sessions (IDs: 105, 108, 115, 139, 144, 146, 150, 154, 161, 177, 179, 193). Embarrassment and shame further prevented help-seeking and often led to withdrawal from training (IDs: 134, 120). On the other hand, learners who succeeded in early skill development and received affirming feedback reported improved confidence and a growing sense of autonomy (IDs: 132, 177, 178, 200).

Another barrier involved complex interfaces and mismatched mental models. Some participants were confused when device design or application interfaces did not align with their expectations. For instance, learners often did not realize that apps available on one device (e.g., a phone) could also be accessed on another (e.g., a tablet or PC), leading to misconceptions and limited transferability of skills (IDs: 160, 181). Activities such as app installation, touchscreen interaction, or online banking were frequently perceived as too complex (IDs: 42, 107, 119, 151).

Educational background and structural inequities also influenced digital proficiency. Learners with limited formal education or those for whom English was not a first language encountered greater difficulty with digital tools and instructions (IDs: 90, 118, 164, 173, 197, 201). These educational and linguistic barriers contributed to feelings of dependency and reinforced digital exclusion (IDs: 139, 164). Marginalized learners also faced compounded challenges when rural isolation, ageism, or lack of culturally relevant content intersected with their digital literacy gaps (IDs: 116, 136, 173).

Finally, several excerpts revealed a mismatch between perceived and actual skills. Some learners overestimated their digital proficiency, which led to frustration when faced with unexpected difficulties (IDs: 127, 195). Others underestimated their ability and lacked the confidence to try new tools, even when they possessed moderate skill levels (IDs: 161, 172, 192). These mismatches sometimes disrupted instruction or led to dropouts, confusion, or inefficient training outcomes.

3.5.6 Mobility

Mobility refers to the degree to which learners can physically move and/or leave their place of residence easily to participate in training. As a facilitator, mobility refers to how ease of movement or accessible training environments enable participation in digital literacy training. As a barrier, mobility refers to physical, geographic, or environmental limitations

that hinder participation in training. All excerpts coded under mobility focused on barriers. However, as with other codes, facilitators and barriers often represent opposite sides of the same condition. For example, older adults with access to local training or safe environments are more likely to engage, while those facing transportation challenges or fear of movement are less likely to participate.

Out of the 200 documents reviewed, 8 (4%) addressed mobility:

- 0 out of the 8 documents (0%) included facilitators
- 8 out of the 8 documents (100%) included barriers
- 0 out of the 8 documents (0%) included both

A common theme across the documents was the impact of transportation and geographic distance on older adults' ability to participate in digital literacy training. Older adults often faced transportation-related obstacles, especially in rural areas with no public transit or limited access to community centers (IDs: 13, 54, 146). Parking availability was also flagged as a practical limitation for learners trying to attend in-person training (ID: 13). Learners who lived far from family members, volunteers, or support networks also missed opportunities for informal learning support (ID: 115).

Physical impairments and health conditions contributed to mobility barriers as well. These stemmed from chronic health conditions, physical impairments, or disability, which reduced older adults' ability to travel to external sites or engage in extended sessions away from home (IDs: 114, 133, 146). Some excerpts noted that mobility issues made the need for alternative delivery formats—like remote or home-based training—especially urgent (ID: 114).

Fear, safety, and pandemic effects were another major concern. Safety-related fears—such as fear of falling or contracting illness—were cited as barriers to mobility. These concerns became particularly acute during the COVID-19 pandemic, which heightened social isolation and reduced participation in community-based digital programs (ID: 183). These fears led some older adults to avoid group settings or travel entirely.

Lastly, compounded structural barriers were described in several excerpts. Mobility constraints often overlapped with other factors such as limited income, disability, or low access to local infrastructure (IDs: 12, 133). These intersections made it more difficult for older adults to both access digital training and sustain learning. In these cases, mobility was one of several interlocking barriers that compounded exclusion from digital programs.

3.5.7 Physical and Cognitive Impairment

Physical and cognitive impairment refers to the extent to which learners experience physical or cognitive limitations that affect their ability to participate in digital literacy training. These impairments include but are not limited to vision and hearing loss, motor difficulties, and memory decline. As a facilitator, physical impairment refers to program components or design features that effectively accommodate these limitations and enable older adults to participate more fully. As a barrier, physical impairment refers to constraints that hinder older adults' ability to access, engage with, or retain information from digital literacy training.

Out of the 200 documents reviewed, 62 (31%) addressed physical impairment:

- 9 out of the 62 documents (15%) included facilitator excerpts.
- 59 out of the 62 documents (95%) included barrier excerpts.
- 6 out of the 62 documents (10%) included both.

A dominant theme across the excerpts was the presence of visual, auditory, and motor limitations that interfered with training participation. Visual barriers included reduced contrast sensitivity, color discrimination, or difficulty seeing screen elements such as small text or progress bars (IDs: 62, 65, 154, 179, 192). Hearing impairments created obstacles in group-based or phone-based learning, where background noise or lack of visual cues complicated communication (IDs: 30, 117). Motor impairments such as arthritis, hand tremors, and limited dexterity made it difficult to navigate devices or interact with screens (IDs: 12, 19, 37, 45, 78). Conversely, programs that incorporated features like large fonts, simplified navigation, customizable settings, or responsive touchscreens were seen as strong facilitators (IDs: 60, 142, 158), making the learning environment more physically accessible.

Another major theme centered on cognitive decline and memory barriers. Learners experiencing reduced short-term memory, diminished attention spans, or slower processing speeds found digital training especially difficult (IDs: 105, 113, 182, 186, 192). Common struggles included forgetting instructions, losing track of steps, and failing to remember procedures between sessions (IDs: 37, 108, 111, 130). These issues were further exacerbated by abstract content, multi-step procedures, or fast-paced sessions and games (IDs: 21, 22, 105). Still, some programs successfully responded to these needs using strategies such as repetition, visual scaffolding, and multimodal instruction. Examples included printed handouts, captioned videos, and other audio-visual aids, all of which helped reduce memory-related obstacles (IDs: 12, 141, 148, 200).

A third theme emphasized the importance of design and instruction that accommodates. Many excerpts pointed to training programs that were mismatched with learners' needs—

particularly when content assumed prior experience or was delivered too quickly (IDs: 71, 103, 111). Interface complexity and small screen controls further hindered learning for individuals with impairments (IDs: 45, 62). In contrast, tailored instruction—such as slower pacing, personalized delivery, and alternate communication formats—was cited as a successful strategy for learners with intellectual or physical disabilities (IDs: 148, 200). WHO's "age-friendly" guidelines were also noted as a helpful reference in designing inclusive learning environments (ID: 200).

Finally, self-perception and psychological impact emerged as a cross-cutting concern. Some participants internalized the belief that technology was not appropriate for their age or that they were not "smart enough" to learn (IDs: 110, 201). Others expressed frustration or self-doubt, particularly when unable to keep pace with others (IDs: 130, 192). These attitudes sometimes resulted in withdrawal or a complete avoidance of training programs. Programs that recognized this emotional component and provided encouragement, empathy, and patient support were more successful in shifting learners' mindsets and fostering persistence (ID: 148).

3.5.8 Support

Support refers to the access learners have to others who can provide help on how to use or troubleshoot digital technology. Support may come from family, friends, peers, program staff, volunteers, or institutions. As a facilitator, support is an enabler or success factor in the delivery of training. As a barrier, support is a challenge or obstacle to the delivery of training—when it is unavailable, rushed, unhelpful, or inaccessible. Facilitators and barriers were often mirror images. For example, emotionally supportive family members increased confidence and learning, while patronizing or impatient relatives led to disengagement.

Out of the 200 documents reviewed, 108 (54%) included excerpts referencing support:

- 92 out of the 108 documents (85%) included facilitator excerpts.
- 46 out of the 108 documents (43%) included barrier excerpts.
- 30 out of the 108 documents (28%) included both.

In terms of types of support and their prevalence: Specifically, the following breakdown of learning technique excerpts across the 200 documents was identified:

- Family – 37% (i.e., 40 out of 108 documents).
- Friends – 9% (i.e., 10 out of 108 documents).
- Peers – 18% (i.e., 19 out of 108 documents).
- Program Staff – 21% (i.e., 23 out of 108 documents).
- Volunteers – 14% (i.e., 15 out of 108 documents).

- Other (Community/Institutional) – 55% (i.e., 59 out of 108 documents).

Family members—particularly children, grandchildren, and spouses—were the most frequently cited source of informal support. Many acted as "warm experts," assisting with device setup, encouragement, and troubleshooting (IDs: 39, 45, 94, 140, 149, 181, 193). Emotional support from family members had a strong influence on digital confidence (ID: 193), and intergenerational learning dynamics were frequently motivating (IDs: 5, 186, 60). However, barriers arose when family members were impatient, lacked pedagogical skill, or had limited time to assist (IDs: 109, 115, 143). In such cases, older adults often avoided seeking help due to feelings of burden or condescension (IDs: 133, 179, 201). When familial support was inconsistent or entirely absent, learners struggled to make sustained progress (IDs: 69, 131, 176).

Friend support played a smaller but still meaningful role. Digitally literate peers often provided emotional reassurance and helped normalize the learning process (IDs: 45, 94, 142, 181, 185), encouraging participation and continuity (IDs: 14, 196). However, this form of support was limited by the availability of digitally fluent friends and was further curtailed by remote learning conditions (ID: 74).

Peer support created low-pressure, relatable learning contexts. Participants benefited from observing others, mutual help, and social motivation (IDs: 45, 68, 94, 142, 181). Programs that incorporated peer tutors or learning companions fostered stronger confidence and retention (IDs: 14, 116, 133, 176, 196). Conversely, when peer interaction was disrupted—due to remote formats or program structure—learners experienced isolation, lower engagement, and reduced motivation (ID: 74, 189).

Program staff support was critical to learner success. Positive interactions included personalized guidance, timely troubleshooting, and scaffolding that allowed learners to build skills gradually (IDs: 22, 24, 45, 49, 112, 157, 194). Face-to-face support was particularly valued (ID: 157). Barriers emerged when staff were overextended, hard to access, or focused on content over learner needs. Some learners reported confusion when support was delayed or absent (IDs: 48, 74, 90, 100, 159).

Volunteer support—from students, retirees, or community members—played a strong supporting role in many programs. When well-trained, they created informal and responsive learning environments that improved access and engagement (IDs: 15, 21, 70, 83, 103, 201). Barriers included inconsistent availability, lack of training, and unclear roles, which led to discontinuity and diminished trust (IDs: 58, 99, 124).

Other community and institutional support was the most cited category, including libraries, hotlines, WhatsApp groups, drop-in centers, and online forums. Learners praised these as essential for sustained learning and follow-up support (IDs: 6, 69, 154, 170, 199).

Institutional supports helped bridge socio-demographic gaps, especially when well-promoted and accessible (IDs: 101, 109, 139, 171). Barriers included impersonal help lines, unclear navigation, and the temporary nature of many community offerings (IDs: 69, 139, 177). When these services lacked consistency or cultural relevance, older adults found them confusing or unhelpful (IDs: 134, 148).

3.5.9 Personal Income

Personal income refers to the amount of income learners have available to cover essential and discretionary living expenses. As a facilitator, personal income enables participation in digital literacy training by supporting the purchase of digital devices, internet access, and paid programming. As a barrier, limited personal income restricts older adults' ability to afford devices, services, or training, reducing access to digital learning opportunities.

Out of the 200 documents reviewed, 22 (11%) included excerpts referencing personal income:

- 0 out of the 22 documents (0%) were coded as facilitator.
- 22 out of the 22 documents (100%) described income as a barrier.
- 0 out of the 22 documents (0%) included both.

However, it should be noted that facilitators and barriers related to income were often inverse reflections of one another. For example, excerpts described programs that offered free devices or subsidized training as ways to mitigate financial exclusion—while other excerpts, coded as barriers, emphasized the consequences of not providing such support.

One of the most frequently cited income-related barriers was the cost of devices and internet access. Participants on fixed or low incomes described difficulty purchasing or upgrading necessary tools such as computers, smartphones, or tablets (IDs: 12, 14, 54, 87, 98, 101, 139, 150, 173, 190). This challenge was often intensified in rural areas, where high device costs were compounded by poor internet infrastructure and expensive service plans (IDs: 54, 98).

Even when training programs were available, many older adults could not afford to participate unless they were fully subsidized. The affordability of training opportunities emerged as a key concern, with some participants explicitly noting that they would be unable to enroll in training unless it was free or offered financial assistance (IDs: 44, 45, 126, 156). In some cases, financial constraints contributed to high dropout rates or complete non-participation (IDs: 156, 173).

The perceived burden of costs also played a major role in limiting participation. Older adults were often conscious not just of the direct financial costs, but also of the ongoing

"effort cost" of adopting and maintaining digital technologies. Many expressed concerns over the long-term affordability of data plans, device upgrades, or app subscriptions (IDs: 42, 108, 146). Some questioned whether the value of learning justified the investment—financially or cognitively (IDs: 103, 108, 139).

Finally, intersections with structural inequities intensified the impact of limited income. Participants with limited formal education, rural residence, chronic illness, disability, or marginalized identities—such as gender or migrant background—faced layered forms of exclusion that were tied to their income status (IDs: 104, 126, 133, 173). Several excerpts specifically highlighted that older adults living on fixed pensions or government support were at particularly high risk of digital exclusion (IDs: 12, 87, 173).

3.5.10 Access to Digital Devices

Access to digital devices refers to the extent to which learners have physical or financial access to information technologies. As a facilitator, it refers to how access to digital devices is an enabler or success factor in the delivery of training. As a barrier, it refers to how lack of access to digital devices is a challenge to the delivery of training. Facilitators and barriers in this category often reflect opposite ends of the same condition. For example, when digital devices were provided to learners, this enabled participation and confidence; conversely, lack of access to devices or internet was cited as a major barrier. This duality underscores the importance of seeing access not just as a static condition but as something programs can actively address or inadvertently reinforce.

Out of the 200 documents reviewed, 53 (26.5%) included excerpts related to access to digital devices:

- 26 out of the 53 documents (49%) included facilitator excerpts.
- 36 out of the 53 documents (68%) included barrier excerpts.
- 9 out of the 53 documents (17%) included both.

A common barrier was device availability and affordability. Older adults without computers, tablets, or smartphones—or who used outdated or second-hand devices—were often unable to fully participate in training (IDs: 3, 83, 98, 137, 140, 179). Low-income and rural participants were particularly affected, citing the inability to afford devices or replace broken hardware (IDs: 54, 108, 173, 196). In contrast, several programs that provided free or subsidized tablets, laptops, or iPads (sometimes bundled with broadband subscriptions) saw increased participation and engagement (IDs: 37, 121, 125, 145, 189). These initiatives effectively removed income-based barriers and created more equitable access to learning.

Use of personal and familiar devices also emerged as a facilitator. Allowing participants to use their own hardware—like smartphones or personal tablets—helped improve learning outcomes by allowing learners to apply and retain skills more effectively (IDs: 151, 160, 194). Familiar devices reduced the anxiety associated with unfamiliar interfaces (ID: 198). However, some participants faced challenges when their personal devices were outdated or incompatible with program platforms (IDs: 55, 137).

In terms of interface design and device usability, even when devices were available, their design could present significant obstacles. Complex interfaces, small icons, or rapidly changing user experiences made learning difficult for older adults with limited digital literacy or physical impairments (IDs: 105, 114, 190). Facilitators included devices specifically designed for older users—such as those used in the Plan Ibirapitá or PRISM programs—which featured simplified layouts, large fonts, and intuitive navigation (IDs: 164, 190). Supplementary materials like printed handouts or instructional booklets also supported usability (IDs: 59, 125).

Access also depended on internet access and digital infrastructure. Many excerpts highlighted the lack of home internet, unstable Wi-Fi, or poor broadband coverage as major barriers (IDs: 12, 83, 88, 101, 170, 183). These issues were especially acute in rural or low-resource communities. Some programs that bundled internet access with devices or provided access points through libraries were able to improve engagement (IDs: 121, 145). However, public internet options remained inaccessible for some participants due to geographic distance or mobility challenges (IDs: 109, 133).

Another recurring theme was reliability and evolving technology expectations. Learners who owned devices still encountered problems with updates, compatibility issues, or app requirements that rendered their tools functionally obsolete (IDs: 86, 116, 137, 178). This created a sense of instability, where access felt temporary rather than empowering. One excerpt underscored the importance of moving beyond basic access toward ensuring long-term digital readiness, supporting learners not just in acquiring devices, but in learning how to manage them over time (ID: 140).

Finally, supportive tools and supplementary materials played a critical role in reinforcing device use. Several programs paired digital devices with printed guides, laminated tip sheets, or offline videos to aid in recall and reduce cognitive load (IDs: 59, 125, 145, 190). These supports were particularly important in programs that introduced unfamiliar or simplified technology (ID: 190). Where such tools were absent, learners struggled to remember procedures or navigate devices—especially when the tools were new or complex (ID: 105).

3.5.11 Access to Training

Access to training refers to the extent to which learners have physical, logistical, or financial access to digital literacy training. As a facilitator, it refers to how access to training is an enabler or success factor in the delivery of training. As a barrier, it refers to how access to training is a barrier or challenge to the delivery of training. Facilitators and barriers were often opposites. For example, training offered in accessible, familiar locations increased participation, while inaccessible venues or poor transportation limited it. Similarly, free or subsidized programs supported access, while costs or lack of continuity discouraged it. These dynamics reveal how small program design decisions can either enable or restrict access.

Out of the 200 documents reviewed, 46 (23%) included excerpts related to access to training:

- 28 documents (61%) included facilitator excerpts.
- 27 documents (59%) included barrier excerpts.
- 9 documents (20%) included both.

Many excerpts emphasized the importance of location, infrastructure, and transportation in determining participation. Older adults were more likely to attend when training was held in familiar and accessible places such as libraries, senior centers, or within residential buildings (IDs: 14, 43, 54, 81, 95, 180, 194). Specific features like proximity to entrances, bathrooms, or parking helped reduce logistical barriers (ID: 95). Programs offering drop-in centers or in-home options further enhanced inclusivity (IDs: 45, 120). In contrast, travel-related barriers—such as long distances, bad weather, poor public transit, or limited parking—especially in rural areas, deterred participation (IDs: 12, 13, 15, 29, 54, 109, 173).

Financial accessibility and resource provision played a critical role in training participation. Free or subsidized offerings increased engagement, particularly when programs included MOOCs, web tutorials, or printed materials (IDs: 17, 74, 182). Device provision—such as iPads paired with training—also enabled access for financially vulnerable participants (IDs: 189, 196). Where such supports were lacking, costs related to training, transportation, or equipment excluded learners with fixed incomes or limited support systems (IDs: 83, 130, 173, 196).

Another strong theme was the importance of continuity and ongoing learning opportunities. Participants expressed that one-time workshops were not enough. Instead, they valued programs with continued access to instructors, drop-in sessions, or ongoing environments that helped reinforce learning and build confidence (IDs: 23, 45, 141, 146). Without follow-up or long-term learning options, learners experienced disengagement, loss of skills, or diminished motivation (IDs: 105, 108, 122, 139, 173).

Several excerpts pointed to the relevance of format, timing, and accessibility of instruction. Training sessions that aligned with older adults' energy levels, schedules, or mobility constraints improved access (IDs: 58, 159, 183). Hybrid approaches—such as chatbots or the use of familiar platforms—helped bridge digital gaps (ID: 159). Conversely, programs that assumed digital fluency, omitted printed materials, or provided only online content created obstacles for beginners and those unfamiliar with technology (IDs: 69, 105, 177, 189).

Lastly, geographic disparities and community exclusion shaped access in significant ways. Urban participants generally had more options, while rural older adults struggled with limited infrastructure, poor connectivity, and few instructional resources (IDs: 54, 109, 173). In some municipalities, there was a complete lack of capacity to offer training at all (ID: 69). Social isolation also posed a barrier, as programs that relied on clubs or word-of-mouth missed more isolated seniors (IDs: 139, 146, 157). Further, when training materials or updates were only provided online, many participants found themselves excluded from continued learning (IDs: 105, 177).

3.6 Learning Outcomes

3.6.1 Psychological Learning Outcomes

Psychological learning outcomes refer to changes in attitudes or values of older adult learners resulting from participation in digital literacy training. These include changes in digital skills confidence, digital skills competence, and the perceived importance of information technology (IT).

Out of the 200 documents reviewed, 89 (44.5%) included excerpts coded under psychological learning outcomes:

- 81 out of the 89 documents (91%) described increased skills confidence.
- 48 out of the 89 documents (54%) described increased skills competence.
- 26 out of the 89 documents (29%) described increased perceived importance of IT.
- 2 out of the 89 documents (2%) reported no change in skills confidence.
- 1 out of the 89 document (1%) reported no change in skills competence.
- 1 out of the 89 document (1%) reported a decrease in perceived IT importance.

Increased digital skills confidence was the most frequently reported psychological learning outcome from participating in digital literacy training. Across various settings, older adults described feeling more confident, autonomous, and willing to engage with digital technologies (IDs: 43, 48, 122, 134, 165, 198, 199). Confidence gains were frequently associated with improved independence (IDs: 21, 45), reduced anxiety (ID: 122), and greater motivation to explore technology (IDs: 70, 129, 151). Programs emphasizing social

support, repetition, and peer interaction were particularly effective at reinforcing confidence (IDs: 16, 39).

However, a small number of studies reported no change in confidence despite increased technology use, particularly during the pandemic (IDs: 118, 150). This highlights the importance of structured training over exposure alone.

Nearly half the documents also described increased digital competence, typically referring to mastery of specific tasks such as using email, navigating websites, managing online accounts, or using communication tools (IDs: 95, 154, 165, 169). In many cases, improvements in competence were closely linked with increases in confidence, suggesting the two reinforce each other (IDs: 66, 97, 153).

Programs that incorporated incremental learning, personalized instruction, and hands-on tasks led to stronger skill development outcomes (IDs: 137, 190).

Several programs reported shifts in participants' attitudes toward digital technology, with learners expressing a greater understanding of how IT supports independence, social connection, and access to services (IDs: 110, 132, 135, 154). This perceived importance often emerged when training was clearly linked to relevant life domains, such as health, finance, or communication (IDs: 125, 201).

Programs used a mix of quantitative and qualitative methods to assess psychological outcomes. Common tools included:

- Pre- and post-training surveys or t-tests measuring confidence and competence (IDs: 117, 122, 125).
- Standardized scales, such as the Mobile Device Proficiency Questionnaire (MDPQ) (ID: 150) or Technology Acceptance Model (TAM) (ID: 112).
- Qualitative methods, including interviews, focus groups, and thematic analysis of participant feedback (IDs: 153, 134, 198).
- Behavioral indicators, such as usage tracking or reduced drop-out rates (ID: 141).

Psychological learning outcomes are central to the success of digital literacy training programs for older adults. Increased confidence, competence, and appreciation for IT empower older learners to remain engaged, independent, and motivated.

3.6.2 Behavioral Learning Outcomes

Behavioral learning outcomes refer to changes in actions among older adult learners after participation in a digital literacy training intervention. These outcomes include the ability to apply digital skills in real-life contexts and the intention to pursue further training.

Out of the 200 documents reviewed, 97 (48.5%) included excerpts coded under behavioral learning outcomes:

- 85 out of the 97 documents (88%) described an increase in the ability to apply learned skills.
- 2 out of the 97 documents (2%) described a decrease in the ability to apply learned skills.
- 2 out of the 97 documents (2%) reported no change in the ability to apply learned skills.
- 27 out of the 97 documents (28%) described an increase in the intention to pursue further training.
- 2 out of the 97 documents (2%) reported a decrease in the intention to pursue further training.
- 0 out of the 97 documents (0%) reported no change in intention to pursue further training.

The majority of documents coded under behavioral learning outcomes (88%) reported that older adults were able to apply the digital skills they acquired through training to everyday life. Participants described improvements in tasks such as using social media, checking email, managing online accounts, evaluating misinformation, and accessing online services (IDs: 39, 122, 153, 169, 182). In many cases, these improvements extended to practical applications such as electronic payments (ID: 39), communication (IDs: 39, 153), and eHealth tasks like telehealth use or online health information searches (IDs: 122, 180, 152).

Skill retention was observed both in the short and long term, with several studies using tools like pre/post assessments, task-based evaluations, or self-reported surveys to measure this (IDs: 122, 125, 145, 153, 165). For instance, participants retained skills in file management, web navigation, and device use even months after the program (IDs: 122, 121, 113).

A few studies reported no change or a decline in the ability to apply skills, often in control groups or in programs lacking ongoing support (IDs: 91, 123). These examples suggest that without reinforcement or appropriate program design, training may not always lead to long-term behavioral change.

Many participants expressed a desire to continue their digital learning journey after completing a digital literacy program. Some studies observed that learners actively sought out additional resources such as community classes, online tutorials, or peer networks to further enhance their knowledge (IDs: 122, 201, 129).

Programs that fostered positive learning environments and promoted independence and autonomy seemed particularly effective in encouraging continued engagement (IDs: 128,

132, 145). Several excerpts also highlighted participant feedback and follow-up behavior, such as enrolling in future courses, forming peer tech-support groups, or purchasing new devices as indicators of continued interest (IDs: 108, 129, 189).

Behavioral learning outcomes were measured using a mix of quantitative and qualitative methods:

- Pre- and post-tests, performance-based assessments, and usage tracking were used to assess skill application (IDs: 122, 125, 137, 145, 165).
- Standardized tools such as the MDPQ, CPQ, and Internet Skills Scale (ISS) were used to measure proficiency (IDs: 121, 137, 150, 57, 116).
- Self-report surveys, interviews, and focus groups captured perceived behavioral change and intentions to continue learning (IDs: 108, 129, 153).
- Behavioral intention and motivational scores were also used in some studies to quantify future engagement (IDs: 108, 112).

Behavioral learning outcomes are a key indicator of the success of a digital literacy training intervention. When programs are well-structured and responsive to learners' needs, they can result in tangible improvements in older adults' ability to apply skills and foster long-term engagement with digital tools.

3.6.3 Benefit Learning Outcomes

Benefit learning outcomes refer to the effectiveness and efficiency gains that older adults obtain after participation in digital literacy interventions. These include improvements in information behavior (e.g., creating, evaluating, and finding digital information; conducting online transactions; performing online activities, etc.) and overall well-being.

Out of the 200 documents reviewed, 62 (31%) included excerpts coded under benefit learning outcomes:

- 21 out of the 62 documents (10.5%) reported an increase in information behavior.
- 0 out of the 62 documents reported a decrease or no change in information behavior.
- 50 out of the 62 documents (25%) reported an increase in well-being.
- 3 out of the 62 documents (1.5%) reported no change in well-being.
- 0 out of the 62 documents reported a decrease in well-being.

Several documents reported that digital literacy training enhanced older adults' ability to search for, evaluate, and engage with online content. Improvements included safer internet use, greater use of digital platforms for practical needs, and more confident information-seeking behavior (IDs: 180, 186, 198, 199). Programs that emphasized topics such as

digital safety, online services, and critical evaluation of information helped learners become more effective and independent online users (IDs: 123, 152, 150, 141).

The majority of benefit-related excerpts focused on positive effects on well-being. These included emotional, social, and cognitive benefits such as reduced loneliness, increased social participation, and a stronger sense of independence (IDs: 24, 39, 108, 134, 145, 194). Programs that supported creativity, peer interaction, and social connection appeared especially effective in supporting emotional and psychological well-being (IDs: 128, 201, 120).

A small number of studies reported no significant improvements in social isolation or overall well-being, despite increases in digital skills (IDs: 107, 126, 153).

Benefit learning outcomes were assessed through a combination of methods:

- Quantitative tools, including self-report surveys, pre/post-tests, and validated scales like the MDPQ or DILE scores (IDs: 121, 145, 113).
- Qualitative methods, including interviews, open-ended participant reflections, and ethnographic observation (IDs: 134, 108, 130).
- Behavioral indicators, such as increased digital activity, reduced loneliness, or engagement in online communities (IDs: 41, 135, 183).

Benefit learning outcomes are a meaningful dimension of digital literacy programs, capturing how digital engagement improves older adults' daily lives beyond technical skill. Positive shifts in information behavior and well-being were commonly reported and were strongest in programs that emphasized relevance, community, and emotional connection. Measuring these outcomes with both structured tools and participant voice helps establish their value as key indicators of program success.

4. Discussion

The following section provides a structured discussion of the findings described in the previous section. This discussion is organized into three domains: i) Teaching Context, ii) Learning Context, and iii) Training Outcomes**.** These three domains mirror the overall structure of the codebook. Teaching Context refers to the teaching of digital literacy skills to older adults from an instructor's perspective. Learning Context refers to the learning of digital literacy skills from an older adult learner's perspective. Training Outcomes refers to the outcomes of the delivery of the digital literacy training provided to older adults.

To aid interpretation of the study's findings, Level 2 codes were further categorized by prevalence. Codes that appeared in 50% or more of the 200 documents were considered primary constructs, indicating strong representation across the literature. Those that appeared in 25% to less than 50% were classified as secondary constructs, while those coded in less than 25% of documents were labeled tertiary constructs. This classification does not necessarily equate frequency with importance. Some constructs may be important and just underreported in the academic literature for the 10-year period for which this scoping review was conducted (i.e., 2014 – 2024) identifying a gap in the literature for these constructs. So, some caution is needed in the interpretation of results. Having said that, it seems appropriate that there would be a strong correlation between the frequency of codes and the importance of that code in influencing the successful delivery of digital literacy training to older adults—particularly with respect to primary constructs—as these codes are heavily studied.

Thus, the aim of this discussion section is to highlight not only which constructs are most represented**,** but also to offer a high-level interpretation of what these distributions may suggest about the current state of knowledge and practice in digital literacy programming for older adults. The following sub-sections examine each of the three domains identified above in turn to explore how patterns of code occurrence illuminate both prevailing themes and gaps in the literature.

4.1 Teaching Context

Teaching Context refers to the conditions under which digital literacy training is designed and delivered from the instructor's standpoint. It draws primarily from two Level 1 codes in the codebook: "Learning Environment" which includes the general contextual and environmental conditions that influence instruction, and "Program Components" which captures specific features of program design and delivery.

Within these two categories, three Level 2 codes—"Learner Input", "Pedagogical Approach", and "Learning Techniques"—exhibited significant thematic overlap during

analysis. As a result, these were synthesized under a new consolidated label, "Teaching Methods", to better capture the interdependent nature of instructional strategies used in digital literacy training for older adults.

Table 5 below presents the frequency and distribution of documents with which Level 2 codes under "Learning Environment" and "Program Components" appeared in the 200-document dataset.

Table 5: Frequency of "Learning Environment" and "Program Components" Level 2 Code Occurrences Across the 200-Document Data Set

CONSTRUCT	LEVEL 2 CODE	NUMBER OF DOCUMENTS	% OF DOCUMENTS
PRIMARY	TEACHING METHODS	194	97%
	SKILLS TAUGHT	119	60%
	DELIVERY MODE	105	53%
SECONDARY	LEARNING MATERIALS	90	45%
	TEACHING STAFF	74	37%
	PROGRAM FUNDING	70	35%
	SCHEDULING	67	34%
	CLASSROOM ENVIRONMENT	53	27%
TERTIARY	MARKETING	16	8%
	CLASS SIZE	14	7%
	PERFORMANCE MEASUREMENT	8	4%
	KNOWLEDGE SHARING	3	2%

Based on the coding distribution, "Teaching Methods" emerged as the most prominent construct, appearing in 97% of documents—clearly establishing it as a central concern in the literature. This reflects widespread attention to how digital literacy is taught, including the role of age-appropriate strategies, adaptive pacing, personalized instruction, and learning-by-doing approaches. The high prevalence of this code underscores that the "how" of teaching—not just the "what"—is considered crucial to successful training outcomes.

"Skills Taught" (appearing in 60% of documents) also featured prominently. These included foundational skills such as using devices, navigating the internet, and accessing services like email or telehealth. The fact that this code surpassed the 50% threshold signals strong consensus on the need to explicitly define and align skill development with learner needs.

"Delivery Mode" found in 53% of documents, marked a third primary construct. Its frequency points to widespread experimentation and variation in delivery formats, ranging from in-person classes to blended and fully virtual programs. This emphasis reflects the changing landscape of digital learning environments—particularly considering pandemic-era shifts toward remote delivery.

Among the secondary constructs, “Learning Materials” (45%) and “Teaching Staff” (37%) were commonly reported. These codes highlight important supporting elements, such as whether learners had access to printed guides, videos, or digital handouts, and the critical role of qualified, patient, and well-supported instructors. The moderate presence of “Program Funding” (35%), “Scheduling” (34%), and “Classroom Environment” (27%) suggest that logistical and structural factors—while important—were addressed less consistently across studies.

Finally, several tertiary codes appeared infrequently in the dataset. “Marketing” (8%), “Class Size” (7%), “Performance Measurement” (4%), and “Knowledge Sharing” (2%) were seldom discussed in depth. While this may indicate their relative lack of emphasis in program reporting, it may also reflect a broader gap in the literature, especially regarding evaluation frameworks for digital literacy programs and marketing related strategies.

Together, these frequency patterns suggest that while instructional delivery (“Teaching Methods”, “Delivery Mode”, “Skills Taught”) dominates the literature, other critical components—such as how programs are measured, sustained, or shared—remain underdeveloped areas of focus. This imbalance points to opportunities for future research and more holistic program design in the digital literacy space.

4.2 Learning Context

Learning Context captures insights related to the “Learner Attributes” Level 1 code in the codebook. These attributes refer to the personal characteristics, circumstances, or demographic factors that shape how older adults engage with digital literacy training. This includes factors such as learners’ motivation, physical or cognitive health, socioeconomic background, digital confidence, and the degree of support available to them. These dimensions collectively influence how individuals approach, experience, and benefit from training.

Table 6 below presents frequency and distribution with which “Learner Attributes” Level 2 codes appeared within the 200-document dataset. As shown, the most referenced factors, “Motivation” (57%) and “Support” (54%), emerged as the strongest influences shaping older adults’ learning contexts. These primary codes were central to many studies and frequently discussed as key enablers or constraints.

Secondary constructs such “Digital Proficiency” (40%), “Physical and Cognitive Impairment” (31%), and “Access to Digital Devices” (27%) also featured prominently. These codes represent tangible, skill-based, and health-related aspects of the learning experience and often appeared in studies that examined digital exclusion, barriers to uptake, and learner needs in detail.

Table 6: Frequency of "Learner Attributes" Level 2 Code Occurrences Across the 200-Document Data Set

CONSTRUCT	LEVEL 2 CODE	NUMBER OF DOCUMENTS	% OF DOCUMENT SET
PRIMARY	MOTIVATION	114	57%
	SUPPORT	108	54%
SECONDARY	DIGITAL PROFICIENCY	79	40%
	PHYSICAL AND COGNITIVE IMPAIRMENT	62	31%
	ACCESS TO DIGITAL DEVICES	53	27%
TERTIARY	ACCESS TO TRAINING	46	23%
	PERSONAL INCOME	22	11%
	AGE	21	11%
	GENDER	8	4%
	MOBILITY	8	4%
	RACE	3	2%
	SEX	0	0%

Tertiary codes, those found in less than 25% of documents, offer additional nuance. These include "Access to Training" (23%), "Personal Income" (11%), "Age" (11%), "Mobility" (4%), "Gender" (4%), and "Race" (2%). While less frequently reported, these factors still have relevance, particularly in understanding how structural or demographic disparities intersect with digital literacy.

Together, these findings suggest that the learning experience of older adults is shaped not only by internal drive and external support, but also by structural conditions and individual capacities. The high frequency of motivational and support-related codes reinforces the importance of designing training that is emotionally affirming, socially scaffolded, and responsive to learners' personal contexts. At the same time, the lower frequency of certain demographic codes reveals opportunities for future work to better account for diversity within the older adult population.

4.3 Training Outcomes

Training Outcomes pertain to the "Outcomes" Level 1 code in the codebook. This category captures a wide range of impacts resulting from digital literacy training programs, including learner-reported psychological changes, observed behavioral developments, and broader well-being or informational benefits. These outcomes are further divided into three distinct types of learning outcomes: psychological, behavioral, and benefit-based, each of which includes a series of Level 2 and Level 3 codes.

Table 7 below presents frequency and distribution with which the three "Learning Outcomes" Level 2 and Level 3 codes appeared within the 200-document dataset. Overall, digital literacy training was associated with overwhelmingly positive learning outcomes. Most documents reported increases in at least one learning domain, and only a handful of documents recorded neutral or negative outcomes. This pattern suggests a generally strong

impact of training programs, though it is important to note that such data may be shaped by selective reporting tendencies in the literature or variation in how outcomes were measured.

Table 7: Frequency of Learning Outcome Occurrences Across the 200-Document Data Set

LEVEL 2 CODE	LEVEL 3 CODE	INCREASED	DECREASED	NO CHANGE	NUMBER OF DOCUMENTS	% OF DOCUMENT SET
PSYCHOLOGICAL LEARNING OUTCOMES	SKILLS CONFIDENCE	81	0	2	83	42%
	SKILLS COMPETENCE	48	0	1	49	25%
	INFORMATION TECHNOLOGY IMPORTANCE	26	1	0	27	14%
BEHAVORIAL LEARNING OUTCOMES	ABILITY TO APPLY SKILLS LEARNED	85	2	2	89	45%
	INTENTION TO PURSUE FURTHER TRAINING	27	2	0	29	15%
BENEFIT LEARNING OUTCOMES	WELL-BEING	50	0	3	53	27%
	INFORMATION BEHAVIOR	21	0	0	21	11%

Among “Psychological Learning Outcomes”, the most frequently cited result pertained to digital skills confidence, reported in 83 documents (42%). Learners described feeling more autonomous and willing to engage with technology, particularly when programs incorporated repetition, peer learning, and supportive instruction. Digital skills competence followed closely, mentioned in 49 documents (25%). This outcome reflects not just confidence but observable gains in performing specific digital tasks, often linked to hands-on learning, structured progression, and personalized support. A smaller but meaningful cluster of documents (14%) reported a shift in how older adults perceived the importance of digital technology, particularly when training addressed high-value life areas such as communication, health access, and online banking.

For “Behavioral Learning Outcomes”, the most prominent finding was the ability to apply newly acquired digital skills in everyday contexts—cited in 89 documents (45%). This included both short- and long-term application of skills, suggesting meaningful retention. In addition, 29 documents (15%) noted an intention to pursue further digital training, with this forward-looking mindset most common in programs that fostered learner autonomy, self-efficacy, and supportive environments.

"Benefit Learning Outcomes" included improved well-being (53 documents, 27%) and changes in information behavior (21 documents, 11%). Well-being improvements were defined broadly and included reduced isolation, enhanced independence, and emotional uplift. These outcomes were more commonly observed in programs that emphasized social connection, creative engagement, and peer interaction. Changes in information behavior included greater use of the internet for practical needs, improved ability to evaluate online information, and safer, more confident navigation of digital environments. Programs that addressed digital safety, online service navigation, and critical media literacy were especially effective in producing these outcomes.

Though no summary was produced in the previous section for learner satisfaction due to a lack of substance in the excerpts coded for "Satisfaction with the Training", it should be noted that learner satisfaction was mentioned in approximately one-third of reviewed documents. While no documents reported dissatisfaction, this outcome should not be interpreted as universal success. Rather, even when programs did not fully meet older adults' training needs, participants still expressed appreciation and a sense of value.

The overwhelmingly positive directionality of reported outcomes—across all three learning outcome types—suggests that digital literacy training for older adults not only improves digital skills but may also support broader cognitive, emotional, and behavioral gains. While some domains were reported less frequently (e.g., information behavior, IT importance), this may reflect gaps in how these constructs are operationalized or prioritized in research rather than a lack of importance. Future work should explore these underreported areas in more depth to capture a fuller picture of training impact.

5. Recommendations

This section presents a comprehensive set of evidence-based recommendations developed through a detailed analysis of the 200 documents that informed this scoping review. These recommendations translate the review's thematic findings into actionable guidance for stakeholders seeking to improve digital literacy training for older adults, particularly those from marginalized or underserved populations.

The recommendations synthesize recurring insights from across varied program contexts and emphasize not only what should be implemented, but how and why certain approaches contribute to successful outcomes. Recommendations reflect a combination of frequency (i.e., how often a need or strategy appeared in the literature) and interpretive depth (i.e., the contextual dynamics and program nuances that shaped outcomes).

To support practical implementation and accountability across sectors, the recommendations are organized into four stakeholder categories:

1. Program Designers and Educators – responsible for curriculum, pedagogy, and instructional delivery
2. Community Organizations and Local Service Providers – responsible for outreach, training environments, and support
3. Policymakers and Funders – responsible for system-level infrastructure and policy alignment
4. Researchers and Evaluators – responsible for building the evidence base and translating findings into usable knowledge

Each category begins with a brief overview followed by a set of concise, evidence-based recommendations. These recommendations were developed directly from the scoping review findings and reflect key needs repeatedly highlighted across the literature—such as learner-centered pacing, culturally relevant content, accessible formats, and sustainable funding. They were informed by patterns in the coded data, common themes across documents, and specific contextual insights identified in the 200-document dataset.

These recommendations are meant to be interpreted as a package—not standalone interventions. Their effectiveness increases when implemented in concert. For example, adapting instruction to learner needs must be paired with flexible scheduling and supported by trained instructors, culturally safe environments, and access to appropriate technologies. Addressing these interlocking components in a coordinated way will lead to more inclusive, sustainable, and empowering digital learning experiences for older adults.

5.1 Program Designers and Educators

Educators, trainers, and curriculum designers are critical to the success of digital literacy programs. This group determines not only what is taught, but how it is delivered, shaping the learning experience in both content and tone. The following recommendations reflect pedagogical and content strategies that support effective, inclusive instruction for older learners.

Use mixed instructional formats to accommodate diverse learning preferences: Offer both individual and group instruction to meet the needs of different learners. One-on-one tutoring, peer mentoring, and small group settings help reduce anxiety, allow for personalized attention, and support learners with mobility or memory issues. Structured group-based learning, meanwhile, offers social accountability, shared experience, and opportunities for collaborative learning.

Implement a structured, tiered curriculum with built-in repetition: Use a scaffolded approach that introduces basic skills first (e.g., powering on a device, navigating home screens) before progressing to more complex tasks (e.g., using government portals, identifying scams). Each module should build on prior content, with frequent review and clear milestones. Repetition across sessions helps reinforce retention, especially for learners with cognitive decline or minimal prior exposure.

Prioritize practical, real-world digital skills: Curricula should focus on skills that matter to older adults' daily lives—such as booking appointments, reading transit schedules, using email, accessing health portals, or connecting with family. Programs that taught real-life tasks—like downloading a bus app or accessing vaccine records—reported higher motivation and satisfaction than those using generic or abstract content.

Embed experiential and hands-on learning throughout the program: Adopt "learning by doing" as a core instructional method. Create opportunities for guided exercises (e.g., setting up an email account), free exploration, project-based learning (e.g., digital storytelling), and playful practice (e.g., games, creative tasks). These techniques build comfort, curiosity, and digital confidence while reducing performance anxiety.

Adjust instructional pacing to learner needs: Ensure content is delivered slowly and deliberately, with regular pauses, time for questions, and opportunities to revisit steps. Avoid rushing to meet arbitrary timelines. Let learners guide the pace through check-ins, surveys, or open-ended feedback.

Use simple, jargon-free language and inclusive explanations: Avoid technical terms unless clearly explained using analogies tied to learners' lived experiences. Avoid assumptions that learners are familiar with digital conventions. Plain language and visual

aids increase clarity and reduce cognitive load. All materials—spoken and written—should reflect the cultural and linguistic diversity of participants.

Provide flexible scheduling and delivery formats: Offer training through a variety of formats—such as weekly in-person classes, drop-in labs, hybrid sessions, and self-paced modules—to accommodate different availability, health needs, and confidence levels. Programs running for 6 to 8 weeks with regular reinforcement outperformed single-session workshops in both retention and learner satisfaction.

Use warm, non-intimidating facilitators ("warm experts"): Learners preferred instructors and volunteers who were approachable, patient, and able to explain concepts clearly—rather than highly technical experts. Hiring and training warm experts—those who are supportive, socially skilled, and adept at building rapport—can significantly enhance learner trust and persistence.

Include intergenerational or peer mentoring models: Programs that paired older learners with younger digital natives or similarly aged peers showed higher engagement and comfort. These models reduce intimidation, foster dialogue, and normalize trial-and-error. Structured peer mentorship can also reinforce learner autonomy.

Support learner autonomy and self-defined goals: Encourage participants to identify personal goals (e.g., accessing telehealth, learning to text grandchildren) and structure learning activities around these goals. Aligning training with learner priorities increases motivation and relevance. Allow learners space to explore apps or functions of interest beyond the core curriculum.

Offer initial digital assessments to tailor instruction: Conduct pre-program digital skill assessments to help assign learners to appropriate levels or modules. These assessments should focus on comfort and familiarity, not academic ability, and be used to place learners in beginner, intermediate, or refresher tracks.

Incorporate accessible instructional strategies and materials: Use large-font handouts, high-contrast visuals, and step-by-step printed guides. Embed screen readers, closed captions, and voice controls where appropriate. Adjust classroom settings to accommodate hearing, vision, and mobility challenges—such as through slower pacing, printed materials, and visual reinforcement.

Normalize mistakes and reduce fear of failure: Foster a psychologically safe environment by emphasizing that mistakes are part of the learning process. Use positive reinforcement, celebrate small wins, and create a classroom culture where questions are welcomed and learners are encouraged to try again without embarrassment.

Create wraparound instructional supports: Provide take-home guides, helpline access, and post-session check-ins to reinforce learning outside of class. Some programs included weekly reminder texts or follow-up calls to check comprehension, troubleshoot issues, and encourage ongoing engagement.

5.2 Community Organizations & Local Service Providers

Community-based organizations, including public libraries, senior centers, housing providers, faith groups, and nonprofit agencies, play a crucial role in delivering digital literacy programming. Their community ties, established physical spaces, and deep understanding of local needs uniquely position them to engage older adults who may be overlooked by institutional providers. Evidence from this review shows that older adults thrive when learning occurs in familiar, inclusive settings that offer continuity, social connection, and support. The following recommendations outline how local organizations can leverage their strengths to expand digital inclusion among older learners.

Deliver programming in trusted and familiar locations: Older adults consistently reported greater comfort and willingness to attend training when it was offered in well-known, accessible locations—such as libraries, community centers, places of worship, or subsidized housing units. These venues reduce stigma, build trust, and eliminate transportation barriers. Familiarity with the space also increases psychological safety and program credibility.

Create welcoming and accessible physical learning environments: Ensure that classrooms are well-lit, temperature-controlled, and outfitted with comfortable seating and accessible workstations. Equipment should be positioned to accommodate mobility aids and hearing/visual impairments. Drop-in tech help zones, tech cafés, or mobile learning units can also bring support directly into the community.

Establish ongoing digital support beyond formal sessions: Older learners require continued access to help after training ends. Community organizations can provide informal tech support through walk-in labs, volunteer-run help desks, phone support lines, and rotating peer mentors. These supports reinforce retention, boost confidence, and enable learners to troubleshoot emerging challenges.

Provide access to devices and affordable connectivity: Many older adults lack the devices or internet connections needed to practice outside the classroom. Community organizations should partner with donors, telecom providers, and municipalities to offer loaner devices, refurbished tablets, Wi-Fi hotspots, or subsidized broadband access. Devices should be pre-configured with simplified interfaces and pre-installed applications to reduce barriers.

Design culturally relevant and linguistically appropriate programming: Programs should reflect the languages, cultural identities, and lived experiences of the communities they serve. This includes using multilingual instructors, offering translated handouts, and embedding local references in curriculum content. Cultural alignment improves trust, engagement, and understanding—particularly among immigrants and racialized older adults.

Build community connection into programming: Digital training should not feel isolating or overly academic. Programs that included time for socialization, refreshments, collaborative tasks, or group storytelling saw higher retention and enthusiasm. Embedding digital skills training within broader community activities—such as wellness programs or senior clubs—can also reduce stigma and improve uptake.

Adapt schedules to fit learner and community rhythms: Offer sessions during daytime hours when learners are most alert and available. Avoid rigid schedules or one-size-fits-all models. Instead, provide drop-in formats, 6–8 week structured cohorts, or open-ended ongoing labs that align with participants' availability. Scheduling flexibility is key for learners with caregiving duties, chronic illness, or transportation challenges.

Offer mobile, home-based, or outreach services for isolated learners: Programs should be prepared to meet learners where they are. Mobile labs, in-home tutoring, or partnerships with home care workers can bring digital literacy support directly to those with severe mobility limitations, rural residence, or social isolation. This is especially important for older adults with disabilities or those living in remote areas.

Use trusted community partners for outreach and recruitment: Effective engagement often relies on word-of-mouth and trusted intermediaries. Partner with ethnocultural associations, senior centers, tenant councils, or health outreach workers to recruit participants. Use personalized invitations and relational approaches instead of flyers or mass advertising, which are often overlooked or mistrusted.

Train peer or intergenerational facilitators in empathy and accessibility: Volunteers, youth mentors, or peer instructors should be trained in how to communicate clearly and respectfully with older learners. This includes awareness of cognitive fatigue, slower learning pace, and age-related frustrations. Facilitation training should include role-play, trauma-informed practices, and anti-ageist approaches.

Bundle digital training with other community services: Offering digital literacy programming alongside meal programs, health clinics, or social groups can increase participation. Co-locating services reduces stigma and normalizes technology learning as part of broader wellbeing and inclusion efforts.

Track local needs and adapt programming accordingly: Conduct regular check-ins, informal surveys, or focus groups to understand what learners want to use technology for (e.g., accessing benefits, health appointments, video calls). Adapt content and supports to meet these evolving goals. Responsive programming builds trust and keeps learners engaged over time.

5.3 Policymakers and Funders

System-level change in digital inclusion requires public investment, policy alignment, and infrastructure development. Policymakers and public agencies play a central role in ensuring the uptake of digital literacy for older adults. The scoping review revealed that many programs struggle due to short-term grants, fragmented policies, and insufficient resources to support equity-focused delivery. The following recommendations offer structural strategies to scale and sustain digital literacy.

Provide multi-year, sustainable funding models: Short-term, one-off grants are insufficient for building trust, capacity, and continuity in community programs. Policymakers and funding agencies should commit to stable, renewable, multi-year funding structures that enable long-term planning, relationship-building, and staff retention. Programs embedded in municipal or provincial aging plans showed stronger outcomes and reach.

Support cost coverage for devices, internet, and learner incentives: Financial barriers—including the cost of devices, connectivity, and transit—prevent many older adults from accessing or continuing digital training. Funding streams should explicitly cover tablets or laptops, data plans, transportation stipends, and small incentives (e.g., food, gift cards) that encourage attendance and ongoing engagement, especially among low-income or isolated learners.

Fund instructor recruitment, training, and professional development: Few programs had the capacity to recruit, train, and retain skilled instructors. Policymakers should allocate funds to develop instructors through onboarding, mentorship, trauma-informed training, and equitable compensation. Incentives for diverse and multilingual facilitators are especially important for reaching underserved populations.

Invest in adaptive infrastructure and accessible learning spaces: Older adults face sensory, cognitive, and physical barriers that require built-in adaptations. Public funding should support accessible spaces—equipped with adjustable furniture, assistive technologies (e.g., screen readers, large-font keyboards), and sound amplification. Programs should be encouraged to conduct accessibility audits and implement universal design principles.

Incentivize cross-sector partnerships and infrastructure sharing: Effective programs often emerged from collaboration between libraries, senior services, telecoms, universities, and nonprofits. Policymakers should promote inter-agency cooperation through joint funding models, co-location of services, and shared digital resources. Infrastructure sharing reduces costs and expands reach across demographics and geographies.

Prioritize digital inclusion in aging, health, and equity policy frameworks: Digital literacy should be recognized as a determinant of health and social participation. Funding agencies and government actors should ensure it is included in national and regional action plans on aging, e-health, transportation, and community development. Regulatory frameworks should embed digital equity principles and hold agencies accountable for outreach to marginalized older adults.

Build funding pathways for linguistically and culturally inclusive programming: Support should be directed toward programs serving racialized, Indigenous, immigrant, and linguistically diverse communities. This includes grants earmarked for translation, community co-design, and culturally aligned curricula. Funding should prioritize programming that reflects the identities and realities of those historically excluded from digital access.

Support evaluation and knowledge-sharing within community programs: Many grassroots initiatives lack the capacity to track outcomes, report success stories, or evaluate effectiveness. Funders should budget for internal evaluation, provide access to external consultants or tools, and require usable reporting formats. Capacity-building for evaluation enhances accountability and contributes to field-wide learning.

Include isolated and homebound older adults in program design: Policymakers should allocate resources for reaching those with limited mobility or chronic illness. This includes home-based instruction, assistive tech bundles, and partnerships with home care services.

Fund centralized hubs or registries of programs and resources: A recurring challenge identified in the literature was the difficulty older adults and practitioners faced in locating digital literacy programs. Governments and funders can address this gap by investing in centralized, searchable registries and regional knowledge hubs. These platforms can house shared curricula, evaluation frameworks, and evidence-based practices, helping to reduce duplication, support program development, and foster cross-sector collaboration.

5.4 Researchers and Evaluators

While digital literacy training for older adults is growing in practice, the research base remains fragmented and methodologically inconsistent. Evaluators and academic researchers must play a more active role in building evidence that is methodologically

rigorous, inclusive of diverse populations, and directly translatable to practice. The following recommendations highlight key priorities to improve the knowledge base, accountability, and impact of digital literacy interventions.

Ensure representation of diverse older adult populations: Research should avoid treating older adults as a homogenous group. Disaggregated analysis across age brackets, gender, race, class, disability, immigration status, language, and geography is necessary to ensure findings are generalizable and relevant to marginalized populations. Studies should reflect intersectional identities and varied digital starting points.

Adopt participatory and co-design research methods: Older adults should not only be studied but engaged as collaborators. Participatory action research, community-based evaluation, and co-design methods ensure that interventions align with local needs and promote ownership. Research teams should build in time and compensation for participant involvement in study design, data interpretation, and dissemination.

Translate research into usable, open-access resources: Studies should not remain siloed in academic journals. Researchers should prioritize the creation of toolkits, training guides, evaluation frameworks, and case studies—available in open-access formats and tailored to the needs of practitioners, funders, and community leaders. Collaborative knowledge hubs that link academic findings to real-world implementation are especially valuable.

Assess digital literacy in relation to broader social determinants: Digital exclusion is linked to income, health, housing, and social support. Research should explore how digital literacy intersects with these factors, and how training programs can be integrated into broader service ecosystems (e.g., public health, transportation, housing supports) to maximize impact.

Standardize core outcome indicators while allowing for contextual flexibility: A common weakness across evaluations is the absence of shared metrics for program effectiveness. Researchers should collaborate to define a basic set of indicators (e.g., digital confidence, task completion, retention) that can be adapted to context. This allows for comparison across programs while preserving local relevance.

6. Multilevel Implementation Framework

This section presents a Multilevel Implementation Framework for advancing digital literacy among older adults. It is informed by two foundational models, Kärnä et al. (2022) and Reuter et al. (2023), and grounded in the recommendations synthesized from this scoping review.

Kärnä et al. propose a four-tiered model for understanding how older adults acquire digital literacy and appropriate information and communication technologies (ICT):

- Macro (policy and structural context),
- Meso (community institutions and delivery systems),
- Micro (everyday learning environments and teaching practices), and
- Nano (individual-level attitudes, readiness, and domestic context).

Reuter et al. extend this logic by emphasizing partnership-building across these same levels, highlighting the importance of coordinated action and contextual sensitivity to support digital participation in later life. Together, these frameworks shift focus from isolated interventions to system-wide alignment and multilevel coordination.

This multilevel implementation framework provides a structured, action-oriented guide that translates recommendations into sequenced and context-specific strategies across different stakeholder levels. It helps clarify:

- Who needs to act
- What actions they should take
- Where those actions fit (structurally and relationally)
- How efforts can align across systems

In this framework, the recommendations presented in the previous section of this working paper have been reorganized and interpreted through the multilevel lens. The result is a coherent action plan that links policy enablers with community-based implementation and learner-centered delivery. Rather than treating digital literacy as a disconnected program, this framework positions it as a systemic outcome requiring coordination across the entire digital inclusion ecosystem.

To support high-level planning and implementation, Table 8 below presents a summary table of key multilevel actions and the stakeholders responsible for executing them. Each item in the table draws directly from the evidence-based recommendations presented in the previous section and are explored in greater depth in the sub-sections that follow.

Table 8: Multilevel Implementation Framework

Level	Action Summary	Key Stakeholders
Macro	Embed digital literacy into healthy aging and digital equity policy agendas	Policymakers, government ministries, funders
	Establish long-term, sustainable public funding mechanisms	Funders, government agencies
	Develop inter-ministerial and cross-sector collaboration frameworks	Government departments, cross-sector leaders
	Support national infrastructure for accessibility and device provision	Public infrastructure planners, telecom providers
	Establish national evaluation frameworks and learning collaboratives	Funders, national evaluators, policymakers
	Incentivize innovation and inclusive design standards	Grant agencies, tech designers, procurement bodies
Meso	Leverage trusted community organizations as delivery hubs	Libraries, senior centers, community hubs
	Build sustainable partnerships across sectors	Local non-profits, health providers, city agencies
	Develop mobile and place-based delivery models	Program implementers, outreach coordinators
	Coordinate culturally responsive outreach and recruitment	Ethnocultural orgs, community ambassadors
	Standardize community training resources and support infrastructure	Training providers, public service teams
	Establish feedback loops between delivery partners and funders	Community orgs, funders, advisory boards
Micro	Use mixed instructional formats and adapt to learner pace	Program facilitators, curriculum designers
	Prioritize real-life tasks and experiential learning	Instructors, training developers
	Offer flexible scheduling and hybrid delivery options	Scheduling teams, program managers
	Design accessible materials and reduce cognitive load	Instructional designers, access coordinators
	Provide consistent review, repetition, and confidence-building	Instructors, support staff
	Use inclusive language and warm, non-technical facilitators	Instructors, volunteers
	Integrate personal goal-setting and learner feedback loops	Learners, instructors, evaluators
Nano	Recognize emotional barriers such as fear, shame, or low confidence	Learners, instructors, support workers
	Tailor content to learners' domestic, physical, and sensory contexts	Home care teams, accessibility consultants
	Enable informal, peer- or family-supported learning within homes	Family members, peer mentors
	Celebrate small wins to foster digital identity and self-efficacy	Learners, instructors

6.1 Macro-Level Actions

Macro-level actions refer to national, provincial, and municipal systems and policies that shape the structural conditions under which digital literacy initiatives are conceived, funded, and sustained. According to Kärnä et al., the macro level sets the enabling environment that governs resource distribution, digital equity priorities, and intersectoral alignment. Reuter et al. similarly emphasize the role of top-level partnerships and policy frameworks in shaping digital inclusion landscapes.

To create a supportive macro-level environment, this framework highlights the following strategies.

Embed digital literacy into healthy aging and digital equity policy agendas: National and regional policies should treat digital literacy as a social determinant of health and civic participation. Digital inclusion for older adults should be prioritized in strategies related to health equity, senior well-being, digital transformation, and lifelong learning.

Establish long-term, sustainable public funding mechanisms: One-time or short-cycle funding constrains planning and weakens program infrastructure. Dedicated multi-year funding should be allocated to digital literacy initiatives, allowing for staff retention, curricular development, outreach, and evaluation.

Develop inter-ministerial and cross-sector collaboration frameworks: Government departments (e.g., aging, education, technology, health) should establish shared mandates for digital inclusion. Formal mechanisms for inter-agency collaboration, co-funded initiatives, and public-private partnerships can increase reach and reduce redundancy.

Support national infrastructure for accessibility and device provision: Equitable access requires investment in broadband expansion, accessible public facilities, and device loan or subsidy programs targeted at marginalized older adults. Coordinated procurement strategies can also reduce costs.

Establish national evaluation frameworks and learning collaboratives: Funders and policymakers should support community programs not just with dollars but with capacity-building infrastructure—such as common evaluation tools, reporting templates, and knowledge-sharing platforms. This promotes continuous improvement and system-level learning.

Incentivize innovation and inclusive design standards: Grants and procurement policies should prioritize organizations that use participatory design, accessibility features, and culturally responsive practices. This ensures that digital tools and training models are shaped with and for diverse older adult populations.

6.2 Meso-Level Actions

Meso-level strategies focus on the institutions, organizations, and service networks that act as intermediaries between policy frameworks and everyday learning. This includes public libraries, community centers, non-profit organizations, housing providers, and local health agencies. These actors serve as the operational backbone of digital literacy programming and are critical to ensuring accessibility, continuity, and cultural relevance.

Leverage trusted community organizations as delivery hubs: Older adults consistently prefer learning in familiar, accessible, and welcoming settings. Libraries, senior centers, faith-based venues, and housing co-ops should be funded and equipped to deliver digital training, provide device access, and offer ongoing support.

Build sustainable partnerships across sectors: Community-level implementation benefits from cross-organizational collaboration. Coordinated efforts between libraries, non-profits, healthcare providers, telecom partners, and local government can improve service integration, resource sharing, and outreach.

Develop mobile and place-based delivery models: To reach older adults with mobility constraints or in underserved areas, programs should invest in mobile tech labs, in-home visits, or on-site training at residential facilities. Flexible geographic delivery models are essential for inclusion.

Coordinate culturally responsive outreach and recruitment: Effective outreach relies on partnerships with ethnocultural organizations and trusted messengers. Programs must actively work to reduce stigma and tailor messages to specific community needs, values, and digital interests.

Standardize community training resources and support infrastructure: Community organizations should use shared templates, teaching materials, and toolkits to reduce duplication and promote consistency. Local drop-in centers and tech cafés can function as community anchors for ongoing support.

Establish feedback loops between delivery partners and funders: Meso-level actors need input into funding priorities and policy direction. Mechanisms for two-way communication—such as community advisory boards, learning collaboratives, and network convenings—can ensure alignment across levels.

6.3 Micro-Level Actions

Micro-level actions focus on the direct environments in which older adults learn, including the design and delivery of training sessions, interactions between instructors and learners,

and the materials, pacing, and emotional climate of the learning space. As Kärnä et al. emphasize, the micro level encompasses the pedagogical interface where digital skills are practiced, reinforced, and integrated into everyday life. Reuter et al. highlight how frontline facilitators and community actors operationalize inclusion and accessibility at this level.

To strengthen implementation at the micro level, this framework emphasizes the following strategies.

Use mixed instructional formats that support learner autonomy and inclusion: Training should incorporate both individual support (e.g., tutoring, mentoring) and small-group sessions that encourage peer learning and shared discovery. Combining formats supports a range of learning styles and builds both confidence and social connection.

Adopt a tiered, skills-based curriculum with clear progression: Training modules should begin with foundational skills and move toward more advanced tasks through a scaffolded sequence. Content should be aligned to learner goals and everyday use cases—such as emailing family, accessing healthcare portals, or identifying scams online.

Emphasize hands-on, experiential learning: Programs should provide opportunities for structured practice, creative tasks (e.g., photo sharing, digital storytelling), and unpressured exploration. Learners benefit from "learning by doing" rather than passive instruction.

Reinforce learning through repetition, review, and reference tools: Older learners often need more time and practice to retain digital skills. Sessions should incorporate built-in review, offer printed handouts or tip sheets, and revisit key tasks across multiple sessions. Reinforcement builds both retention and confidence.

Train instructors in geragogy and culturally responsive methods: Facilitators should be equipped to teach older adults using age-appropriate pacing, inclusive language, and patient, affirming communication. Training in geragogy and cultural humility is essential to fostering trust and reducing learner anxiety.

Create emotionally safe and empowering learning environments: Shame, fear of failure, and previous negative experiences with technology can inhibit participation. Instructors should build rapport, validate small successes, and normalize the learning curve through non-judgmental support and encouragement.

Use "warm experts" as instructors and support figures: Older adults respond more positively to facilitators who are approachable, relatable, and non-technical in demeanor. Programs should prioritize hiring or training staff and volunteers who can translate digital concepts clearly and supportively.

Incorporate learner voice in content development and pacing: Learners should be involved in identifying goals, selecting relevant topics, and shaping the pace of instruction. Co-design approaches increase motivation and ensure content reflects lived realities.

Provide flexible scheduling and multiple entry points: Programs should accommodate learners with caregiving duties, health conditions, or fluctuating availability. Offering recurring sessions, drop-in labs, and self-paced options increases access and retention.

6.4 Nano-Level Actions

The nano level represents the most immediate, individual-centered dimension of digital literacy. As defined by Kärnä et al., this level includes personal experiences, emotional responses, household dynamics, and existing digital habits. It also encompasses self-efficacy, motivation, and the ways learners engage with technology in their own time and space. Reuter et al. note that while structural supports are essential, successful appropriation of digital tools ultimately rests on how older adults internalize and integrate technology into their daily lives.

Although often overlooked in implementation planning, nano-level strategies are essential to bridging the gap between training and long-term adoption.

Key strategies at the nano level include the following.

Foster digital self-efficacy through affirming instruction: Learners' belief in their ability to use technology effectively is a critical driver of ongoing engagement. Programs should normalize mistakes, highlight progress, and use strength-based messaging to help participants build confidence over time.

Address fear and past negative experiences with empathy: Many older adults enter training with anxiety or a sense of failure. Instructors should acknowledge these feelings, create low-pressure environments, and frame technology as something learnable at any age.

Encourage at-home practice and ongoing digital use: Skills are more likely to stick when reinforced outside of formal settings. Programs should provide printed guides, family engagement ideas, and follow-up prompts to support practice at home. Encouraging learners to use technology in meaningful personal contexts (e.g., connecting with grandchildren, managing appointments) helps cement skills.

Support informal learning networks and peer encouragement: Participants benefit from sharing challenges and successes with peers. Creating peer groups, tech buddies, or

social clubs centered on digital activities extends learning beyond the classroom and strengthens commitment.

Customize support based on personal routines and interests: Learners are more motivated when digital tools are aligned with their hobbies, values, or responsibilities. Tailoring content to individual interests—like photography, travel, or health tracking—can boost relevance and enthusiasm.

Engage family members or caregivers as allies: Where possible, programs should involve household members in digital learning. Encouraging intergenerational teaching or inviting relatives to sessions helps reinforce skills and reduce isolation.

Accommodate physical and cognitive variation in home-use tools: Many older adults face challenges related to vision, memory, or dexterity. Devices provided or recommended for at-home use should include accessible features (e.g., voice commands, adjustable fonts, simplified interfaces) to support continued independent use.

This multilevel implementation roadmap reinforces the idea that promoting digital literacy among older adults is not the responsibility of any single actor, but a shared commitment that spans policy, community, instructional practice, and individual engagement. By integrating the structural insights from Kärnä et al. and Reuter et al. with the concrete, evidence-based recommendations developed in this review, the roadmap offers a strategic pathway toward equitable, sustainable, and learner-centered digital inclusion.

7. Conclusion

This scoping review provides a comprehensive synthesis of how digital literacy training is delivered to older adults, identifying the structural, instructional, and personal factors that shape participation and outcomes. Using established frameworks from Arksey and O'Malley and the Joanna Briggs Institute and organizing findings through Detlor et al.'s tripartite model and Kärnä et al.'s multilevel lens, the review offers an integrated view of the digital learning landscape for aging populations. Across diverse programs and contexts, clear patterns emerge; learner-centered design, trusted delivery environments, sustained support, and cultural and cognitive responsiveness are critical to success.

At the same time, persistent challenges—including access barriers, underreported program outcomes, and fragmented infrastructure—point to areas where more coordinated policy, funding, and research efforts are urgently needed. Importantly, the review underscores that digital literacy is not merely a technical skillset but a pathway to social connection, independence, and well-being in later life. Future work should prioritize inclusive program models, robust outcome measurement, and partnerships that bridge sectors and communities. As digital participation becomes increasingly essential to aging with dignity, the findings in this review can inform a more equitable and sustainable ecosystem of support for older adults.

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9. Appendix A

This appendix provides a list of the 200 documents identified for detailed analysis in the scoping review. Each document is uniquely represented by an ID number. These numbers range from 1 to 201, where ID# 96 is not utilized as that document was later removed from the data set after closer inspection.

ID #	Title	Authors	Venue	Year	Summary
1	The role of empowering mature and older people's usage of digital media in enhancing intergenerational communication and family relationships in Bahrain	Al-Hashimi, S.	Gerontechnology	2021	The paper evaluates an intergenerational digital interaction campaign in Bahrain, where youth teach older adults technological skills to bridge the digital divide, enhance familial relationships, and improve attitudes between generations.
2	Compuabuelitos/Technogrands: An intergenerational experience based on Pierre Faure's pedagogy	Aldaco-Arias, S. M., & Silas-Casillas, J. C	International Review of Education	2021	The paper describes the Compuabuelitos project, where teenagers taught elderly people basic cell phone skills using Pierre Faure's pedagogical model, resulting in improved perceptions and relationships between generations.
3	Digital Inclusion in Later Life: Older Adults' Socialisation Processes in Learning and Using Technology	Aleti, T.; Figueiredo, B.; Martin, D. M.; & Reid, M.	Australasian Marketing Journal	2024	The paper examines how older adults develop digital competence through socialisation processes involving reciprocity, self-socialisation, and outsourcing, highlighting the role of socialisation agents and barriers faced in this process.
4	Geri-Mobile Health: Feasibility of a VA Mental Health Mobile Apps Coaching Program for Older Veterans	Alfaro, A.J.; Sakai, E.; Carlson, C.; Mehta, P.S.; Anderson, J.; Wynn, M.; & Gould, C.E.	Clinical Gerontologist	2024	The Geri-Mobile Health program is a feasible and acceptable individualized coaching initiative that helps older veterans improve mobile device proficiency and app usage, leading to decreased anxiety and depressive symptoms by addressing barriers to using mental health apps.
5	Recent issues of elderly intergenerational instructional strategies: a scoping review	Ali, M. A. M.; Ahmad, N. A.; Ariff, M. I. M.; Alias, N.; Baharum, Z.; & Shahdan, T. S. T.	Journal of Education and Learning	2024	The paper is a scoping review that identifies recent instructional strategies and issues related to enhancing digital application usage among the elderly, focusing on intergenerational interaction and learning, while addressing ageism, adaptation to technology, and social isolation.

ID #	Title	Authors	Venue	Year	Summary
6	Supporting technology access for older adults through in-home, intergenerational involvement: The case for ethnographic methods and student service e-learning courses	Allison, T. A., Stephens, C. E., & Kotwal, A. A.	Journal of the American Geriatrics Society	2024	This is an editorial commentary on a study by Hawley et al. that uses a mixed-methods approach to improve video healthcare visits for older adults. It discusses the adaptation of ethnographic methods for implementation science and the role of champions, particularly students and trainees, in enhancing digital literacy and access to healthcare technology. The paper does not evaluate a specific digital literacy program but suggests strategies for improving access to video-based healthcare for older adults.
7	Intergenerational Joint Media Engagement Pre-testing Interviews, Activities and Tablet's Applications	Amaro, A. C.; Oliveira, L.; & Baldi, V.	International Conference on Entertainment Computing	2018	The paper presents a preliminary study validating data collection methods for Joint Media Engagement sessions between children and older adults using tablet apps, aiming to inform future research on intergenerational interactions and develop guidelines for designing supportive mobile content.
8	"Let's build our family tree!": grandparents and grandchildren using tablets together	Amaro, A. C.; Oliveira, L.; & Veloso, A. I.	Procedia Computer Science	2016	The paper explores how mobile touch screen devices, particularly tablets, can be used collaboratively by grandparents and grandchildren to support intergenerational interactions, aiming to develop guidelines for designing digital content that promotes these relationships.
9	IT and Computer Technologies for Education of Senior Citizens and Improving the Quality of Their Life	Anikeeva, O.A.; Sizikova, V.V.; Demidova, T.E.; Starovojtova, L.I.; Akhtyan, A.G.; Godzhieva, R.B.; Karpunina, A.V.; & Maydangalieva, Z.A.	Eurasia Journal of Mathematics, Science and Technology Education	2019	The paper is a research study that conducts a survey to understand the educational needs and barriers faced by senior citizens in Russia regarding IT and computer literacy. It does not evaluate a specific digital literacy program but highlights the importance of tailored IT solutions for improving the quality of life and education for older adults.
10	Multi-stakeholder perspectives on information communication technology training for older adults: Implications for teaching and learning	Arthanat, S.; Vroman, K.G.; Lysack, C.; & Grizzetti, J.	Disability and Rehabilitation: Assistive Technology	2018	This is a qualitative research study using a grounded theory approach to explore barriers and strategies for effective ICT training for older adults. It does not evaluate a specific digital literacy program but seeks to understand the factors influencing ICT adoption through the perspectives of older adults, care providers, and ICT trainers. The study aims to develop a conceptual model for ICT training based on these insights.

ID #	Title	Authors	Venue	Year	Summary
11	Breaking Barriers to Digital Literacy: An Intergenerational Social-Cognitive Approach	Atkinson, K.; Anttila, P.; Barnes, J.; Haataja, J.; Albee, J.; & Nanavati, K.	Proceedings of the 18th International ACM SIGACCESS Conference on Computers and Accessibility	2016	The paper is an experience report that evaluates the BASIC program, a digital literacy initiative for older adults at Michigan Tech. It uses narratives from participants to illustrate how the program helps overcome barriers to digital literacy through a social-cognitive approach. The paper focuses on the practical application of Bandura's Social Cognitive Theory to improve digital literacy among seniors.
12	Digital learning preferences of Arabic-speaking older immigrants in Canada: A qualitative case study	Au, A.; Siddiqi, H.; Sayadi, G.; Zhao, T.; Kleib, M.; Tong, H.; & Salma, J.	Educational Gerontology	2024	This is a community-based qualitative descriptive study that evaluates a co-designed digital literacy program for Arabic-speaking older immigrants in Canada. The study explores learning approaches and digital engagement, emphasizing the importance of tailoring programs to individual needs, fostering social support, and addressing language and sensory barriers. It uses Adult Learning Theory and the Digital Competence Framework for Citizens (DigComp 2.2) to guide its approach.
13	Mitigating the Challenges and Capitalizing on Opportunities: A Qualitative Investigation of the Public Library's Response to an Aging Population	Wynia Baluk, K., Griffin, M., & Gillett, J.	Canadian Journal on Aging	2021	This is a qualitative exploratory study that investigates the promising practices and challenges faced by Canadian public libraries in developing programs for older adults. It uses community-based research principles, an environmental scan, and thematic analysis of interviews with public librarians. The study identifies key challenges such as limited space and staff capacity, and promising practices like intergenerational programs and digital literacy. It does not evaluate a specific digital literacy program but highlights digital literacy as an important aspect of programming.
14	Exploring the Digital Literacy Needs and Training Preferences of Older Adults Living in Affordable Housing	Wynia Baluk, K.; Detlor, B.; La Rose, T.; & Alfaro-Laganse, C.	Journal of Technology in Human Services	2023	The paper is a qualitative research study using thematic analysis to explore the digital literacy needs and training preferences of older adults in affordable housing. It does not evaluate a specific digital literacy program but gathers data to inform the development of one. The study is part of a pilot project and uses convenience sampling to recruit participants.
15	Aging in a Digital Society: Exploring How Canadian and Australian Public Library Systems Program for Older Adults	Wynia Baluk, K.; McQuire, S.; Gillett, J.; & Wyatt, D.	Public Library Quarterly	2021	This paper is a comparative research study that explores how Canadian and Australian public libraries develop programs for older adults. It uses environmental scans and thematic analyses to compare practices in both countries. The study does not

ID #	Title	Authors	Venue	Year	Summary
					evaluate a specific digital literacy program but discusses digital literacy training as part of broader library programming efforts for older adults. It highlights the importance of digital literacy training through one-on-one tutoring and workshops.
16	"Because I'm Old": The Role of Ageism in Older Adults' Experiences of Digital Literacy Training in Public Libraries	Barrie, H.; La Rose, T.; Detlor, B.; Julien, H.; & Serenko, A.	Journal of Technology in human Services	2021	This is a study exploring the experiences of older adults in digital literacy training sessions at public libraries in Ontario. It uses semi-structured interviews with 12 participants to examine themes such as ageism and the creation of a "safe space" for learning. The study does not evaluate a specific digital literacy program but provides insights into the broader context of digital literacy training for older adults. It suggests implications for addressing ageism and enhancing digital literacy training environments.
17	Technological digital literacy: volunteer training	Barrientos-Báez, A., García, Á. P., & Caldevilla-Domínguez, D.	Investigaciones sobre lectura	2021	The paper is a research study evaluating a specific digital literacy program implemented through volunteer training. It assesses the effectiveness of this program in improving digital literacy among older adults using pretest and posttest evaluations. The study concludes that the program is successful in enhancing digital literacy skills.
18	Challenges associated with online health information seeking among older adults	Berkowsky, R. W.; & Czaja, S. J.	Aging, Technology and Health	2018	The paper is a review and recommendation paper that discusses the challenges older adults face in online health information seeking and provides guidelines for technology designers and trainers to improve digital literacy. It does not evaluate a specific digital literacy program but offers general recommendations for promoting digital literacy training among older adults.
19	Older adults and their acquisition of digital skills: A review of current research evidence	Bhattacharjee, P.; Baker, S.; & Waycott, J.	Australian Conference on Human-Computer Interaction	2020	The paper is a systematic review that synthesizes findings from 22 articles to identify challenges faced by older adults in learning digital skills and their reactions to these challenges. It does not evaluate a specific digital literacy program but provides recommendations for improving digital literacy training based on the literature reviewed.

ID #	Title	Authors	Venue	Year	Summary
20	Game-based Assessment and Training of Elderly for Upgrading Digital Skills: New Game INFINITY	Blazic, A. J.	IEEE 7th Eurasian Conference on Educational Innovation	2024	The paper is an empirical research study evaluating a specific digital literacy training program called INFINITY, developed as part of the Erasmus+ DIGIBLEND project. It uses a game-based assessment approach to enhance digital skills among the elderly, with practical evaluation conducted through gameplay sessions and participant feedback.
21	Learning Digital Skils for Elderly People by using Touch Screen Technology and Learning Games: A Case Study	Blažič, B. J., Cigoj, P., & Blažič, A. J.	CSEDU 2018-Proceedings of the 10th International Conference on Computer Supported Education	2018	This is a research in progress paper that evaluates a specific digital literacy program aimed at elderly people. It uses a game-based learning approach to teach digital skills through touch screen technology, as part of the GIRDA project. The study involved 30 participants from nursing homes and focused on overcoming barriers to digital adoption among the elderly. The paper presents early results and plans for future research.
22	Overcoming the digital divide with a modern approach to learning digital skills for the elderly adults	Blazic, B. J.; & Blazic, A. J.	Education and Information Technologies	2020	This is a research study evaluating a specific digital literacy program for older adults using interactive games on touchscreen tablets. The study is conducted in two phases across four European countries, focusing on both exposure to new technology and its effect on smartphone usage. It uses qualitative methods, including coding analysis, surveys, and interviews, to assess outcomes. The study finds that game-based learning can effectively promote digital literacy among older adults, though it notes some limitations in participant selection and social status considerations. Future research is suggested to develop tailored games for older learners.
23	Perspectives on Artificial Intelligence Adoption for European Union Elderly in the Context of Digital Skills Development	Bogoslov, I. A., Corman, S., & Lungu, A. E.	Sustainability	2024	The paper is a research study that investigates AI adoption by the elderly in the EU, emphasizing digital skills development. It uses bibliometric analysis to identify gaps in understanding and considers cultural influences using Hofstede's model. The study highlights personalized approaches for digital literacy but does not evaluate a specific program. It provides insights for developing policies and initiatives to support AI adoption among older populations.

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24	Understanding the Role of Support in Digital Mental Health Programs With Older Adults: Users' Perspective and Mixed Methods Study	Borghouts, J., Eikey, E. V., De Leon, C., Schueller, S. M., Schneider, M., Stadnick, N. A., ... & Sorkin, D. H.	JMIR Formative Research	2022	This is a mixed methods research study evaluating a specific digital mental health program for older adults, which includes digital literacy training. The study assesses older adults' experiences and identifies important aspects of support needed during engagement with the program. It evaluates the effectiveness of digital literacy training as part of the intervention.
25	Implementing reverse mentoring to address social isolation among older adults	Breck, B.; Dennis, C.; & Leedahl, S.	Journal of Gerontological Social Work	2018	This is a qualitative research study that evaluates the Engaging Generations Cyber-Seniors Program, a specific digital literacy program. The study uses qualitative data from mentor logs and post-surveys to understand the impact of reverse mentoring on social isolation among older adults. It finds that reverse mentoring increases self-efficacy, breaks down stereotypes, and fosters intergenerational connections, thereby reducing social isolation.
26	Training Younger Volunteers to Promote Technology Use Among Older Adults	Brown, L. E., & Strommen, J.	Family and Consumer Sciences Research Journal	2018	This is a research in-progress paper describing the development of an intergenerational technology training program that incorporates a subjective aging intervention. It does not evaluate a specific digital literacy program but outlines the creation and initial implementation of the TeachSD Toolkit, with plans for future evaluation. The paper uses ecological systems theory to frame its approach. Reportable data are not yet available.
27	Older People's Media Repertoires, Digital Competences and Media Literacies: A Case Study from Italy	Carenzio, A., Ferrari, S., & Rasi, P.	Education Sciences	2021	This is a qualitative research study exploring older people's media use, digital competences, and media literacies in Italy through interviews with 24 individuals aged 65 to 98. It identifies four user profiles and highlights the impact of the COVID-19 pandemic on digital media use. The study uses a "warm expert intergenerational interview" methodology and does not evaluate a specific digital literacy program but surveys older people's experiences and needs. It finds variation in willingness to develop digital skills and suggests further research with a larger sample.
28	"You Don't Need Instagram, It's for Young People": Intergenerational Relationships and ICTs Learning Among Older Adults	Carlo, S.; & Bonifacio, F.	22nd HCI International Conference	2020	The paper is an ethnographic study that evaluates a specific digital literacy program aimed at older adults in Italy. It focuses on intergenerational learning, where secondary school students teach seniors about ICTs. The study explores relational dynamics and role reversals in digital learning contexts, highlighting both challenges and potential benefits. It does not quantitatively

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					assess digital literacy outcomes but provides insights into the symbolic and social aspects of intergenerational exchanges.
29	Impact of a culturally adapted digital literacy intervention on older people and its relationship with health literacy, quality of life, and well-being	Carrasco-Dajer, C. M., Vera-Calzaretta, A. R., Ubillos-Landa, S., Oyanedel, J. C., & Díaz-Gorriti, V.	Frontiers in Psychology	2024	This is a research study evaluating a specific culturally adapted digital literacy intervention program for older adults. The study uses a quasi-experimental design with pre-and post-evaluation to assess the impact on digital literacy, health literacy, quality of life, well-being, and social support. The intervention showed a significant improvement in digital literacy but no direct impact on other measured outcomes. Indirect correlations were found between improved digital literacy and enhancements in well-being and social support.
30	Not like riding a bike: How public libraries facilitate older people's digital inclusion during the Covid-19 pandemic	Casselden, B.	Journal of Librarianship and Information Science	2023	The paper is a qualitative case study that evaluates the Housing Plus Pilot, a specific digital literacy program providing remote digital skills training to older people in sheltered housing. It assesses participants' perceptions of their digital literacy skills and confidence before and after the training, using semi-structured interviews. The study highlights the impact of the program on social connectedness and digital inclusion during the Covid-19 pandemic.
31	Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area	Castilla, D., Botella, C., Miralles, I., Bretón-López, J., Dragomir-Davis, A. M., Zaragoza, I., & Garcia-Palacios, A.	International Journal of Human-Computer Studies	2018	This is an observational research study that evaluates a specific digital literacy program using a social network with linear navigation for elderly users in rural areas. The study involved an eight-session computer course and measured various outcomes related to digital literacy skills. It found that participants improved in their ability to use ICTs and expressed a high intention to continue using the system. The study highlights the effectiveness of linear navigation in teaching digital literacy to elderly users.
32	Development of Computer Competence Courses in Seniors -Shift from Learning Space with Computer-Based Activities to Virtual Platform -Case Study	Cerná, M., & Svobodová, L.	International Conference on Blended Learning	2018	This is a research in-progress paper that explores the development of computer literacy courses for elderly people within a local intergenerational project in Hradec Králové (Czech Republic). It does not evaluate a specific digital literacy program but rather proposes potential solutions for updating the learning environment to include virtual platforms and social networks. The paper uses qualitative research methods, including interviews and observations, to gather data and inform its proposals.

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33	Benefits in Utilization of the Internet by Elderly Peoplecase study	Cerná, M., & Svobodová, L.	International Symposium on Educational Technology	2017	This is a case study paper that evaluates a specific digital literacy program called "Internet for Senior Citizens" in Hradec Kralove. It conducts a survey to understand the benefits and challenges of digital literacy training for elderly people, focusing on both technical and social impacts. The paper analyzes computer literacy among elderly people and discusses potential benefits such as improved computer skills, information access, and enhanced communication methods.
34	The Elderly in SMART Cities	Cerna, M., Poulova, P., & Svobodova, L.	Smart Education and e-Learning 2018	2018	This is a research study evaluating a specific digital literacy program called 'Internet for the Senior Citizens'. It uses both qualitative and quantitative methods to assess the digital literacy needs and competencies of elderly people, aiming to improve their integration into Smart Cities. The study identifies key skills that seniors wish to develop and informs future program iterations.
35	Digital Storytelling as an Intervention for Older Adults: A Scoping Review	Chang, H., Do, Y., & Ahn, J.	International Journal of Environmental Research and Public Health	2023	This is a scoping review that examines the potential psychosocial benefits of digital storytelling (DST) interventions for older adults. It synthesizes evidence from various studies to understand the effects of DST on mental health, community connections, digital literacy, ageism, and intellectual abilities. The review does not evaluate a specific digital literacy program but highlights that DST can enhance digital literacy by increasing access to digital technology. It calls for further research to confirm the efficacy of DST interventions.
36	Applying PBL Model to Technological Learning Strategies for Older Adults	Chang, K. Y.; & Lee, C. F.	International Conference on Human-Computer Interaction	2023	This is a research study that evaluates a specific digital literacy program for older adults. It uses a participatory workshop format to test a technological learning strategy integrating PBL models and learning communities. The study measures changes in learning attitudes, proficiency, and psychological well-being using a Technological Learning Attitude scale. Positive effects were observed in participants' desire for learning, perceived usefulness, and psychological well-being.

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37	Teaching Tablet Technology to Older Adults	Chaudhry, B., Dasgupta, D., Mohamed, M., & Chawla, N.	23rd HCI International Conference	2021	This paper is a research study evaluating a specific digital literacy training program for older adults. It involved conducting workshops to teach tablet skills to 42 older adults, focusing on understanding their challenges and developing effective teaching strategies. The study used thematic analysis to identify challenges such as touchscreen use and password management and emphasized strategies like repetition and one-on-one help. The paper also describes the development of a tablet-based application called seniorHealth and provides recommendations for teaching specific skills to older adults.
38	WristEye: Wrist-Wearable Devices and a System for Supporting Elderly Computer Learners	Chen, L. B.; Li, H.Y.; Chang, W.J.; Tang, J.J.; & Li, K.S.M.	IEEE Access	2016	This is a research paper that presents the development and evaluation of the WristEye system, a wrist-wearable device designed to assist elderly individuals in learning basic computer skills. The system uses kinematic sensors to monitor wrist movements and provides real-time feedback to instructors. The study demonstrates the system's effectiveness in improving computer learning for elderly students by providing accurate performance assessments and identifying areas where students need additional help. The paper includes experimental results from testing the system with elderly learners in Taiwan.
39	Bridging the Digital Divide for Rural Older Adults by Family Intergenerational Learning: A Classroom Case in a Rural Primary School in China	Cheng, H., Lyu, K., Li, J., & Shiu, H.	International Journal of Environmental Research and Public Health	2021	This is a research study that evaluates a specific digital literacy program called the Family Intergenerational Learning (FIL) project. The study is conducted over three months in a rural primary school in China, using qualitative methods to assess the program's effectiveness in improving digital literacy among rural older adults and fostering lifelong learning awareness among grandchildren.
40	IT Humanities Education Program to Improve Digital Literacy of the Elderly	Choi, E.; & Park, N.	Journal of Curriculum and Teaching	2022	The paper is a research study that evaluates a specific educational program designed to improve digital literacy among the elderly. It combines IT and humanities and was tested on 23 older adults in South Korea. The study used pre- and post-tests and satisfaction surveys to evaluate the program's effectiveness, showing statistically significant improvements in digital literacy.

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41	Addressing Digital Divide through Digital Literacy Training Programs: A Systematic Literature Review Addressing Digital Divide through Digital Literacy Training Programs: A Systematic Literature Review	Choudhary, H., & Bansal, N.	Digital Education Review	2022	The paper is a systematic literature review that examines digital literacy training programs (DLTPs) for marginalized populations. It synthesizes findings from 86 studies to understand the profile of DLTPs, the digital competences emphasized in their curricula, and the tangible outcomes of internet use post-training. The study does not evaluate a specific program but provides a comprehensive overview of existing literature to inform future research and policy-making in digital literacy training. It uses the PRISMA procedure for systematic reviews and draws on multiple databases to ensure a broad scope of analysis.
42	Digital competencies in seniors: benefits, opportunities, and limitations	Colombo-Ruano, L.; & Gonzalez-Gonzalez, C. S.	Jornadas Internacionales de Campus Virtuales	2022	The paper is a systematic review that analyzes the benefits, opportunities, and limitations of technology use among older adults and its relationship with digital competencies. It does not evaluate a specific digital literacy program but reviews existing literature to understand the impact of digital competencies on older adults.
43	Computer Anxiety and Computer Self-Efficacy of Older Adults by	Cooper-Gaiter, E. D.	Dissertation	2015	The is a dissertation using a concurrent triangulation mixed-methods design to evaluate the impact of a computer knowledge and skills workshop on older adults' computer anxiety and self-efficacy. It specifically evaluates a digital literacy program by analyzing changes in these psychological constructs among African American older adults. The study found significant improvements in reducing computer anxiety and increasing self-efficacy, demonstrating the workshop's effectiveness.
44	Addressing computer skills of older adults in college	D'Esposito, F	Dissertation	2015	This is a position paper that advocates for increased support and policy changes to address the digital literacy challenges faced by older adults returning to college. It does not evaluate a specific digital literacy program but emphasizes the need for supportive services and adjustments in teaching methods to improve retention and success rates among older students.
45	Falling Off the Bandwagon? Exploring the Challenges to Sustained Digital Engagement by Older People	Damodaran, L.; Olphert, C. W.; & Sandhu, J.	Gerontology	2014	This is a research paper that reports on the Sus-IT project, which conducted a survey to understand the challenges faced by older people in sustaining digital engagement. Sus-IT was a three-year project and the largest and most ambitious programme of

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					research on ageing ever mounted in the UK with the objective of improving the quality of life of older people
46	Self-development in Old Age versus the Challenges of the Information Society: The polish-Bulgarian-portuguese perspective	Danilewicz, W.; & Prymak, T.	Education and Self Development	2019	This is a research study that uses a survey method to understand the interest of elderly people in digital literacy and self-development within the information society. It is part of the Erasmus+ adult Education project and does not evaluate a specific digital literacy program but rather surveys seniors' interest and engagement in digital literacy training across Poland, Portugal, and Bulgaria. The study finds a high level of interest among seniors in engaging with modern technologies.
47	Digital Information Access for Ageing Persons	de Carvalho, C. V., Cano, P., Roa, J. M., Wanka, A., & Kolland, F.	International Conference on Advanced Learning Technologies	2018	The paper is an empirical research study evaluating the UISEL initiative, a specific digital literacy program for senior citizens across Europe. It assesses the program's effectiveness in improving digital skills through participant feedback and expert evaluations, finding generally positive results but noting the course duration as a limitation.
48	Overcoming the Silver Generation Digital Gap	de Carvalho, C. V.; Cano, P.; Roa, J. M.; Wanka, A.; & Kolland, F.	Univers. Comput. Sci.	2019	This paper is a research study evaluating the UISEL initiative, a specific digital literacy program for senior citizens. It uses a case study methodology to assess the program's implementation and effectiveness across seven European countries. The study includes surveys and interviews to gather feedback from participants and trainers, showing positive outcomes in terms of digital literacy development among seniors.
49	Assessing the Effects of eHealth Tutorials on Older Adults' eHealth Literacy	De Main, A. S.; Xie, B.; Shiroma, K.; Yeh, T.; Davis, N.; & Han, X.	Journal of Applied Gerontology	2022	This is a research study evaluating the effectiveness of a specific digital literacy program, the multimedia tutorial OnTOP, compared to a paper-based tutorial. It uses a randomized controlled trial design to assess improvements in eHealth literacy among older adults. Both tutorials were effective, but the multimedia tutorial received more positive attitudes from participants.

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50	Educational process in E-learning activity for elderly people: a systematic review	de Oliveira Jr, E. R., & Pasqualotti, A.	Interactive Learning Environments	2023	This paper is a systematic review that synthesizes findings from ten studies to identify pedagogical processes involved in e-learning activities for elderly people. It does not evaluate a specific digital literacy program but provides insights into how e-learning can be adapted for older adults. Key findings include the need for adaptive content, communication features, and face-to-face meetings. The review highlights that e-learning is generally well accepted by the elderly and can enhance digital skills.
51	Digital Media Use and the Role of Internet Self-efficacy Among Older Technology Volunteers -A Baseline Study from the Project "DiBiWohn"	Doh, M., Schlichting, J. L., Leopold, D., Göbl, L., & Jokisch, M. R.	International Conference on Human-Computer Interaction	2023	This is a research study that conducts a survey to understand digital literacy training among older adults, focusing on internet self-efficacy and digital competencies. It does not evaluate a specific digital literacy program but provides baseline data for the DiBiWohn project. The study uses quantitative methods to analyze survey data from technology volunteers and a comparison group.
52	Computerized Cognitive and Skills Training in Older People With Mild Cognitive Impairment: Using Ecological Momentary Assessment to Index Treatment-Related Changes in Real-World Performance of Technology-Dependent Functional Tasks	Dowell-Esquivel, C., Czaja, S. J., Kallestrup, P., Depp, C. A., Saber, J. N., & Harvey, P. D.	The American Journal of Geriatric Psychiatry	2024	This is a randomized clinical trial evaluating the efficacy of the FUNSAT digital literacy program for older adults with mild cognitive impairment or normal cognition. The study uses ecological momentary assessment to measure real-world performance changes over six months. It finds significant improvements in technology-related skills and real-world task performance, demonstrating the potential for remote training to achieve real-world transfer of skills. The study highlights increased digital literacy, particularly in participants with MCI.
53	Lessons Learned from Supporting Low-income Older Adults to Use a Tablet PC in the Age of Digital Divide	Du, X., Yao, W., & Kim, S.	International Conference on Human-Computer Interaction with Mobile Devices and Services	2021	This is an empirical research study that evaluates digital literacy training by providing instruction sessions to low-income older adults on using tablet PCs. It identifies challenges faced by these users and suggests design implications for senior-friendly technology. The study does not evaluate a specific digital literacy program but implements its own training sessions as part of a community outreach effort.

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54	Digital Learning in Rural Ontario, Canada: An Evaluation of the Computer for Seniors Program	Dunlop, J. M.; Chechak, D.; Hanby, W.; & Holosko, M. J.	Journal of Rural and Community Development	2020	This paper is an evaluation study of a specific digital literacy program called the Computer for Seniors Program (CSP) in North Middlesex, Ontario. It assesses the effectiveness of an 8-week computer skills training intervention for rural seniors using a pre and post-test design with the Seniors Basic Computer Skills Scale (SBCSS). The study found increased self-reported computer skills among participants, but results are not generalizable due to methodological limitations. The paper emphasizes community development and the need for further program expansion. It is a pilot test aimed at evaluating feasibility and effectiveness.
55	Nebraska Offers Digital Skills Training Platform to Seniors	Edinger, J.	Government Technology (govtech.com)	2020	The is a news article that reports on the launch of a digital skills training platform for seniors in Nebraska, initiated by the Nebraska State Unit on Aging in partnership with GetSetUp.io. It describes the program's goals to combat social isolation and improve digital literacy among seniors during the COVID-19 pandemic. The paper does not evaluate the program but outlines its implementation and features, such as senior-focused classes and a custom platform to facilitate participation.
56	Connecting Older New Yorkers Through Skills Training, AI	Edinger, J.	Government Technology (govtech.com)	2024	This is a news article on initiatives by the New York State Office for the Aging (NYSOFA) to enhance digital literacy and implement technology for older adults. It does not evaluate a specific digital literacy program but describes various projects and pilots aimed at improving digital skills and technology use among seniors.
57	Evaluation of a virtual 4-week digital literacy program for older adults during COVID-19: a pilot study	Elbaz, S., Gruber, J., Elberhoumi, K., Bukhari, S. N., Rej, S., & Sekhon, H.	Educational Gerontology	2024	This is a pilot study evaluating a specific 4-week digital literacy program for older adults conducted via Zoom. The study assessed the program's effectiveness in improving digital literacy skills using the Computer Proficiency Questionnaire (CPQ) and found that participants' skills improved post-intervention. The study involved a small sample of 5 older adults and aimed to address the digital divide exacerbated by the COVID-19 pandemic.
58	A Community Partnership Approach to Digital Literacy Training for Older Adults Between Public Libraries and Seniors' Organizations	Elgamal, R.; La Rose, T.; Detlor, B.; Julien, H.; & Serenko, A.	The Canadian Journal of Information and Library Science	2024	This is an exploratory case study that evaluates a specific digital literacy program through a partnership approach between public libraries and senior organizations in Ontario, Canada. It investigates the benefits and challenges of this partnership in

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					enhancing digital literacy among older adults. The study uses qualitative methods, including interviews, to gather insights.
59	Singapore to provide seniors more opportunities to go digital	Estopace, E.	SMB World Asia	2016	This is a news article reporting on a partnership between the Infocomm Development Authority of Singapore and the People's Association Senior Academy to enhance digital literacy among seniors. It describes initiatives like increasing IT classes, launching the "Learn and Live I.T." project, and recognizing tech-savvy seniors through the Silver Infocomm Wellness Ambassador program. The article does not evaluate a specific digital literacy program but reports on efforts to promote digital literacy.
60	Improving the Digital Literacy and Social Participation of Older Adults: An Inclusive Platform that Fosters Intergenerational Learning	Farag, Y.; Narra, G.; Balasubramaniam, D.; & Boyd, K. M.	International Conference on Information and Communication Technologies for Ageing Well and e-Health	2024	This is a research in progress paper that evaluates digital literacy training promotion through the development and testing of a specific platform called EldersOnline. The study involves in-depth user studies with older adults and an online survey of younger adults to understand and improve the technology support process, aiming to enhance older adult autonomy and social participation through intergenerational learning. The paper includes the development and evaluation of a prototype platform designed to facilitate these goals.
61	Going Beyond Telecenters to Foster the Digital Inclusion of Older People in Brazil: Lessons Learned from a Rapid Ethnographical Study	Ferreira, S. M., Sayago, S., & Blat, J.	Information Technology for Development	2016	The paper is a rapid ethnographic study that explores the digital inclusion of older people in Brazil by examining their interactions with ICT in an educational setting. It highlights the importance of addressing both basic and non-instrumental needs in digital literacy training. The study provides insights into how ICT courses can empower older adults by focusing on their evolving needs.
62	Older Adults in ICT Contexts: Recommendations for Developing Tutorials	Ferreira, S.; & Veloso, A.I.	21st HCI International Conference, HCII 2019	2019	The paper is a systematic review that analyzes empirical projects and experiences to derive recommendations for developing tutorials to help older adults use ICT. It does not evaluate a specific digital literacy program but reviews existing literature and projects to provide guidelines for tutorial development. The study identifies five examples of projects or initiatives that use help tutorials to support technological system use by older adults.

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63	Older adults' experiences with using information and communication technology and tech support services in New York City: findings and recommendations for post-pandemic digital pedagogy for older adults	Finkelstein, R., Wu, Y., & Brennan-Ing, M.	Frontiers in Psychology	2023	This is a research study evaluating older adults' experiences with ICT and tech support services during the COVID-19 pandemic. It involved a survey of 35 older adults in New York City who received ICT devices, broadband, and training. The study aimed to understand technology competence, use, barriers, and the impact of various components like devices, connectivity, training, and support services. It concluded that customized training based on individual skills is necessary. The study categorized participants into groups based on their technology use and evaluated the effectiveness of the tech support services provided.
64	Digital Literacy for Older Adults: perceptions about teaching-learning	Flauzino, K. D. L., Pimentel, M. D. G. C., Batistoni, S. S. T., Zaine, I., Vieira, L. O. B., Rodrigues, K. R. D. H., & Cachioni, M.	Educação & Realidade	2020	This is an exploratory and descriptive study evaluating a specific digital literacy program for older adults, focusing on optimizing factors in the teaching-learning process based on students' perceptions. It is part of a project titled "Digital literacy and remote scheduled intervention for the elderly by means of mobile devices" developed by USP and ICMC. The study involves analyzing pre-test perceptions of 317 older students enrolled in a university outreach program, USP 60+. It highlights personal qualities of instructors and methodological strategies as key factors in digital literacy education for older adults.
65	Strategies for enhancing success in digital tablet use by older adults: A pilot study	Fletcher-Watson, B., Crompton, C., Hutchison, M., & Lu, H.	Gerontechnology	2016	This is a research study evaluating a specific digital literacy program for older adults. It investigates the impact of one-to-one support, free tablet provision, and addressing age-related physical challenges on digital literacy. The study found that these strategies increased self-efficacy in tablet use among participants. The program was conducted over six weeks with eight older adults, showing significant improvements in digital skills. The study emphasizes the importance of personalized support and access to technology in overcoming barriers to digital literacy.
66	Bridging the Age-based Digital Divide: An Intergenerational Exchange during the First COVID-19 Pandemic Lockdown Period in Ireland	Flynn, S.	Journal of Intergenerational Relationships	2022	This is a qualitative empirical research paper that explores the intergenerational exchange of digital communication skills between young adults and older family members during the first COVID-19 lockdown in Ireland. It uses an online survey to understand this exchange and does not evaluate a specific digital literacy program. The study finds that young adults successfully

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					helped older adults develop digital skills, facilitating independent contact with family and friends, and that there were reciprocal benefits for the young adults involved.
67	Ireland and the Lifelong Learning Curve: The Intergenerational Contribution to Digital Literacy for Life	Flynn, S.	Dissertation	2023	The paper is a case study research that uses mixed methods to explore how intergenerational and peer relationships support digital literacy development among older adults in Ireland. It does not evaluate a specific digital literacy program but investigates informal and non-formal learning exchanges. The study also examines the impact of digital engagement on quality of life.
68	StudieS in the education of adultS Keeping up with the times in Ireland: Older adults bridging the age-based digital divide together?	Flynn, S.	Studies in the Education of Adults	2024	This is a research study using a mixed methods case study methodology. It examines the role of informal peer learning in the digital lives of older adults in Ireland. The study does not evaluate a specific digital literacy program but conducts surveys and interviews to understand how informal peer learning can help bridge the digital divide among older adults.
69	Social Contact for Older People with Visual Impairment through Mastery of Smartphones: Barriers and Suggested Solutions	Fuglerud, K. S., Tunold, S., & Kjæret, K.	Universal Design 2021: From Special to Mainstream Solutions I. Verma (Ed.)	2021	This is a qualitative research study that explores barriers to smartphone use among older people with visual impairment in Norway. It evaluates digital literacy training by conducting interviews and stakeholder meetings and piloting a telephone-based support service. The study aims to find solutions to motivate older people with VI to use smartphones, improve training provision, and organize post-training support. It concludes with recommendations for enhancing access to digital skills training for this demographic.
70	Findings From Talking Tech: A Technology Training Pilot Intervention to Reduce Loneliness and Social Isolation Among Homebound Older Adults	Gadbois, E. A., Jimenez, F., Brazier, J. F., Davoodi, N. M., Nunn, A. S., Mills, W. L., ... & Thomas, K. S.	Innovation in Aging	2022	This is a research study evaluating the Talking Tech pilot intervention, a specific digital literacy program aimed at reducing loneliness and social isolation among homebound older adults. The study used qualitative interviews and quantitative surveys to assess the impact of the intervention on digital literacy, loneliness, and social isolation.

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71	Improving the digital skills of older adults in a COVID-19 pandemic environment	Garcia, K. R., Rodrigues, L., Pereira, L., Busse, G., Irbe, M., Almada, M., ... & Costa, E.	Educational Gerontology	2021	The paper is a discussion or review paper that explores the implications of the COVID-19 pandemic on older adult education and digital skills development. It does not evaluate a specific digital literacy program but discusses strategies and challenges in promoting digital literacy among older adults. The paper highlights the necessity of digital literacy in a pandemic scenario and suggests strategies to facilitate digital skills education for older adults.
72	What Role Does Geragogy Play in the Delivery of Digital Skills Programs for Middle and Older Age Adults? A Systematic Narrative Review	Gates, J. R., & Wilson-Menzfeld, G.	Journal of Applied Gerontology	2022	This is a systematic narrative review that explores the implementation and delivery of digital skills programs for middle and older-aged adults. It does not evaluate a specific digital literacy program but synthesizes existing evidence to understand broader trends. The review focuses on whether adult learning theories like geragogy are present in these programs and identifies themes such as negative perceptions of aging, the learning environment, and the value of technology. It provides recommendations for delivering digital skills to older adults, emphasizing empowerment and personalized learning.
73	Bridging the 'instruction gap': how ICT instructors help older adults with the acquisition of digital skills	Geerts, N., Schirmer, W., Vercruyssen, A., & Glorieux, I.	International Journal of Lifelong Education	2023	This is a qualitative research study that examines how ICT instructors contribute to the acquisition of digital skills among older adults and explores their role in digital inclusion. It uses qualitative interview data from 26 ICT instructors in Flanders, Belgium, to understand their teaching strategies and challenges. The study does not evaluate a specific digital literacy program but investigates the role of ICT instructors in promoting digital literacy among older adults. It concludes that ICT instructors' 'cold' expertise complements 'warm' support from family and friends.
74	Older Adults Learning Computer Programming: Motivations, Frustrations, and Design Opportunities	Guo, P. J.	International Conference on Human Factors in Computing Systems	2017	This is an empirical research paper that conducts a survey to understand the motivations and frustrations of older adults learning computer programming. It does not evaluate a specific digital literacy program but rather provides insights into the learning experiences of this demographic. The study proposes a learner-centered design approach based on the findings.

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75	Enhancing the wellbeing of the elderly: Social use of digital technologies in aged care	Hasan, H., & Linger, H.	Educational Gerontology	2016	The paper is an action research study that investigates how digital technologies can enhance the social wellbeing of elderly citizens in aged-care facilities. It evaluates its own intervention program involving computer kiosks and weekly ICT training sessions over two years. The study identifies themes related to social wellbeing rather than evaluating a specific digital literacy program.
76	New Ways to Tell my Story Evaluation of a Digital Storytelling Workshop for Older Adults	Hausknecht, S., Vanchu-Orosco, M., & Kaufman, D.	International Conference on Computer Supported Education	2016	This is an empirical research study evaluating a specific digital literacy program, namely a digital storytelling workshop for older adults. The study discusses the design, development, and implementation of the workshop and evaluates its effectiveness through participant feedback and skill improvement data. Participants reported increased skills in digital storytelling and other digital skills, with time constraints being a noted challenge. Overall, the workshop was well-received, with significant improvements in digital storytelling skills. The evaluation includes both qualitative and quantitative data.
77	Sharing life stories: Design and evaluation of a digital storytelling workshop for older adults	Hausknecht, S.; Vanchu-Orosco, M.; & Kaufman, D.	International Conference on Computer Supported Education	2017	The paper is a research study that evaluates a specific digital literacy program, which is a digital storytelling workshop for older adults. It examines the design and evaluation of the workshop across multiple iterations, using both quantitative and qualitative data to assess learning outcomes and challenges. The study finds that participants improved their digital storytelling skills and, to a lesser extent, other digital literacy skills. The paper emphasizes the importance of facilitation and a supportive environment in promoting digital literacy among older adults.
78	Digital assistive technologies for ageing people–learning barriers and educational approaches	Helander, N., Weck, M., & Meristö, T.	EDULEARN19 Proceedings	2019	This is a "work in progress" empirical study that uses qualitative research methods (semi-structured interviews and focus groups) to explore the attitudes of older adults in South Finland towards digital assistive technologies. It identifies learning barriers such as physical and cognitive declines, lower digital literacy, and social environment issues. The study suggests that user-friendly design can help overcome these barriers. It does not evaluate a specific digital literacy program but surveys older adults to understand their learning barriers and attitudes. The findings are summarized in a table at the end of the paper.

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79	Digital Competences In The Social Media Program For Older Adults In Vulnerable Contexts	Holguin-Alvarez, J.; Manrique-Alvarez, G.; Apaza-Quispe, J.; & Romero-Hermoza, R.	International Journal of Scientific Technology Research	2020	This is an experimental research paper that evaluates a specific digital literacy program focused on social networks for older adults in vulnerable contexts. The study uses a quantitative approach with an experimental design to assess the effects of the program on digital competences. Significant improvements were observed in the experimental group, indicating the program's effectiveness in promoting digital literacy and inclusion among the elderly.
80	"He Explained It to Me and I Also Did It Myself": How Older Adults Get Support with Their Technology Uses	Hunsaker, A.; Nguyen, M. H.; Fuchs, J.; Djukaric, T.; Hugentobler, L.; & Hargittai, E.	Socius	2019	This is a qualitative research study that explores the support needs of older adults in using digital media through in-depth interviews. It does not evaluate a specific digital literacy program but investigates how older adults receive and perceive support for digital literacy. The study is conducted across three European countries and highlights the importance of individualized support and peer-led programs for improving digital literacy among older adults.
81	Activities to Encourage Older Adults' Skills in the Use of Digital Technologies on the Example of Multigenerational Houses in Germany	Jakob, D.; Kuchler, J.; Ahrens, D.; & Wahl, F.	International Conference on Human-Computer Interaction	2024	The paper is a qualitative research study that uses guided expert interviews to evaluate the promotion of digital skills among older adults in multigenerational houses (MGHs) in Germany. It does not evaluate a specific digital literacy program but surveys the effectiveness and challenges of such programs in MGHs.
82	Toward global digital literate citizens: A case of Thailand's aging generation	Jantavongso, S.	Electronic Journal of Information Systems in Developing Countries	2022	This is an exploratory research paper that constructs a model for digital literacy competency among Thai older adults in rural areas. It conducts interviews with 97 participants to understand their digital competencies and identify gaps. The study does not evaluate a specific digital literacy program but aims to inform curriculum development and support policy initiatives in Thailand. The research highlights the importance of safety, communication and collaboration, and information and data literacy as key competencies.

ID #	Title	Authors	Venue	Year	Summary
83	Intergenerational programming during the pandemic: Transformation during (constantly) changing times	Jarrott, S. E., Leedahl, S. N., Shovali, T. E., De Fries, C., DelPo, A., Estus, E., ... & Walker, A.	Journal of Social Issues	2022	The paper is a collective case study examining four U.S. intergenerational programs during the COVID-19 pandemic. It explores how these programs adapted to remote formats to continue reducing ageism and fostering intergenerational relationships. The study evaluates the use of digital tools for maintaining contact but does not focus on a specific digital literacy program.
84	ICT TECHNOLOGIES IN SOCIAL ISSUES SUPPORT -AN EVIDENCE FROM SERBIA	Jevtic, B., Zakic, N., & Raco, R.	21st International Scientific Conference on Economic and Social Development	2017	The paper is an empirical research study that evaluates the impact of ICT technologies on cognitive functions and satisfaction levels of older adults in Serbia. It conducts a survey to understand the relationship between ICT training satisfaction and learning outcomes, finding high satisfaction levels among participants. The study supports social care activities for the elderly by leveraging ICT technologies. It does not evaluate a specific digital literacy program but rather assesses the general impact of ICT training on older adults.
85	ICT volunteering as a protective factor for older adults: investigating motives of internet use, internet self-efficacy and perceived obsolescence	Jokisch, M. R., Göbl, L., Schlichting, J., Leopold, D., & Doh, M.	Educational Gerontology	2023	This is a cross-sectional research study that investigates the impact of volunteering on digital literacy among older adults. It does not evaluate a specific digital literacy program but conducts a survey to understand how volunteering, especially in ICT, affects internet usage motives, internet self-efficacy, and perceived obsolescence. The study is part of the DiBiWohn project aimed at providing digital educational services for older adults. It highlights the positive effects of ICT volunteering on digital literacy. The Germany-wide Senior Technology Ambassadors initiative is mentioned as an example of promoting digital literacy through peer mentoring.
86	"Known Unknowns": Reducing Digital Inequalities in the Silver Economy	José, M. L., Ferreira, F. A., Zopounidis, C., Doumpos, M., & Ferreira, N. C.	Transactions on Engineering Management	2023	This is an empirical research paper that uses a constructivist, socio-technical approach combining cognitive mapping and DEMATEL techniques in a neutrosophic context. It does not evaluate a specific digital literacy program but develops a framework to understand and prioritize initiatives aimed at promoting digital literacy in the silver economy.

ID #	Title	Authors	Venue	Year	Summary
87	Virtual Intergenerational Reverse-Mentoring Program Reduces Loneliness among Older Adults: Results from a Pilot Evaluation	Juris, J. J., Bouldin, E. D., Uva, K., Cardwell, C. D., Schulhoff, A., & Hiegl, N.	International Journal of Environmental Research and Public Health	2022	This is a pilot evaluation study that assesses the impact of an online intergenerational reverse-mentoring program, Cyber-Seniors, on reducing loneliness among older adults in rural Appalachia during COVID-19. The study evaluates a specific digital literacy program by measuring changes in social isolation and loneliness using pre-and post-tests. The results suggest that the program is effective in reducing loneliness among older adults.
88	Need and Potential Use of Telemedicine in Two Rural Areas	Karlin, N. J., & Weil, J.	Activities, Adaptation & Aging	2022	This is a research study that evaluates the potential use of telemedicine in rural communities through case studies. It conducts a survey to understand digital literacy needs but does not evaluate a specific digital literacy program. The study identifies barriers to telemedicine adoption and highlights the need for digital literacy training among older adults in rural areas. It provides insights into the benefits and challenges of telemedicine from the perspective of these older adults.
89	A Multilevel Model of Older Adults' Appropriation of ICT and Acquisition of Digital Literacy	Kärnä, E., Aavikko, L., Rohner, R., Gallistl, V., Pihlainen, K., Müller, C., ... & Korjonen-Kuusipuro, K.	International Journal of Environmental Research and Public Health	2022	This paper is a research study that develops a multilevel model to understand the factors influencing older adults' appropriation of ICT and acquisition of digital literacy. It does not evaluate a specific digital literacy program but explores various factors across different countries to inform stakeholders about supporting older adults in gaining digital literacy. The study involves data collection from multiple countries using diverse methods and highlights the complexity of digital literacy acquisition among older adults.
90	Qualitative Evaluation of an Intervention Program for Sustained Internet Use Among Low-Income Older Adults	Kim, J., & Gray, J.	Ageing International	2016	This is a qualitative research study evaluating a specific digital literacy program for low-income older adults. It uses semi-structured interviews to explore participants' experiences, identify factors affecting their Internet use, and provide recommendations for program improvement. The study identifies themes of impacts, barriers, and user needs and wants through thematic analysis.

ID #	Title	Authors	Venue	Year	Summary
91	Exploring Older Adults' Adoption and Use of a Tablet Computer During COVID-19: Longitudinal Qualitative Study	Kim, S., Yao, W., & Du, X.	JMIR aging	2022	This is a longitudinal qualitative study that explores how older adults adopt and use tablet computers during the COVID-19 pandemic. It investigates the learning process and challenges faced by older adults who are first-time tablet users. The study does not evaluate a specific digital literacy program but examines the practical and theoretical aspects of digital literacy among older adults. It highlights the importance of using familiar methods to aid older adults in using digital devices.
92	A Location-Based Game for Two Generations: Teaching Mobile Technology to the Elderly with the Support of Young Volunteers	Kopeć, W., Abramczuk, K., Balcerzak, B., Juźwin, M., Gniadzik, K., Kowalik, G., & Nielek, R.	International Summit on eHealth	2017	This is a research in progress paper evaluating a specific digital literacy program through a location-based game called "Stroll Around Yesterday." The game aims to improve digital literacy among the elderly by engaging them in cooperative tasks with younger participants, enhancing their technical skills, physical activity, and intergenerational interaction. Preliminary results are promising, but further gameplay is planned to verify outcomes.
93	Older Adults Learning Digital Skills Together: Peer Tutors' Perspectives on Non-Formal Digital Support	Korpela, V., Pajula, L., & Hänninen, R.	Media and Communication	2023	This is a qualitative research study that examines non-formal digital support and peer tutoring as a means to promote digital and social inclusion among older adults. It uses thematic analysis of semi-structured interviews with peer tutors in Central Finland to explore the characteristics and effectiveness of peer tutoring in digital literacy training. The study does not evaluate a specific digital literacy program but provides insights into the peer tutoring model as a method of digital literacy training.
94	Investigating the multifaceted role of warm experts in enhancing and hindering older adults' digital skills in Finland	Korpela, V., Pajula, L., & Hänninen, R.	International Journal of Lifelong Education	2024	This is a qualitative research paper using an ethnographic approach to explore the role of informal learning and digital support among older adults in Finland. It uses inductive thematic analysis based on participant-induced elicitation (PIE) interviews. The study investigates how informal digital support from "warm experts" affects older adults' digital skills and inclusion, highlighting both benefits and challenges. It does not evaluate a specific digital literacy program but rather examines the informal learning environment.

ID #	Title	Authors	Venue	Year	Summary
95	Computer and Internet Training for Health Information with Rural Older Adults	Krajnik, S. R.	Dissertation	2014	This is a research study evaluating a specific digital literacy training program for rural older adults. The study investigates the feasibility and effects of an 8-hour computer and Internet skills training program aimed at improving participants' ability to locate and evaluate online health information. The results indicate significant improvements in digital literacy and self-perceptions of electronic health literacy among participants. However, the study's small sample size is noted as a limitation.
97	Information Communication Technology Use to Improve eHealth Literacy, Technophobia, and Social Connection among Community Dwelling Older Adults	Lee, O. E.; Kim, D.; Lee, H. J.; & Beum, K. A.	Educational Gerontology	2022	This is a research study evaluating a specific digital literacy program called the Intergenerational Forum (IF) in South Korea. The study uses a pretest-posttest nonequivalent control group design to assess the impact of the program on e-health literacy, technophobia, social isolation, and social capital among older adults. The findings indicate improvements in eHealth literacy and confidence in using technology, as well as a reduction in technophobia among participants. The study highlights the feasibility and effectiveness of intergenerational learning programs for enhancing digital literacy among older adults.
98	Using a Quasi-Experimental Study to Examine Program Participation and Outcomes for Older Adult Intergenerational Technology Program Participants	Leedahl, S. N., Brasher, M., Capolino, A., & Estus, E.	Journal of Intergenerational Relationships	2023	This is a quasi-experimental study evaluating the University of Rhode Island Engaging Generations Cyber-Seniors (URI eGen Cyber-Seniors) Program. It examines the impact of the program on older adults' social integration, digital competence, and technology use. The study finds significant improvements in these areas for program participants compared to non-participants. The paper provides evidence supporting the effectiveness of the digital literacy program.
99	The informatics lifecourse: Studying the experiences of older adults learning technology in senior centers	Lenstra, N.	ASIS&T Annual Meeting	2017	This is a poster that describes an ethnographic research paper that studies the experiences of older adults learning technology in senior centers. It does not evaluate a specific digital literacy program but rather documents and analyzes the experiences of older adults, highlighting their determination and creativity in learning technology. The study introduces the concept of the "informatics lifecourse" to explain how older adults learn technology over time. It emphasizes the role of community-based

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					institutions like senior centers in supporting digital literacy learning practices.
100	THE COMMUNITY INFORMATICS OF AN AGING SOCIETY: A COMPARATIVE CASE STUDY OF SENIOR CENTERS AND PUBLIC LIBRARIES	Lenstra, N.	Dissertation	2016	This is a dissertation that uses a comparative case study approach to investigate how community-based information infrastructure, specifically public libraries and senior centers, supports older adult digital literacy. It does not evaluate a specific digital literacy program but examines the broader role of these institutions in promoting digital literacy among older adults.
101	Exploring Community Inclusion in Older Adulthood through the use of Computers and Tablets	Leonard, K.	Dissertation	2017	This is a qualitative research study exploring how computers and tablets can facilitate community engagement for socially isolated older adults. It does not evaluate a specific digital literacy program but suggests that digital literacy training, particularly through intergenerational learning, could help overcome barriers. The study uses interviews to understand the challenges and opportunities related to digital literacy and online volunteering.
102	Implementing Technology Literacy Programs in Retirement Homes and Residential Care Facilities: Conceptual Framework	Li, K. S.; Nagallo, N.; McDonald, E.; Whaley, C.; Grindrod, K.; & Boluk, K.	JMIR Aging	2022	This paper presents a conceptual framework for implementing technology literacy programs (TLPs) in retirement homes and residential care facilities. It does not evaluate a specific digital literacy program but provides a structured approach using the enTECH Computer Club's knowledge translation toolkit and the framework for person-centered care. The framework is categorized into "structure," "process," and "outcome" domains.
103	Bridging Connectivity Issues in Digital Access and Literacy: Reflections on Empowering Vulnerable Older Adults in Singapore	Lim, H. A.; Lee, J. S. W.; Lim, M. H.; Teo, L. P. Z.; Sin, N. S. W.; Lim, R. W.; Chua, S. M.; Yeo, J. Q.; Ngiam, N. H. W.; Tey, A. J. Y.; Tham, C. Y. X.; Ng, K. Y. Y.; Low, L. L.; & Tang, K. W. A.	JMIR Aging	2022	This paper is a descriptive account of a specific digital literacy program called Project Wire Up in Singapore. It evaluates the program by discussing the barriers faced and solutions implemented to improve digital literacy among vulnerable older adults. The paper provides insights into the program's structure, including its 3-pronged approach and tiered curriculum, and highlights the role of grassroots organizations and government initiatives in supporting the program. It is not a survey or theoretical analysis but rather an evaluation of a specific initiative.

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104	Exploring the intersections of immigrant seniors' digital literacies and social connectedness: a Canadian study	Lin, C. C.; Li, N. J.; & Lee, E.	Frontiers in Education	2023	This is a qualitative research study using narrative inquiry to explore how immigrant seniors in Canada engage with digital technologies for social connectedness during the COVID-19 pandemic. It does not evaluate a specific digital literacy program but provides insights and strategies for designing senior-friendly digital literacy programs. The study identifies themes such as online social interaction, digital making, and community support as crucial for fostering digital literacy among seniors.
105	Technology, Autonomy, and Participation: Designing Community Games and Services to Enhance Older Adults' Technology Literacy	Liu, H., Kim, M., Li, M., & Narayan, S. L.	Congress of the International Association of Societies of Design Research	2021	This article discusses a research project aimed at improving technology literacy among older adults by designing community games and services that enhance their sense of autonomy and participation . The researchers conducted surveys and interviews to understand older adults' technology usage patterns and barriers, developing three personas based on technology literacy levels. They then created game prototypes and a service system to address specific challenges faced by older adults at different literacy levels, with the goal of increasing their confidence and motivation to learn and use digital technologies
106	Active Ageing -Enhancing Digital Literacies in Elderly Citizens	Loureiro, A., & Barbas, M.	HCI International Conference 2014	2014	The is a research in-progress paper that evaluates a specific digital literacy program through hands-on workshops tailored to the needs of elderly citizens, identified via a questionnaire. It includes a pilot study to assess feasibility and is part of a broader initiative called "Active Citizenship | Grandparents 2.0" aimed at enhancing digital literacy among Portuguese seniors.
107	The Study of Smartphone Usage Competency Assessment and Training for the Elderly	Lu, S. C., Wen, T. N., & Chang, P. L.	Medinfo	2017	This is a research study that evaluates a specific digital literacy training program for the elderly. The study aimed to develop an assessment of smartphone usage competence and construct a training program based on defined competencies. It involved 41 participants and showed significant improvements in smartphone usage ability after the training. The study used a pre-test and post-test design to evaluate the effectiveness of the training program.

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108	Bridging the Digital Divide for Older Adults via Observational Training: Effects of Model Identity from a Generational Perspective	Ma, Q., Chan, A. H., & Teh, P. L.	Sustainability	2020	This is an empirical research study that evaluates a specific digital literacy training program for older adults using observational training through behavior modeling. The study involved an experiment with 59 older adults in Hong Kong, assessing the effectiveness of different generational models (child, young adult, older adult) on training outcomes. It found that the older adult model was most effective in enhancing self-efficacy and willingness to use technology. The study provides evidence for using behavior modeling to promote digital literacy among older adults.
109	The new role of nursing in digital inclusion: Reflections on smartphone use and willingness to increase digital skills among Chinese older adults	Ma, T., Zhang, S., Zhu, S., Ni, J., Wu, Q., & Liu, M.	Geriatric Nursing	2022	This is a qualitative research study using theme analysis to explore older adults' willingness to use smartphones and improve their digital skills. It involves semi-structured interviews with 23 older adults in China. The study identifies four themes: current smartphone use, digital dilemmas, social support for digital skills, and willingness to learn digital skills. It emphasizes the role of nursing in promoting digital inclusion but does not evaluate a specific digital literacy program. Instead, it surveys older adults to understand their experiences and needs regarding digital literacy.
110	The role of curiosity triggers and features in digital literacy training	Maceviciute, E., Manžuch, Z., & Gudinavičius, A.	Library & Information Science Research	2023	This is a qualitative research study that evaluates a specific digital literacy training program using digital comics to enhance engagement among vulnerable groups in Lithuania. It examines how curiosity triggers and features influence participation and sustained interest in digital literacy training. The study uses qualitative content analysis of data from graphic questionnaires, focus groups, and interviews. It highlights the importance of novelty, surprise, perceived utility value, and resource availability in fostering engagement and sustaining interest. The findings inform instructional design and policy-making for promoting digital inclusion.

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111	Blended Learning Supported on a Learning Management System An Intervention for Digital Literacy for Older Adults	Martinez-Alcala, C. I., Cepeda-Rebollar, R. M., Ramírez-Salavador, J. Á., Rosales-Lagarde, A., Jimenez-Rodriguez, B., & Lopez-Noguerola, J. S.	Iberian Conference on Information Systems and Technologies	2018	This paper is a research study evaluating a specific digital literacy program for older adults using a blended learning approach supported by a Learning Management System (LMS). It involved 81 participants aged 60 and above, with a focus on developing digital skills through multimedia teaching materials. The study assessed the program's effectiveness through usability and validation tests, finding that while participants found it useful, they preferred it as a support tool due to the need for instructor assistance.
112	Digital Inclusion in Older Adults: A Comparison Between Face-to-Face and Blended Digital Literacy Workshops	Martínez-Alcalá, C. I., Rosales-Lagarde, A., Alonso-Lavernia, M. D. L. Á., Ramírez-Salvador, J. Á., Jiménez-Rodríguez, B., Cepeda-Rebollar, R. M., ... & Agis-Juárez, R. A.	Frontiers in ICT	2018	This is a research study that evaluates a specific digital literacy program for older adults by comparing face-to-face and blended workshops. It uses a Learning Management System (LMS) to support the blended workshop and measures digital literacy improvements using the Senior Digital Literacy Evaluation (SDLE) instrument. The study found that digital literacy increased more significantly in the blended learning group. The paper also includes a validation test for the blended workshop.
113	The Effects of Covid-19 on the Digital Literacy of the Elderly: Norms for Digital Inclusion	Martínez-Alcalá, C. I., Rosales-Lagarde, A., Pérez-Pérez, Y. M., Lopez-Noguerola, J. S., Bautista-Díaz, M. L., & Agis-Juarez, R. A.	Frontiers in Education	2021	This is a research study evaluating a specific digital literacy program, the Digital Literacy Workshop for the Elderly (TAD), which was adapted to an online format due to COVID-19. The study uses the Digital Literacy Evaluation (DILE) to assess changes in digital literacy among older adults across different stages of learning. It found significant improvements in digital literacy levels among participants.
114	DESIGNING AN ACTIVE AGEING COURSE FOR SENIORS WITH A CO-CREATION PERSPECTIVE	Martínez-Molina, S., Fornes, G., de Almeida Cunha, S. M., Bueno, L., Garcés, J., Pérez, D., & Quílez, M.	INTED2019 Proceedings	2019	This is an empirical research paper focused on developing a training program for seniors to participate in the not-for-profit sharing economy. It uses a co-creation methodology to design the program, involving stakeholders in the process. The paper does not evaluate an existing digital literacy program but rather develops a new one aimed at enhancing digital skills among seniors.

ID #	Title	Authors	Venue	Year	Summary
115	The warm expert-A warm teacher? Learning about digital media in intergenerational interaction	Martinez, C., & Olsson, T.	Convergence	2022	This is a qualitative research study exploring the role of "warm experts" in facilitating digital literacy among older adults through intergenerational learning. It uses in-depth interviews with older adults in Sweden to understand their experiences of learning digital media from younger family members. The study identifies opportunities and barriers to learning, focusing on interaction dynamics rather than evaluating a specific digital literacy program. It is structured around Illeris's model of learning and highlights factors like physical proximity and time availability as influencing learning opportunities.
116	Accounting for diversity in older adults' digital inclusion and literacy: the impact of a national intervention	McCosker, A., Critchley, C., Walshe, J., Tucker, J., & Suchowerska, R.	Ageing & Society	2023	This is a research study evaluating the impact of the "Be Connected" digital literacy program in Australia. It uses a mixed-methods approach, including surveys and interviews, to assess the program's effectiveness in improving digital skills and literacy among older adults. The study identifies diverse groups within the older adult population and emphasizes the need for tailored interventions. It provides insights into the challenges faced by older adults in digital inclusion and suggests improvements for future program designs.
117	Competency-based training to develop basic computer skills for the elderly: a case study of the Dusit community, Bangkok, Thailand	Meethongjan, K., & Tachpetpaiboon, N.	Procedia-Social and Behavioral Sciences	2015	This is a research study evaluating a specific competency-based training program aimed at developing basic computer skills for the elderly in the Dusit community, Bangkok, Thailand. The study used pre-test and post-test assessments to evaluate the effectiveness of the training, showing statistically significant improvements in digital literacy among participants.
118	Elderly People and the Barriers to Digital Education	Melchior, C.	Italian Journal of Sociology of Education	2023	This is a research study that compares survey data from 2019 and 2022 to understand digital literacy among the elderly. It does not evaluate a specific digital literacy program but surveys the elderly population to identify barriers to digital education, such as low motivation and comfort with technology. The study finds that while technology use frequency has increased, comfort levels have not significantly improved, indicating persistent barriers.

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119	Digital inclusion for social inclusion. Case study on digital literacy	Méndez-Domínguez, P., Carbonero Muñoz, D., Raya Díez, E., & Castillo De Mesa, J.	Frontiers in Communication	2023	This is a research study that uses both quantitative and qualitative methods to explore digital literacy and its impact on social inclusion. It does not evaluate a specific digital literacy program but conducts a survey and focus groups to understand digital literacy's role in promoting social inclusion.
120	The significance of digital citizenship in the well-being of older migrants	Millard, A.; Baldassar, L.; & Wilding, R.	Public Health	2018	The paper is an ethnographic study that evaluates a specific digital literacy program, the Internet Café in Perth, Western Australia. It examines how digital literacy training supports the well-being of older migrants by enhancing their ability to maintain social networks, access healthcare services, and increase autonomy and social participation. The program uses a community of practice approach to facilitate learning.
121	Digital Literacy Training for Low-Income Older Adults Through Undergraduate Community-Engaged Learning: Single-Group Pretest-Posttest Study	Miller, L. M. S.; Callegari, R. A.; Abah, T.; & Fann, H.	JMIR Aging	2023	This is a research study evaluating a specific digital literacy training program using a community-engaged learning (CEL) approach. The program pairs undergraduate students with low-income older adults to improve digital literacy skills. The study reports significant improvements in digital literacy and confidence among older adults, highlighting the potential of intergenerational approaches to reduce the digital divide. The study uses a single-group pretest-posttest design.
122	Changing Patterns of Perceived ICT Skill Levels of Elderly Learners in a Digital Literacy Training Course	Miwa, M., Nishina, E., Kurosu, M., Takahashi, H., Yaginuma, Y., Hirose, Y., & Akimitsu, T.	Library and Information Science Research E-Journal	2017	This is a research study evaluating a specific digital literacy training program offered by the Open University of Japan. It conducts a survey to understand changes in perceived ICT skills among elderly learners one to three years after completing the course. The study finds that most ICT skills decline over time, but frequent use of PCs and the Internet, self-instruction, peer learning, and TV courses help retain these skills. The paper uses statistical analysis and visualizations to support its findings.
123	A digital media literacy intervention for older adults improves resilience to fake news	Moore, R. C., & Hancock, J. T.	Scientific Reports	2022	This is a research study that evaluates the effectiveness of a specific digital literacy program, MediaWise for Seniors, aimed at improving older adults' resilience to fake news. The study found that the intervention significantly improved participants' ability to discern true from false news, demonstrating the program's effectiveness.

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124	Teaching older people internet skills to minimize grey digital divides Developed and developing countries in focus	Mubarak, F., & Nycyk, M.	Journal of Information, Communication and Ethics in Society	2017	The paper is a systematic literature review that explores the grey digital divide affecting older people in developed and developing countries. It examines how country type and cultural factors influence older people's willingness to learn internet skills. The paper emphasizes the importance of government funding and policy informed by evidence-based research. It does not evaluate a specific digital literacy program but reviews existing literature to understand the broader context and challenges. The paper highlights the need for internet skills education as a strategy to minimize the grey digital divide.
125	Improving older adults' telehealth through a novel community-academic partnership: Preliminary data	Neumann, A. V.; Gonzalez, A.; Walter, L. C.; & Rivera, J.	Journal of the American Geriatrics Society	2023	This is a research in progress paper evaluating a specific digital literacy program called Tech Allies for Health. The program was developed through a community-academic partnership to improve telehealth skills among older adults. The study involved providing devices and volunteer trainers to older adults, conducting remote training sessions, and evaluating outcomes through surveys and interviews. The results showed significant improvements in telehealth skills and confidence among participants. Limitations include a small sample size and lack of a control group. The program's success highlights the benefits of community-academic partnerships in promoting digital literacy.
126	Building Digital Literacy in Older Adults of Low Socioeconomic Status in Singapore (Project Wire Up): Nonrandomized Controlled Trial	Ngiam, N. H. W., Yee, W. Q., Teo, N., Yow, K. S., Soundararajan, A., Lim, J. X., ... & Low, L. L.	Journal of Medical Internet Research	2022	This is a nonrandomized controlled trial evaluating the impact of a specific digital literacy program called Project Wire Up. The program is volunteer-led, one-on-one, and home-based, aimed at improving digital literacy among older adults of low socioeconomic status in Singapore. The study found significant improvements in digital literacy but no significant changes in loneliness, social connectedness, quality of life, or well-being.
127	InfoBiTS: A Mobile Application to Foster Digital Competencies of Senior Citizens	Noichl, S.; & Schroeder, U.	European Conference on Technology Enhanced Learning	2020	This is a research in progress paper that evaluates a specific digital literacy program called InfoBiTS, which is a mobile application designed to enhance digital competencies among senior citizens. The paper includes a pilot study that assesses the usability and comprehensibility of the app's modules. The study emphasizes the importance of everyday relevance and video content in learning materials for seniors.

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128	Teaching older people computer literacy: the rewards of supporting students' explorations of technology	Nycyk, M.	Educational Gerontology	2020	This is an ethnographic essay (2 pages) that discusses digital literacy training by observing the impact of supportive tutors and the freedom to explore computer literacy topics on older learners. It does not evaluate a specific digital literacy program or conduct a survey but rather reflects on the author's 10 years of fieldwork and observations. The essay highlights the transformative potential of digital literacy for older people when they are given the opportunity and support to learn.
129	COMPARISON OF PROMPTING PROCEDURES TO TEACH INTERNET SKILLS TO OLDER ADULTS	Pachis, J. A., & Zonneveld, K. L.	Journal of Applied Behavior Analysis	2018	This is a research study that evaluates the effectiveness and efficiency of video prompting and text-based instructions for teaching Internet and ICT skills to older adults. It does not evaluate a specific digital literacy program but compares two instructional methods. The study found both methods effective, with varying efficiency across participants.
130	INTERGENERATIONAL LEARNING WITH ICT: A CASE STUDY	Patrício, M. R., & Osório, A.	Studia Paedagogica	2016	This is a case study research paper that explores the contribution of intergenerational learning to digital literacy and social inclusion. It evaluates the impact of intergenerational ICT workshops on different age groups without focusing on a specific digital literacy program. The study identifies benefits such as increased digital literacy, social inclusion, and improved intergenerational relations through three distinct case studies conducted between 2011 and 2013.
131	Game-Based Learning for Fostering Digital Literacy in Older Adults: An Intergenerational Approach	Perim, C., Sousa, C., & Damásio, M. J.	International Conference on Human-Computer Interaction	2024	The paper is a systematic literature review that explores the intersection of intergenerational dynamics, digital literacy, and game-based learning (GBL) for older adults. It consolidates existing research to understand how GBL and intergenerational interactions can enhance digital literacy among older adults. The study does not evaluate a specific digital literacy program but rather reviews literature to highlight potential strategies and challenges in this area.
132	The Left Behind Generation: Instructional Practices to Increase the Technological Literacy of Older Adults	Phillips, D. P.	Dissertation	2019	This dissertation is a mixed-methods research study evaluating community-based technology training programs for adults aged 55 and older. It examines instructional practices and participant perceptions to address gaps in technological literacy among older

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					adults. The study uses qualitative and quantitative methods but does not evaluate a specific digital literacy program.
133	Older adults' reasons to participate in digital skills learning: An interdisciplinary, multiple case study from Austria, Finland, and Germany	Pihlainen, K., Ehlers, A., Rohner, R., Cerna, K., Kärnä, E., Hess, M., ... & Müller, C.	Studies in the Education of Adults	2023	This is a research study employing a multiple-case design to investigate why older adults participate in digital skills learning opportunities. It uses both qualitative and quantitative methods across Austria, Finland, and Germany. The study identifies social, individual, and technical reasons for participation but does not evaluate a specific digital literacy program. Instead, it aims to understand the motivations behind participation in digital skills training.
134	Perceived benefits from non-formal digital training sessions in later life: views of older adult learners, peer tutors, and teachers	Pihlainen, K., Korjonen-Kuusipuro, K., & Kärnä, E.	International Journal of Lifelong Education	2021	This is a research study that uses a survey method to understand the perceived benefits of digital literacy training for older adults, ICT teachers, and peer tutors in Finland. It does not evaluate a specific program but explores the general impacts of digital skills training on participants' digital literacy, independence, and wellbeing.
135	DRAMATIZATION AND DIGITAL TECHNOLOGY IN INTERGENERATIONAL LEARNING	Polymeris, G.; Giannakoulopoulos, A.; & Tiligadis, K.	Proceedings of Digital Culture & Audiovisual Challenges: Interdisciplinary Creativity In Arts And Technology	2018	The paper is a qualitative research study that evaluates the use of dramatization and digital technology in promoting digital literacy among the elderly through intergenerational learning activities. It involved a specific program where elderly participants were trained in digital skills by interacting with younger participants, using methods like digital storytelling and reverse mentoring. The evaluation was formative, conducted throughout the project's duration. The study concluded that these methods effectively enhance digital literacy and promote intergenerational solidarity.
136	INCREASING THE EFFICIENCY OF ICT EDUCATION OF THE ELDERLY ACCORDING TO THEIR ICT PROFICIENCY	Pospíšil, J., Špatenková, N., & Pospíšilová, H.	ICERI2017 Proceedings	2017	This is a research study that proposes a model for optimizing ICT education for the elderly by tailoring course curricula to different levels of ICT proficiency. It is based on empirical research involving 3,855 respondents to verify the legitimacy of an ICT proficiency index. The study does not evaluate a specific digital literacy program but suggests curriculum adjustments in four key areas: smartphone usage, computer usage in everyday situations, online communication, and social networking. The aim is to enhance the effectiveness of ICT education for the elderly.

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137	Promoting Digital Proficiency and Health Literacy in Middle-aged and Older Adults Through Mobile Devices With the Workshops for Online Technological Inclusion (OITO) Project: Experimental Study	Quialheiro, A.; Miranda, A.; Garcia Jr, M.; de Carvalho, A. C.; Costa, P.; Correia-Neves, M.; & Santos, N. C.	JMIR Formative Research	2023	This is a research study evaluating a specific digital literacy program, the OITO project, which aimed to improve digital and health literacy among middle-aged and older adults through an 8-workshop program. The study found significant improvements in digital literacy but not in health literacy. It used a quasi-experimental design and reported high recruitment and satisfaction rates. Limitations included the lack of a control group.
138	National digital strategies and innovative eHealth policies concerning older adults' dignity: a document analysis in three Scandinavian countries	Raja, M., Kymre, I. G., Bjerkan, J., Galvin, K. T., & Uhrenfeldt, L.	BMC Health Services Research	2023	This is a document analysis study that examines national digital strategies and eHealth policies concerning older adults' dignity in Norway, Sweden, and Denmark. It does not evaluate a specific digital literacy program but discusses the promotion of digital literacy through national strategies. The study highlights issues such as unequal access to digital services and the importance of security in eHealth systems. It is a qualitative research paper.
139	'Borrowed access'the struggle of older persons for digital participation	Reneland-Forsman, L.	International Journal of Lifelong Education	2018	This is a qualitative research study that explores the engagement of older persons with digital interfaces and their social inclusion. It does not evaluate a specific digital literacy program but investigates the broader context of digital literacy among older adults through interviews. The study suggests informal learning scenarios as a potential solution for improving digital inclusion.
140	Optimising conditions and environments for digital participation in later life: A macro-meso-micro framework of partnership-building	Reuter, A.; Xu, W.; Iwarsson, S.; Olsson, T.; & Schmidt, S. M.	Frontiers in Psychology	2023	The paper is a perspective article proposing a macro-meso-micro framework for partnership building to enhance digital participation among older adults. It does not evaluate a specific digital literacy program or conduct a survey but instead focuses on theoretical and conceptual discussions to influence policy and research agendas.
141	Discontinued Information and Communication Technology Usage among Older Adults in Continuing Care Retirement Communities in the United States	Rikard, R. V.; Berkowsky, R. W.; & Cotten, S. R.	Gerontology	2018	This is a research study using a randomized controlled trial to evaluate the effects of an 8-week ICT training intervention on older adults in continuing care retirement communities (CCRCs). It examines whether the training affects the likelihood of discontinued ICT use, searching for health information, and searching for general information. The study finds that ICT training can motivate continued use by increasing skill levels and confidence, particularly among independent living residents. It highlights the role of age and IADL impairments as factors

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					increasing the risk of discontinuation. The study uses longitudinal data and flexible parametric regression models for analysis.
142	A New Tool for Assessing Mobile Device Proficiency in Older Adults: The Mobile Device Proficiency Questionnaire	Roque, N. A., & Boot, W. R.	Journal of Applied Gerontology	2018	This is a research study focused on developing and validating the Mobile Device Proficiency Questionnaire (MDPQ) to assess mobile device proficiency in older adults. It does not evaluate a specific digital literacy program but provides a tool that can inform digital literacy training by assessing proficiency levels. The study includes statistical validation of the questionnaire's reliability and validity. One of the findings of this study is the need to tailor content- The MDPQ can be used to tailor training programs for older adults by assessing their initial proficiency levels.
143	Explicit and Implicit Intergenerational Digital Literacy Dynamics: How Families Contribute to Overcome the Digital Divide of Grandmothers	Rosales, A., & Blanche-T, D.	Journal of Intergenerational Relationships	2022	This is a qualitative research study that examines intergenerational family dynamics affecting the digital literacy of grandmothers in five countries. It uses focus groups and thematic analysis to explore informal learning processes within families, without evaluating a specific digital literacy program. The study highlights the role of explicit and implicit learning dynamics in promoting digital literacy among older women.
144	Digital Inclusion Competences for Senior Citizens: The Survival Basics	Rose, J., Holgersson, J., & Söderström, E.	International Conference on Electronic Government	2020	This is a research study that evaluates digital literacy training through qualitative analysis of workshops conducted under the Mer Digital program. It focuses on understanding and developing a competence framework tailored for senior citizens' digital inclusion, based on their expressed needs and perceptions. The study identifies key competences such as information literacy, communication, and transactional skills as essential for seniors in a digital society.
145	Tech Mentors, Warm Experts and Digital Care Work: Pandemic Lessons from a Remote Digital Literacy Training Program for Older Adults	Sawchuk, K., & Lafontaine, C.	International Conference on Human-Computer Interaction	2022	This paper is a research study evaluating a specific digital literacy program implemented by two Canadian non-profit organizations during the COVID-19 pandemic. The program involved distributing tablets and providing remote digital training to older adults. The study used surveys, interviews, and observations to assess the program's impact on older adults and the organizations involved, focusing on what participants found valuable and the challenges they faced.

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146	Educational Concepts of Digital Competence Development for Older Adults-A Scoping Review	Schirmer, M., Dalko, K., Stoevesandt, D., Paulicke, D., & Jahn, P.	International Journal of Environmental Research and Public Health	2023	The paper is a scoping review that systematically extracts and synthesizes existing literature on educational programs designed to support digital competences in older adults. It does not evaluate a specific digital literacy program but provides an overview of various strategies and criteria for developing such programs. The review includes 47 publications and aims to identify best practices and challenges in promoting digital literacy among older adults.
147	Digital skills training for older people: The importance of the 'lifeworld'	Schirmer, W., Geerts, N., Vercruyssen, A., & Glorieux, I.	Archives of gerontology and geriatrics (Print)	2022	This is a theoretical research paper that proposes a framework for improving digital skills training for older adults by considering their "lifeworlds." It is based on qualitative interviews with ICT instructors in Flanders and does not evaluate a specific digital literacy program but offers a theoretical analysis to enhance training effectiveness. The paper is part of ongoing research on digital inclusion.
148	How Older Adults Learn ICT-Guided and Self-Regulated Learning in Individuals With and Without Disabilities	Schlomann, A., Even, C., & Hammann, T.	Frontiers in Computer Science	2022	This is a qualitative research study that explores ICT learning strategies and preferences among older adults with and without intellectual disabilities through semi-structured interviews. It does not evaluate a specific digital literacy program but aims to understand the learning preferences and strategies of the target population. The study finds that guided learning in one-to-one settings is the most preferred format for both groups. The paper suggests that ICT training should be modular, combining guided and self-regulated learning based on individual abilities and preferences.
149	Problematizing the Digital Literacy Paradox in the Context of Older Adults' ICT Use: Aging, Media Discourse, and Self-Determination	Schreurs, K.; Quan-Haase, A.; & Martin, K.	Canadian Journal of Communication	2017	This is a research study that uses surveys and interviews to understand older adults' digital literacy, barriers they face, and the support systems they rely on. It proposes a model for understanding their needs in gaining digital literacy, emphasizing the importance of experience and social support. The study does not evaluate a specific digital literacy program but provides insights into the broader context of digital literacy among older adults.

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150	Gluu Essentials Digital Skills Training for Middle-Aged and Older Adults That Makes Skills Stick: Results of a Pre-Post Intervention Study	Seaton, C. L.; Rush, K. L.; Hung Li, E. P.; Hasan, M. K.; & Fawcus, L.	JMIR Aging	2023	This is a pre-post intervention study evaluating the Gluu Essentials digital skills training program for middle-aged and older adults. It assesses the program's effectiveness in improving mobile device proficiency and engagement in online activities, finding increased proficiency and activity frequency but unchanged confidence levels. The program is deemed effective and acceptable, with recommendations for enhanced delivery.
151	An Intergenerational Information and Communications Technology Learning Project to Improve Digital Skills: User Satisfaction Evaluation	Seguí, F. L., de San Pedro, M., Verges, E. A., Algado, S. S., & Cuyàs, F. G.	JMIR Aging	2019	This is a research study evaluating a specific digital literacy program called "Digital Partners," which is an intergenerational ICT learning project. The study assesses participant satisfaction using quantitative and qualitative methods, finding high satisfaction levels among participants. The project aims to improve digital skills among seniors by pairing them with junior participants.
152	Evidence-based digital literacy class for older, low-income African-American adults	Seo, H., Erba, J., Altschwager, D., & Geana, M.	Journal of Applied Communications Research	2019	This is a research study evaluating a specific digital literacy program for older, low-income African-American adults. The study involves a community engagement project with 47 participants from a senior community center. It uses a mixed-methods approach to evaluate the impact of a four-month long computer class on participants' digital literacy skills, focusing on privacy, security, and information verification. The findings offer insights into adult learning in digital literacy among marginalized populations and provide a framework for similar programs.
153	Evaluating the Social and Technological Benefits of an Intergenerational Program for Older Adults	Serrano, I.	Master's Thesis	2018	This thesis involves conducting a research study evaluating the University of Rhode Island's Cyber-Seniors Program, an intergenerational digital literacy training program. It assesses older adults' outcomes related to social isolation, loneliness, social engagement, and digital competency through pre/post surveys. The study found significant improvements in digital competence but not in social isolation, social engagement, or loneliness. Qualitative feedback was positive regarding technological knowledge and interactions.

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154	Improving Indonesian seniors' digital resilience and quality of life through the Digital Academy for Seniors program	Setiansah, M.; Nuryanti, N.; Santoso, E.; Runtiko, A. G.; & Novianti, W.	Journal of Media Literacy Education,	2023	This is a qualitative research paper evaluating the Digital Academy for Seniors program, a non-formal learning initiative aimed at improving digital literacy among seniors. The study assesses changes in knowledge, attitudes, and skills through focus group discussions and pre-and post-tests, demonstrating the program's effectiveness in enhancing digital resilience and quality of life for seniors.
155	Situating bridge: Understanding older adults' digital leisure practices during the COVID-19 pandemic	Snellgrove, M.; & Punch, S.	Journal of Leisure Research	2024	This is a qualitative research study exploring how older adults adapted their bridge-playing habits during the COVID-19 pandemic, shifting from in-person to digital play. It uses diary accounts to understand these changes, focusing on digital literacy and technology's role in maintaining social connections and leisure activities. The study highlights digital transition facilitators' importance but does not evaluate a specific digital literacy program. Instead, it examines the broader context of digital literacy as it relates to older adults adapting to digital leisure activities during the pandemic.
156	Computer Education and Third Age Universities: A Systematic Review	Sobral, S. R.; & Sobral, M.	International Journal of Environmental Research and Public Health	2021	The paper is a systematic review that evaluates existing literature on computer education at senior universities. It does not evaluate a specific digital literacy program but categorizes findings into educators, organizations/directors, students, and conceptual/review papers. It aims to understand the demographics, motivations, and barriers for older adults in learning ICT and suggests future guidelines for teaching.
157	Digital Participation Among People Aged 50+ in Switzerland: Insights to Course Offers and Training Experiences	Speck, S.; & Ruther, L.; Misoch, S.	International Conference on Information and Communication Technologies for Ageing Well and e-Health	2023	The paper is a research in progress article that uses a mixed-methods approach to assess digital training courses for people aged 50+ in Switzerland. It focuses on qualitative data from program analysis and interviews to understand the experiences and needs of participants. The study aims to evaluate the status quo of digital trainings, investigate participant needs, and provide best practice recommendations. It does not evaluate a specific digital literacy program but conducts a survey to understand digital literacy training promotion. The study highlights the importance of tailoring courses to target groups and the role of digital skills in social inclusion.

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158	The Effect of Using the Chatbot to Improve Digital Literacy Skill of Thai Elderly Kanyarat	Sriwisathiyakun, K.	World Conference on Information Systems and Technologies	2023	This is a research study evaluating a specific digital literacy program using a chatbot called "Senior See Net" for Thai elderly. The study involved developing the chatbot, validating it with experts, and testing it with elderly participants. It found significant improvements in digital literacy and high user satisfaction. The methodology used is research and development.
159	Enhancing digital literacy with an intelligent conversational agent for senior citizens in Thailand	Sriwisathiyakun, K., & Dhamanitayakul, C.	Education and Information Technologies : Official Journal of the IFIP technical committee on Education	2022	The paper is a research study that develops and evaluates a new digital literacy program using a chatbot called "Senior See Net" for senior citizens in Thailand. It conducts a survey to understand baseline digital literacy levels and preferences among senior citizens, then uses this data to design and validate the chatbot. The study does not evaluate an existing program but creates a new tool to enhance digital literacy.
160	Breaking Digital Barriers: A Social-Cognitive Approach to Improving Digital Literacy in Older Adults	Steelman, K. S., Tislar, K. L., Ureel, L. C., & Wallace, C.	18th International Conference, HCI International 2016	2016	This is a research in-progress paper that evaluates a specific digital literacy program called BASIC (Building Adult Skills in Computing). The program pairs students with older adults to help them with computing technology, using Social Cognitive Theory to inform their approach. The paper reviews socio-technical barriers and describes ongoing work to formalize the training program and develop supportive technology.
161	Eliciting Best Practices in Digital Literacy Tutoring: A Cognitive Task Analysis Approach	Steelman, K. S.; Tislar, K. L.; Ureelii, L. C.; & Wallace, C.	HCI International 2017	2017	This is a narrative study that evaluates the BASIC digital literacy program for older adults using cognitive task analysis. It identifies best practices in tutoring through semi-structured interviews with experienced tutors and provides a framework for tutor training. The study emphasizes the importance of independent practice and plans to develop additional learning support tools.
162	Identifying and Mitigating Technology-Related Anxiety	Steelman, K.; & Wallace, C.	International ACM SIGACCESS Conference on Computers and Accessibility	2017	The paper is for a POSTER SESSION by Kelly Steelman and Charles Wallace (2017) where they briefly discuss their research study that evaluates the BASIC digital literacy program for older adults. It identifies technology-related anxiety as a significant barrier to digital literacy and explores strategies to mitigate this anxiety. The study proposes an anxiety-aware design toolkit to enhance digital literacy training.

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163	Governance networks that strengthen older adults' digital inclusion: The challenges of metagovernance	Suchowerska, R.; & McCosker, A.	Government Information Quarterly	2021	This is a case study research paper that evaluates the "Be Connected" program, a nation-wide, state-led digital skills and literacy initiative in Australia aimed at empowering older adults. It combines an exploratory survey and semi-structured interviews to assess how community-based organizations leverage program resources. The paper discusses the challenges and successes of implementing the program through a metagovernance model, focusing on balancing standardized resources with customized support. It specifically evaluates the "Be Connected" program rather than conducting a general survey on digital literacy training promotion.
164	Older adults in the digital age in Latin America: bridging the digital age divide 1	Sunkel, G.; & Ullmann, H.	CEPAL Review	2019	The paper is a comprehensive research study that examines the use and appropriation of digital technologies among older adults in Latin America. It uses national household survey data to analyze Internet use trends and determinants among older adults, highlighting a significant digital age divide. The paper evaluates policies and programs promoting digital inclusion but does not focus on a specific digital literacy program. It provides a regional overview and offers policy recommendations to improve ICT access and usage among older adults.
165	Technology training for older job-seeking adults: The efficacy of a program offered through a university-community collaboration	Taha, J.; Czaja, S.J.; & Sharit, J.	Educational Gerontology	2016	This is a research study evaluating a specific digital literacy program for older job-seeking adults. The study examined the feasibility and efficacy of an e-learning training program focused on Microsoft Excel, implemented through an academic-community partnership. The program improved participants' technology skills and was well-received, demonstrating the potential of such initiatives to enhance digital literacy among older adults.
166	Teenaged Internet tutors' level of interactivity -by sharing tacit and explicit knowledge with older learners	Tambaum, T.; & Normak, P.	European journal for Research on the Education and Learning of Adults	2018	This is a research study examining the interactivity of teenage tutors teaching digital skills to older adults. It does not evaluate a specific digital literacy program but investigates how previous experience and preparation affect tutoring techniques. The study finds that teenage tutors often use non-interactive methods and suggests a need for better training in interactive techniques. It proposes hypotheses for future research on naturalistic tutoring.

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					The paper is not a survey or evaluation of a specific program but an analysis of tutoring processes.
167	Role of technology in the relationship between grandparents and grandchildren in Asia	Tan, C. K.; & Liu, C.	Gerontechnology	2022	This is a half-page summary for an Oral Presentation that describes a literature review paper examining the role of technology in the relationship between grandparents and grandchildren, particularly in Asian societies where filial piety is important. It discusses how technology can foster closeness and enhance digital literacy through reverse mentoring by grandchildren. It does not evaluate a specific digital literacy program or conduct a survey.
168	Breaking Barriers: Designing Digital Inclusion and Digital Literacy Learning Programs for Senior Citizens	Tan, Y.Y.; Neo, M.; & Asran, I.N.M.	2023 7th International Conference on E-Society, E-Education and E-Technology (ESET)	2023	The paper is a research study that evaluates a specific digital literacy program called "Bengkel Teknologi Senior" for senior citizens in Malaysia. It focuses on promoting digital inclusion through intergenerational learning and aligns its learning modules with the European Digital Competence Framework for Citizens. The study discusses the program's design, objectives, and potential improvements. It includes detailed descriptions of the learning modules and instructional strategies used. The evaluation is based on mapping the program's modules to the DigComp framework.
169	Digital Literacy of Older Women with Smartphones: a Dialogic Approach to Overcoming Barriers	Tellado, I., Girbés-Peco, S., Joanpere-Foraster, M., & Burgués-Freitas, A.	Research on Ageing and Social Policy	2024	This is a case study evaluating a specific digital literacy program for older women using smartphones. It uses qualitative methods to assess the impact of a dialogic learning approach on participants' autonomy, social relationships, and digital literacy skills. The study is part of a larger project focused on empowering vulnerable women through adult education. The findings highlight the program's success in enhancing participants' self-confidence and digital skills.

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170	Determination of Internet appropriation by older people through technological support services	Tirado-Morueta, R., Rodríguez-Martín, A., Álvarez-Arregui, E., Ortíz-Sobrino, M. Á., & Aguaded-Gómez, J. I.	New Media & Society	2023	This is a research study that surveys older adults in Spain to understand how technological support services (TSSS) promote digital literacy and Internet use. It evaluates the role of TSSS across different organizational contexts without focusing on a specific program. The study identifies patterns of Internet use and highlights the increasing importance of TSSS as age increases. TSSS (Technological Support Services for Seniors) are community-based services promoted by public institutions to facilitate Internet access and literacy support for older people . These services are located in various organizational contexts such as nursing homes, community senior centers, university programs for seniors, and adult education programs . TSSS aim to help older people benefit from the resources of the digital world by providing access to technology and offering digital literacy training
171	The digital inclusion of older people in Spain: technological support services for seniors as predictor	Tirado-Morueta, R., Rodríguez-Martín, A., Álvarez-Arregui, E., Ortíz-Sobrino, M. Á., & Aguaded-Gómez, J. I.	Ageing & Society	2023	This is a research study that uses a survey method to analyze the impact of technological support services on digital inclusion among older adults in Spain. It evaluates how these services predict and determine digital skills and social connectivity rather than evaluating a specific digital literacy program.
172	We Must Protect Children but Also Their Grandparents: A Qualitative Understanding of Older Adults' General Perceptions and Understanding of Social Networks	Tkáčová, H., Gadušová, Z., Sotirofski, K., & Yusupova, M.	Journal of Education Culture and Society	2023	This is a qualitative research study that explores older adults' perceptions and understanding of social networks through semi-structured interviews with 24 participants in Slovakia. It identifies a gap between low self-reported knowledge and willingness to use social networks, outlines seven motivations and four challenges related to social network use, and emphasizes the need for media education focusing on 'digital citizenship' to enhance digital literacy. The study does not evaluate a specific digital literacy program but suggests the necessity for such education.
173	Barriers to Digital Inclusion among Older People: a Intergenerational Reflection on the Need to Develop Digital Competences for the Group with the Highest Level of Digital Exclusion	Tomczyk, Ł., Mascia, M. L., Gierszewski, D., & Walker, C.	Innoeduca. International Journal of Technology and Educational Innovation	2023	The paper is a qualitative research study that explores barriers to digital inclusion among older people by conducting structured interviews with younger adults. It identifies eight main barriers but does not evaluate a specific digital literacy program. Instead, it aims to understand public perceptions and inform future interventions.

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174	Digital inclusion from the perspective of teachers of older adults -expectations, experiences, challenges and supporting measures	Tomczyk, Ł., Mróz, A., Potyrała, K., & Wnęk-Gozdek, J.	Gerontology & Geriatrics Education	2022	This is a qualitative research study that uses structured in-depth interviews to understand the needs, experiences, and challenges of educators working with older adults in the context of digital inclusion. It does not evaluate a specific digital literacy program but provides insights into the broader context and needs related to digital literacy training for older adults.
175	Inclusion and the Digital Divide from the Perspective of Digital Competence Trainers	Tomczyk, Ł., Mróz, A., Potyrała, K., & Wnęk-Gozdek, J.	International Workshop on Gerontechnology	2020	This paper is a qualitative research study that explores the perspectives and knowledge levels of educators involved in digital inclusion for seniors in Poland. It conducts a survey through digitally mediated interviews with six specialists to understand their expertise and challenges in promoting digital literacy among older adults. The study does not evaluate a specific digital literacy program but rather examines the broader context of digital inclusion efforts.
176	Social Support and "Playing Around": An Examination of How Older Adults Acquire Digital Literacy With Tablet Computers	Tsai, H. Y. S., Shillair, R., & Cotten, S. R.	Journal of Applied Gerontology	2017	This is a qualitative research study that examines how older adults acquire digital literacy through tablet computers. It uses semi-structured interviews with 21 participants aged 65 and above. The study focuses on the role of social support and self-directed learning in this process. It does not evaluate a specific digital literacy program but aims to understand the factors facilitating digital literacy acquisition among older adults. The findings suggest that social support is crucial for older adults to start using tablets and that "playing around" with the devices is a key way they gain expertise. The study's insights are intended to inform future policies and programs to increase digital literacy among older adults.
177	Motivation matters: Older adults and information communication technologies	Tyler, M.; De George-Walker, L.; & Simic, V.	Studies in the Education of Adults	2020	The paper is a qualitative research study using a case study method to explore the digital experiences and motivations of older adults in Queensland, Australia. It does not evaluate a specific digital literacy program but investigates the implications for technology training and development based on participants' experiences. The study emphasizes the importance of motivation, self-efficacy, and personal utility in influencing ICT engagement among older adults. Training programs should be tailored to individual learning preferences and needs.

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178	Older adult Internet super-users: counsel from experience	Tyler, M.; Simic, V.; & De George-Walker, L.	Activities, Adaptation & Aging	2018	This is an exploratory, qualitative case study that investigates the digital experiences of older Australian retirees who are Internet "super-users." It does not evaluate a specific digital literacy program but aims to understand digital participation through self-efficacy, digital competence, and personal learning environments. The study uses methods like photovoice, diaries, and interviews to develop guidelines for improving Internet use among older adults. The findings are not generalizable but offer insights into enhancing digital engagement for older adults.
179	A Novel Approach to Improving the Digital Literacy of Older Adults	Vaswani, M.; Balasubramaniam, D.; & Boyd, K.	45th International Conference on Software Engineering (ICSE-SEIS)	2023	The paper is a research in-progress that explores digital literacy among older adults by conducting user studies and surveys. It proposes a novel approach combining a senior-friendly learning management system with inter-generational support, evaluated through preliminary studies using the prototype system Elderlearn. The study does not evaluate an existing program but develops and tests a new system.
180	Individualistic Versus Collaborative Learning in an eHealth Literacy Intervention for Older Adults: Quasi-Experimental Study	Vazquez, C.; Xie, B.; Shiroma, K.; & Charness, N.	JMIR Aging	2023	This is a quasi-experimental research study evaluating the effectiveness of collaborative learning (CL) versus individualistic learning (IL) in promoting digital literacy among older adults. It specifically assesses an eHealth literacy intervention program, examining short-term and long-term effects on various digital literacy skills. The study finds significant short-term improvements in eHealth literacy but notes the need for continuous training to maintain long-term benefits. The research is part of the eHiLL program, focusing on optimizing learning strategies for older adults.
181	How "basic" is basic digital literacy for older adults? Insights from digital skills instructors	Vercruyssen, A.; Schirmer, W.; & Mortelmans, D.	Frontiers in Education	2023	This paper is a qualitative research study that uses interviews with 26 digital skills instructors to explore the challenges older adults face in acquiring basic digital literacy. It argues that current definitions and frameworks of digital literacy are too advanced for older adults with no prior digital experience. The study does not evaluate a specific digital literacy program but provides insights into the difficulties faced by older adults and suggests that existing frameworks need to be adjusted to be more accessible.

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182	Digital Literacy Program: reducing the Digital Gap of the Elderly: Experiences and Lessons Learned	Vidal, E.	2019 International Conference on Inclusive Technologies and Education (CONTIE)	2019	This is an exploratory research in-progress paper evaluating a specific Digital Literacy Program for the elderly implemented by the Universidad Nacional de San Agustin de Arequipa. The paper assesses the program's impact on reducing the digital gap among older adults by providing practical training in digital skills. It reports on the program's acceptance, growth in demand, and participant achievements, aiming to share experiences for replication by other institutions.
183	Co-designing implementation strategies to promote remote physical activity programs in frail older community-dwellers	Villa-García, L., Davey, V., Peréz, L. M., Soto-Bagaria, L., Risco, E., Díaz, P., ... & Inzitari, M.	Frontiers in Public Health	2023	This is a research study using a mixed-methods approach to identify and prioritize implementation strategies for mHealth interventions aimed at increasing physical activity among frail older adults. It does not evaluate a specific digital literacy program but conducts a survey to understand and improve digital literacy and other factors affecting mHealth adoption. The study involves co-design with stakeholders to ensure strategies are feasible and contextually adapted.
184	Distance education as a condition of elderly's social activity	Volkova, O., Ananchenkova, P., & Besschetnova, O.	International Conference on Human-Computer Interaction	2020	This is a research study that evaluates digital literacy training for the elderly by conducting surveys and interviews to understand their motives and experiences in computer literacy courses. It does not evaluate a specific program but provides insights into the broader impact of such training on elderly social integration and activity. The study was conducted from 2014 to 2017 in Russian regions.
185	Older People as Digital Newcomers: From Evidence to Intervention Proposal	Vukelic, M.; Cizmic, S.; Jankovic, D.; Vidanovic, B.; & Petrovic, I.B.	International Conference on Human-Computer Interaction	2020	This is a mixed-method research paper that analyzes factors influencing older adults' computer proficiency and intention to use online services. It proposes an intervention to support older people as digital newcomers by engaging various stakeholders in a self-sustainable program. The study does not evaluate a specific digital literacy program but conducts surveys and qualitative research to understand digital literacy training promotion among older adults.

ID #	Title	Authors	Venue	Year	Summary
186	Bridging the digital divide: the smart TV as a platform for digital literacy among the elderly	Wang, C.H.; Wu, C.L.	Behavior and Information Technology	2021	This is a research study that investigates how Smart TV can be used to improve digital literacy among the elderly in Taiwan. It explores the effects of technology anxiety, digital feedback, and familiar technological skills on technology adoption. The study uses scaffolding theory and diffusion of innovation theory and employs a structured equation analysis method (PLS) to test its hypotheses. It conducts a survey to understand how Smart TV can promote digital literacy, rather than evaluating a specific program. The results support using Smart TV as a valid strategy to bridge the digital divide for the elderly.
187	A Toolkit for Co-Designing towards Community-Based Active Ageing: Lessons Learned during Development	Wang, G., Kasraian, D., Valk, C., Lu, Y., Hurst, W., Jambroes, M., & Van Wesemael, P.	International Journal of Environmental Research and Public Health	2022	This is a research study that develops and evaluates a toolkit for co-designing community-based active ageing interventions with older adults. It involves rapid reviews to identify effective behavioural change techniques and methods for co-designing with older adults. The toolkit was evaluated through a hackathon, showing increased confidence among students in designing health behaviour change interventions. The study does not evaluate a specific digital literacy program but focuses on facilitating co-design processes.
188	Digital skills training in care homes: achievement.	Wild, D.; & Kydd, A.	Nursing older people	2016	This paper is a practice development report evaluating a specific digital literacy training program implemented in care homes. It describes the setup of an IT learning environment and the role of IT champions in promoting digital skills among staff. The evaluation is qualitative, based on reports and experiences shared by the IT champions, as well as follow-up questionnaires. The paper discusses the successes and challenges faced during the implementation of the program.
189	Learning digital skills online: empowering older adults through one-to-one, online digital training provision	Wilson-Menzfeld, G.; Gates, J. R.; Moreland, M.; Raw, H.; & Johnson, A.	Frontiers in Psychology	2023	The paper is a research study evaluating the War Widows InTouch (WW.it) programme, a digital literacy training initiative for older adults. It uses a mixed-method explanatory sequential design, focusing on qualitative data from interviews to explore facilitators and barriers of online digital skills training as an alternative to face-to-face models. The program aims to enhance digital access, confidence, and skills among older war widows while addressing social isolation.

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190	Technological interventions to reduce loneliness and social isolation among community-living older adults: A scoping review	Wister, A.; O'Dea, E.; Fyffe, I.; & Cosco, T. D.	Gerontechnology	2021	This is a scoping review that provides a comprehensive overview of technological interventions aimed at reducing loneliness and social isolation among community-dwelling older adults. It categorizes interventions into three groups: computer and tablet-based competence training, health-oriented technical interventions, and video games and animatronic pets. The review does not evaluate a specific digital literacy program but includes digital literacy training as part of its broader analysis. It identifies barriers such as accessibility and technology literacy that affect the uptake of these interventions. The study uses systematic methods for data extraction and analysis.
191	Gamified money: exploring the effectiveness of gamification in mobile payment adoption among the silver generation in China	Wong, D.; Liu, H.i; Meng-Lewis, Y.; Sun, Y.; & Zhang, Y.	Information Technology and People	2021	This is a research study that investigates the effectiveness of gamification in promoting mobile payment adoption among older adults in China, specifically though the through the gamified cultural practice of gifting red packets on WeChat. It uses a survey method to collect data from elderly WeChat users and employs structural equation modeling for analysis. The study focuses on perceived enjoyment and perceived risks as key factors influencing technology adoption. It does not evaluate a specific digital literacy program but explores digital inclusion through gamification.
192	Helping older adults conquer digital tablets	Wright, P.	Gerontechnology	2016	This is an observational study documenting the experiences of a UK group of older adults learning to use digital tablets over two years. It does not evaluate a specific digital literacy program but describes the evolution of peer group meetings aimed at enhancing digital literacy. The study highlights the balance between instructional and social elements in these meetings and suggests that such structured peer group settings can support older adults in overcoming challenges with digital tablet use.
193	How does family support work when older adults obtain information from mobile internet?	Xiong, J.; & Zuo, M.	Information Technology and People	2019	This is a quantitative research study that uses a survey to understand the role of family support in improving mobile internet literacy among older adults in China. It does not evaluate a specific digital literacy program but examines how family emotional and cognitive support influence digital literacy and the quality of information obtained. The study finds that family

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					emotional support is more impactful than cognitive support in enhancing digital literacy, which in turn improves information quality.
194	Empowering Older Adults: Improving Senior Digital Literacy	Yoo, H.J.	American Association for Adult and Continuing Education	2021	The paper is a research study focused on developing and explaining a specific 7-week digital literacy course for older adults. It evaluates digital literacy training promotion by detailing the course structure and considerations for creating a supportive learning environment, rather than testing a model or conducting a survey. As such, this study does not include quantitative/qualitative data from participants, rather it focuses on providing information on the course design.
195	Digital Literacy Competencies and Interests of Elderly People	Zadražilová, I., & Vizváry, P.	European Conference on Information Literacy	2021	This is a quantitative research study that conducts a survey to understand the digital literacy competencies and interests of elderly people in the Czech Republic. It does not evaluate a specific digital literacy program but aims to inform the design of educational offerings in libraries. The study finds that younger elderly individuals have higher self-assessed digital skills and that there is a preference for education supporting active ageing over traditional digital skills. The findings are intended to guide library programs to better meet the needs of the elderly.
196	Elderly and their barriers to accepting and learning to use technology: A scoping review	Zaid, N. N. M.; Ahmad, N. A.; Rauf, M. F. A.; Zainal, A.; Razak, F. H. A.; Shahdan, T. S. T.; & Pek, L. S.	St. Theresa Journal of Humanities and Social Sciences	2021	This paper is a scoping review that aims to identify barriers faced by the elderly in learning and accepting technology and explores mitigating efforts. It reviews 19 articles to highlight psychological, cognitive, physical, and socioeconomic challenges. The paper suggests interventions like technological-based training sessions but does not evaluate a specific digital literacy program. It provides a comprehensive overview of existing literature rather than conducting new empirical research.
197	Conceptualising Digital-Based Instructional Strategies for Elderly Learning	Zaid, N. N. M.; Pek, L. S.; & Ahmad, N. A.	St. Theresa Journal of Humanities and Social Sciences	2021	The paper is a systematic literature review that identifies instructional strategies for elderly learners to improve digital literacy. It does not evaluate a specific digital literacy program but proposes a conceptual model using the Technology Acceptance Model (TAMS) based on existing literature. Six instructional strategies are identified through thematic analysis.

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198	Computer classes for older people: motivations and outcomes	Zaidman, S.; & Tinker, A.	Working with Older People	2016	This is a qualitative research study that uses semi-structured interviews to explore the motivations and outcomes of computer classes for older people. It does not evaluate a specific digital literacy program but investigates digital literacy training through interviews with participants at a community center in London. The study identifies motivations such as gaining computer skills and social interaction, and outcomes like skill acquisition and increased confidence. It highlights factors influencing these outcomes, such as computer ownership and teaching style..
199	Generational Inclusion: Getting Older Adults Ready to Own Safe Online Identities	Zanchetta, C.; Schiff, H.; Novo, C.; Cruz, S.; & Vaz de Carvalho, C.	Education Sciences	2022	This is a research paper evaluating a specific digital literacy program called the AUDID project, which aims to improve digital literacy among older adults by increasing their awareness of online identities and internet safety. The paper describes the design, implementation, and evaluation of this training program, highlighting positive outcomes in terms of increased knowledge and behavioral changes among participants. The project involved collaboration across multiple European countries.
200	SUSTAINTABLE DEVELOPMENT AND ACTIVE AGEING IN EU COUNTRIES - BRIDGES AND GAPS	Zdjelar, R., Hrustek, N. Z., & Sumpor, M.	Economic and Social Development: Book of Proceedings	2019	This paper is a scoping review that explores the relationship between digital literacy among people aged 54+ in EU countries and sustainable development. It reviews theoretical concepts, policies, and practical contributions related to active aging and digital literacy. The paper does not evaluate a specific digital literacy program but provides an overview of existing projects and strategies, identifying gaps in current approaches. It includes a case study on digital literacy in Croatia to illustrate its influence on sustainable development goals (SDGs).
201	Bridging information and communication technology and older adults by social network: An action research in Sichuan, China	Zhang, Y.; Zheng, G.; & Yan, H.	Journal of the Association of Information Science and Technology	2022	The paper is an action-oriented field research study that explores the interplay between social networks and older adults' use of ICT in Sichuan, China. The study investigates how technical help and social networks influence digital literacy among older adults. The study finds that both strong and weak social ties are effective in improving digital skills, with different impacts on engagement and perseverance. It highlights the importance of a supportive social network for digital inclusion.