Seniors as Digital Creators: Senior-Student Co-design in Libraries

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ABSTRACT

This study examines how seniors experience digital technologies and reconstruct their meanings through intergenerational co-design in a public library. Moving beyond functional skill transfer, this study focuses on how seniors participate as creators. A qualitative case study was conducted using participant observation and interviews during sessions. The findings show that the public library functioned as a psychologically safe space and social hub, enabling seniors to engage with unfamiliar digital technologies. Interactions with student researchers transformed seniors from passive recipients of education into co-creative partners, as technological hierarchies were gradually mitigated through reciprocal exchanges of technical support and life experiences. Through this process, seniors came to redefine digital technologies as expressive resources for articulating personal narratives. The study suggests that public library digital programs should move beyond instruction-centered approaches toward co-design models that emphasize meaningful participation.

Keywords: Public Library, Intergenerational Co-design, Seniors, Digital Literacy, Qualitative Case Study

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1. Introduction

Digital technologies have reshaped daily life, yet their impact is not felt equally across generations. For some seniors, these advancements often become barriers rather than opportunities, leading to digital exclusion and a narrative centered on “technological deficiency” (Cho, 2007; Hwang & Jeon, 2022).

Public libraries have emerged as vital hubs for bridging this divide, leveraging their accessibility and institutional trust to support “information-vulnerable” groups (Yoon, 2012). However, most library programs still focus on basic technical skills, framing seniors as passive recipients of instruction rather than active participants (Lim, 2020; Eom & Kim, 2023). Offering only skill-based learning may limit opportunities for agency, expression, and creative engagement with technology.

Prior studies have explored participatory design with older adults, emphasizing the necessity of sustained engagement and the recognition of seniors’ lived experiences as critical design assets (Malmborg et al., 2016; Sakaguchi-Tang et al., 2021). While library makerspaces have emerged as vital participatory environments for community engagement (Koh et al., 2024), the intersection of these two domains remains under-researched. In our study, we address this gap by investigating an intergenerational co-design program situated within a public library makerspace. Therefore, by understanding how library programs can support the elderly to actively engage with technology through collaborative creation and spatial mediation, we aim to provide frameworks for designing inclusive, participation-centered digital literacy initiatives.

Through a qualitative lens, this study explores the following:

1) How can intergenerational co-design address digital technology experiences of seniors carried out within the context of public libraries?
2) How do seniors experience and participate in intergenerational co-design programs?
3) How do seniors understand and interpret digital technologies and information in intergenerational co-design processes?

Ultimately, this study seeks to provide an integrated understanding of seniors’ digital experiences to inform the future design of more inclusive digital literacy initiatives.

2. Related Works

This section establishes the theoretical framework for this study by examining the digital divide

and the evolving social role of public libraries. It analyzes the limitations of existing senior programs and proposes intergenerational co-design as a participatory alternative that repositions them as active creators of meaning.

2.1 Digital Divide and the Role of Public Libraries

The digital divide refers to disparities arising from differences in access to and use of information and communication technologies (ICT). It is understood as a multidimensional phenomenon shaped by economic, regional, physical, and social conditions (Lee et al., 2019; Park et al., 2022). In South Korea, people with disabilities, low-income populations, seniors, and residents of rural areas are officially defined as core vulnerable groups, while multicultural families and North Korean defectors have also been discussed as policy targets (Yoon, 2012; Hwang & Jeon, 2022). In a study that examined 58 public library sites to understand what activities were conducted regarding the digital divide, the findings showed the insufficient support for information vulnerable populations such as elderly groups, immigrants and rural residents (Cho, 2007).

Seniors consistently experience the most severe digital divide among vulnerable groups, characterized by lower informatization levels and a persistent gap compared to the general population (Hwang & Jeon, 2022; Kim & Lee, 2022). Difficulties in using kiosks, accessing online administrative services, and navigating digital interfaces illustrate how digital technologies can function as barriers in seniors' everyday lives (Cho, 2007). Importantly, these challenges are increasingly framed not as individual problems but as conditions that restrict social participation.

Legally mandated by the Library Act, public libraries have worked on providing equitable information access to seniors who are defined as a vulnerable group (Yoon, 2012). Beyond this mandate, their public spaces allow vulnerable users to engage with digital resources without psychological burden, functioning as accessible social infrastructures supported by professional librarians (Yoon, 2017).

Building on this perspective, this study focuses on experiences and interactions, and extends existing discussions on mitigating the digital divide beyond access and skills toward questions of meaning-making and participation.

2.2 Services and Programs for Seniors in Public Libraries

Public libraries have developed a range of services and programs for seniors by defining them

as a knowledge- and information-vulnerable group. Within this framework, libraries have focused on ensuring access to information, mitigating the digital divide, and supporting lifelong learning and leisure activities (Yoon, 2017).

Senior services in public libraries initially developed around collections designed to accommodate age-related physical changes and usage constraints. Large-print books, audiobooks, and audiovisual materials have been emphasized to improve seniors' access to reading materials (Bae, 2021; Lim, 2020).

Programs and educational services constitute another central axis of senior services in public libraries. Seniors frequently visit libraries to participate in programs, and libraries have offered a wide range of lifelong learning, cultural, leisure, and health-related activities (Lim, 2020; Kim et al., 2019; Eom & Kim, 2023). Digital education programs, such as instruction in basic computer and smartphone use, internet navigation, and email, have been provided as practical support for everyday life and as a means of facilitating adaptation to digital environments (Yoon, 2017). Such digital literacy support has been linked to higher life satisfaction among older adults in Korea (Lee & Chang, 2024).

Spatial and facility-related services have also been discussed in relation to usability for older adults. Comfortable seating, clear signage, and accessible layouts have been proposed as elements for reducing physical barriers to library use (Kim & Lee, 2014). While dedicated senior-only spaces have raised concerns about potential stigmatization or segregation, alternative approaches such as integrated spatial configurations have been suggested to allow seniors to use library spaces alongside other generations (Bae, 2021).

Taken together, public library services for seniors have evolved across collections, programs, and spaces with a strong emphasis on accessibility and barrier reduction. While these efforts have expanded seniors' access to information, their experiential knowledge and interpretive practices have received comparatively limited attention. Recent qualitative work in Korea has examined older adults' public library use experiences, identifying both positive and negative factors across materials/services, programs, facilities, and emotional dimensions (Kim, 2024). However, this line of research still offers limited attention to how seniors actively construct meaning through interaction in library contexts. Recognizing these limitations, this study argues for an approach that repositions seniors as active agents who participate in the construction of experience and meaning.

Recent international studies have highlighted the growing role of makerspaces as core infra-structural resources in public libraries. Koh et al. (2024) showed that makerspaces contribute to learning outcomes, community engagement, and equitable access to creative technologies. Their findings suggest that library makerspaces function as participatory learning environments where

hands-on experimentation and collaborative creation are integrated into everyday library services. This perspective positions makerspaces as spatial foundations that enable participatory programs and intergenerational co-design activities.

2.3 Concept and Theoretical Background of Co-design

Co-design refers to a collaborative design process in which end users and multiple stakeholders actively participate across the design stages (Chung et al., 2020). Rather than delivering solutions unilaterally, co-design encourages participants to explore problems and contribute to their resolution through guided participation (Sanders & Stappers, 2008). Within this framework, design emerges from the collective creativity of participants' diverse experiences and knowledge, emphasizing the principle of designing with people rather than for them (Kim & Koo, 2023; Suh, 2015).

Co-design is theoretically rooted in participatory design (PD), which emerged in Scandinavia in the 1970s to promote workplace democracy and user empowerment (Schuler & Namioka, 1993). PD regarded users as active participants and later evolved toward interdisciplinary collaboration and creative cooperation (Cooper, 1999).

Empirical studies with older adults illustrate how co-design can support meaningful participation when appropriate mediating tools are employed. Min and Koo (2020) showed that toolkits designed to document and reflect daily life enabled older adults to identify previously unarticulated inconveniences. Kim and Koo (2023) further demonstrated that metaphorical and game-based co-design tools reduced technological burden and facilitated idea sharing among older adults. These studies highlight the importance of accommodating cognitive and psychological conditions in co-design practice.

Based on prior studies, co-design offers an opportunity to define problems and construct meaning based on seniors' lived experiences. This approach addresses the limitations of traditional library services, which have historically focused on functional support while giving limited attention to seniors' interpretive practices. Building on this, the present study investigates the meanings of intergenerational co-design within public library contexts.

International scholarship also underscores the necessity of sustained, participatory engagement. Malmborg et al. (2016) described this as mobilization, arguing that the continuous involvement of older adults as active contributors depends on ongoing negotiation and a nuanced, contextual understanding of aging. Sakaguchi-Tang et al. (2021) similarly showed how collaborative partnerships between seniors and student designers transform life experiences into primary design resources.

3. Method

3.1 Research Design and Context

This study adopted a qualitative case study methodology to conduct an in-depth exploration of seniors' digital literacy development and patterns of intergenerational interaction. The research was carried out at a public library located in Seoul, which was selected as the research site due to its high rate of use by local seniors and its operation of a wide range of cultural programs, making it a suitable environment for participant recruitment and program implementation. The core activity of the study employed an Intergenerational Co-design approach, in which participants were positioned as design partners who collaboratively generate ideas and make shared decisions throughout the design process (Yip et al., 2020). Rather than a unidirectional educational model in which student researchers instruct seniors, this approach was designed to observe changes in participants' roles and interactions through a collaborative process in which seniors' experiences (storytelling) and student researchers' technical skills (video editing) were integrated to produce shared outcomes. The research procedure consisted of the following stages: preliminary planning, participant recruitment and team formation, the implementation of five co-design sessions, and post-program analysis.

This study was designed as an exploratory qualitative case study focusing on the process of participation and meaning-making. Accordingly, the study did not aim to quantitatively assess changes in digital literacy levels using standardized indicators. Instead, it sought to understand how seniors' participation experiences, interaction patterns, and interpretations of digital technologies were constructed within the intergenerational co-design process. Given the process-oriented and exploratory nature of the research questions, a qualitative case study approach was considered the most appropriate methodological strategy.

3.2 Participants

Senior participants were recruited using purposive sampling (Patton, 2015). Recruitment was primarily facilitated by a librarian at the public library where the program was conducted, focusing on seniors who had consistently participated in existing library programs, with attendance reliability as a key selection criterion. A total of eight seniors were selected, all of whom were women aged 55-68. All participants belonged to a storytelling club and regularly visited the library at

least once a week for club meetings and lectures.

All senior participants were familiar with mobile devices such as smartphones, but differed in prior experience with video editing. More than half of the participants were novices, while others had experience with mobile or PC-based programs or video production roles in their organizations. This diversity in digital proficiency was considered suitable for observing interactional dynamics within the study.

Student researchers as co-design partners consisted of seven undergraduate students and one graduate student from the Department of Library and Information Science at University A in Seoul. They had prior interests in information user studies and seniors' digital barriers and voluntarily participated based on agreement with the research aims. The study was organized into four teams, each composed of two seniors and two student researchers, with one-to-one partnerships within each team.

Prior to the study, all participants were informed about the research objectives, procedures, and the possibility of video and audio recording, and written informed consent was obtained. All names were anonymized and replaced with ID codes, and detailed participant information is presented in Table 1.

〈Table 1〉 Participant Information of Seniors

Team	Senior	Age	Background	Digital Proficiency
1	S1	65~70	Storytelling activities	Able to use a smartphone; reluctant to use PCs such as laptops
	S2	65~70	Storytelling activities, helping husband's business	Able to use a smartphone; active in online search and media consumption
2	S3	60~65	Storytelling activities, reading program instructor	Proficient with smartphones and PCs; experience with video editing and AI tools
	S4	65~70	Storytelling activities	Able to use smartphones and PCs
3	S5	65~70	Storytelling activities	Able to use smartphones and PCs; active internet use
	S6	60~65	Storytelling activities, Etiquette Instructor	Able to use smartphones and PCs; capable of using devices for work purposes
4	S7	60~65	Storytelling activities	Able to use smartphones; active internet use
	S8	50~55	Storytelling activities, Contract Worker	Able to use smartphones and PCs; active media consumption

This study did not require Institutional Review Board (IRB) review under the Enforcement Decree of the Bioethics and Safety Act. The research analyzed de-identified data generated through an already ongoing public library program rather than researcher-initiated intervention. Participants

were community-dwelling seniors voluntarily engaging in regular library programming, without cognitive impairment, dependency, or collection of identifiable private information. The study posed minimal risk, and all data were de-identified prior to analysis. In addition, the research was conducted off campus and therefore did not fall under institutional IRB review procedures.

3.3 Research Procedure

This study conducted intergenerational co-design sessions between seniors and students using a co-design approach. The sessions aimed to produce storytelling videos based on seniors' narration and to enhance seniors' digital literacy skills. Sessions were held once a week on Fridays and lasted for two hours each. Each session was generally structured into two components: (1) the collaborative production of storytelling videos, in which seniors and student researchers discussed ideas together and applied video editing techniques (approximately one hour), and (2) toolkit-based activities designed as hands-on digital technology experiences to support the development of seniors' digital literacy (approximately one hour). Detailed descriptions of the activities conducted in each session are presented in Table 2.

〈Table 2〉 Summary of Session Activities

Date / Session	Video Production Activities	Toolkit Activities	Notes
5/23 Session 1	Self-introduction video, account creation and login, video planning	Bingo game (sharing experiences and perceptions of digital media, information search), Discussion	Toolkit icebreaking not conducted
5/30 Session 2	Planning video structure, practice (creating images with Canva), recording	Practiced using various apps and card games	Regular session
6/13 Session 3	Viewing the first completed draft video, providing feedback, explaining editing, creating thumbnails	Toolkit activities not conducted due to internet outage	Some activities moved to Session 4
6/20 Session 4	Video editing and audio insertion, evaluation of other teams' videos	Video evaluation, drawing comics, feedback sharing	Some Session 3 activities replaced
6/27 Session 5	Final video presentation and interviews	Student researchers and seniors shared and discussed comics and gave feedback	Regular session

This program was intentionally designed as a non-lecture-based format. Student researchers were positioned as co-design partners rather than instructional authorities, supporting collaborative exploration instead of delivering predefined technical content. This structure allowed participants

to actively shape design directions and integrate their lived experiences into the creative process.

3.4 Data Collection and Analysis

We collected 40 reflective journals written by student researchers at the end of the sessions, focusing on key session events, interactions with seniors, and student researchers' personal reflections and learning experiences. Pre- and post-program surveys were administered to the student researchers to examine changes in their perceptions of seniors, as well as their expectations for and suggestions regarding the sessions. Finally, semi-structured interviews were conducted with senior participants during Session 5 after the completion of the program. The interview focused on participants' overall program experiences, their characteristics, and challenges encountered in using digital technologies.

The collected data were analyzed using the open coding method of grounded theory as proposed by Strauss and Corbin (1998). Transcribed data were iteratively reviewed to identify meaningful units and to generate initial codes, which were then grouped into analytical categories. To ensure analytical rigor and consistency, coding decisions and category structures were refined through iterative team discussions in line with collaborative qualitative analysis practices (Richards & Hemphill, 2018). The resulting codebook is presented in Table 3.

〈Table 3〉 Codebook

Parent code	Subcodes	Definition
Setting as infrastructure	(a) Physical resources (space/equipment) (b) Psychological safety (familiarity/low burden) (c) Staff mediation (librarian as connector)	Library conditions that enabled participation and stabilized the co-design environment.
Role and agency shift	(a) Learner positioning (early dependence) (b) Co-producer positioning (idea contribution) (c) Ownership/pride (self-efficacy)	Changes in seniors' participation roles over time—from passive learners to active collaborators and decision-makers.
Meaning-making of digital technologies	(a) Barriers (psychological/physical/cognitive) (b) Everyday anchoring (life experience linkage) (c) Analogical interpretation (metaphors/comparisons)	How seniors interpreted unfamiliar tools through lived experience and how barriers shaped early engagement.

4. Findings

This section explores how seniors' digital experiences are constructed through intergenerational co-design. It first examines how the setting within the public library space created an environment for co-design to occur (4.1). Next, it analyzes how seniors interpret and construct meaning within these co-design sessions (4.2). Finally, this section explores the change of seniors' roles and agency through collaborative interaction with students (4.3). Researchers are denoted as R#.

4.1 The Setting

This section analyzes how the library's physical infrastructure, combined with institutional trust and staff mediation, created a stable environment for seniors and student researchers. It shows how the setting fostered relationships and sustained engagement.

4.1.1 Spatial and Physical Capital of the Public Library

The public library provided essential physical capital for the stable operation of the program. Spatial resources that supported discussion and collaborative work, such as a makerspace and recording rooms, formed the foundation of the study. One student researcher described the makerspace layout as follows: "Two laptops were set up at each table for each group," indicating that an environment was created in which each senior could use at least one laptop while sitting side by side with a student researcher and receiving one-to-one support through shared screen viewing (R1 journal, Session 1).

The availability of laptops, wireless networks, and stationery within the library allowed participants to engage in the study without separate preparations. When an application installation error occurred on S5's personal device, the immediate available alternative infrastructure minimized interruptions and anxiety caused by technical issues (R2 journal, Session 1). In another instance, when S5 was unable to bring a personal laptop due to its use by a family member, participation was still possible through the use of a library-provided laptop (R3 journal, Session 2). Such physical support ensured device ownership or glitches did not become barriers to participation.

4.1.2 Public Libraries as Safe Spaces

For seniors, the public library was already a familiar place embedded in their everyday lives. S2, S4, and S5 shared that they regularly visited the library for club meetings or for children's

storytelling programs (R1 journal, Session 1; R3 journal, Session 1; R4 journal, Session 1). S1 expressed perceptions of the library associated with rest and communication, indicating that she regarded it as a place that alleviates psychological burden (R5 journal, Session 1). S2 described the public library as “a place that hosts various cultural events, with programs not only for children but also for adults”, implicitly suggesting it functioned as an open space for attempting new technology activities.

The library’s open structure also had a positive influence on student researchers. Student researchers’ practice of arriving early and working individually before sessions helped them acclimate to the space and encouraged natural encounters with participants. The partner student researcher of S3 checked seating arrangements and prepared interview equipment in advance, adjusting the environment to support smooth communication (R6 journal, Session 1). Similarly, the partner student researcher of S2 reported that by waiting in the library earlier than scheduled, they were able to meet S2, who had also arrived early, and spend time conversing before the session began (R4 journal, Session 1).

4.1.3 Human Resources of the Public Library

Public library staff played a decisive role as social mediators connecting the senior community and the research team.

During the planning and recruitment stages, a librarian introduced the research team to an existing storytelling club of community-dwelling seniors, supporting the feasibility of the research. This process is reflected in senior interview transcripts (e.g., R1, R3, R5), in which participants described how the librarian’s involvement reduced apprehension about joining an unfamiliar, university-led research project. The trust mediation functioned as an endorsement and encouraged participation.

During implementation, librarians did not act as direct instructors; instead, they provided indirect support that stabilized the research environment, such as preparing spaces and ensuring order. Librarians arranged equipment in advance and provided guidance on how to use the wireless network prior to sessions (R2 journal, Session 1; R6 journal, Session 1). When situational changes occurred, such as temporary Wi-Fi unavailability, they shared this information in advance, enabling both the research team and participants to respond flexibly (R1 journal, Session 3; R5 journal, Session 3; R7 journal, Session 3).

4.2 Seniors' Intergenerational Co-design Program Experiences

This section analyzes the shift reported by seniors through the intergenerational co-design program. The findings show how the seniors transitioned from passive learners to active co-producers by integrating their life experiences with new digital practices. Rather than focusing on technical limitations, seniors leveraged emotional bonds and relational mediation with student researchers to reclaim their agency. This transformation was supported by the program's 1:1 mentorship and cross-group sharing.

4.2.1 Shifts in Seniors' Participant Positions

Initially, seniors tended to perceive student researchers as technically proficient experts and positioned themselves as "learners" who received one-directional instruction. In Session 1, a student researcher observed that S1 "tended to follow the student researcher's explanations as given," and expressed difficulty imagining independent practice after the session (R5 journal, Session 1). These early interactions were characterized by a vertical information flow and reliance on guidance.

As the sessions progressed, however, this hierarchical relationship gradually weakened, and seniors increasingly contributed ideas grounded in their own experiences. For example, in Session 2, S2 brought a storybook she had prepared in advance and commented that the narrative would feel insufficient if transferred directly into video form, suggesting the need for additional narration (R4 journal, Session 2). This indicated that seniors were shifting from instruction recipients to active contributors in content decisions.

This shift became more apparent in later sessions as collaborative production advanced. After Session 3, student researchers noted that seniors frequently proposed ideas, evaluated intermediate outcomes, and negotiated directions for revision, signaling a move from unidirectional learning toward reciprocal knowledge exchange (R1 journal, Session 3). By the final session, seniors explicitly expressed pride in their contributions to the completed videos, emphasizing that they had carried out substantial portions of the work themselves and responded positively to feedback from other teams (R1 journal, Session 5). These accounts suggest that seniors gradually came to recognize themselves as co-producers with this role transition closely tied to increased confidence and self-efficacy.

4.2.2 The Mediating Role of Student Researchers

Seniors' experiences were shaped by relationship-centered interactions with student researchers, who functioned as mediators rather than mere technical instructors. This mediation was evident when seniors faced difficulties. For instance, during thumbnail creation, when S1 and S2 were dissatisfied with AI-generated images produced through Canva, the student researcher suggested adjusting keywords and provided concrete examples. Seniors then refined the prompts themselves, resulting in outputs that more closely aligned with their intentions (R5 journal, Session 3). In this process, student researchers facilitated translation between seniors' aesthetic preferences and technical affordances, without unilaterally determining outcomes.

Student researchers also played a crucial role in easing seniors' emotional burdens related to technology use. In early sessions, some seniors expressed anxiety about performance or learning speed. Rather than emphasizing technical mastery, student researchers responded with reassurance and encouragement, reframing participation as a process-oriented experience (R7 journal, Session 1). This relational mediation contributed to a learning atmosphere in which seniors felt less pressure to "perform well" and more freedom to ask questions and experiment.

Moreover, the program deliberately avoided formal, lecture-style instruction in favor of informal, conversation-based interaction. Through everyday dialogue interwoven with task execution, student researchers supported seniors in engaging with digital technologies in a more relaxed manner. Several seniors contrasted this experience with prior interactions in family contexts, where repeated questions about technology were often met with impatience (R4 journal, Session 1; R5 journal, Session 1). In contrast, the student researchers' consistent and empathetic responses encouraged seniors to remain engaged, suggesting that mediation functioned not only at the technical level but also at the emotional and relational levels.

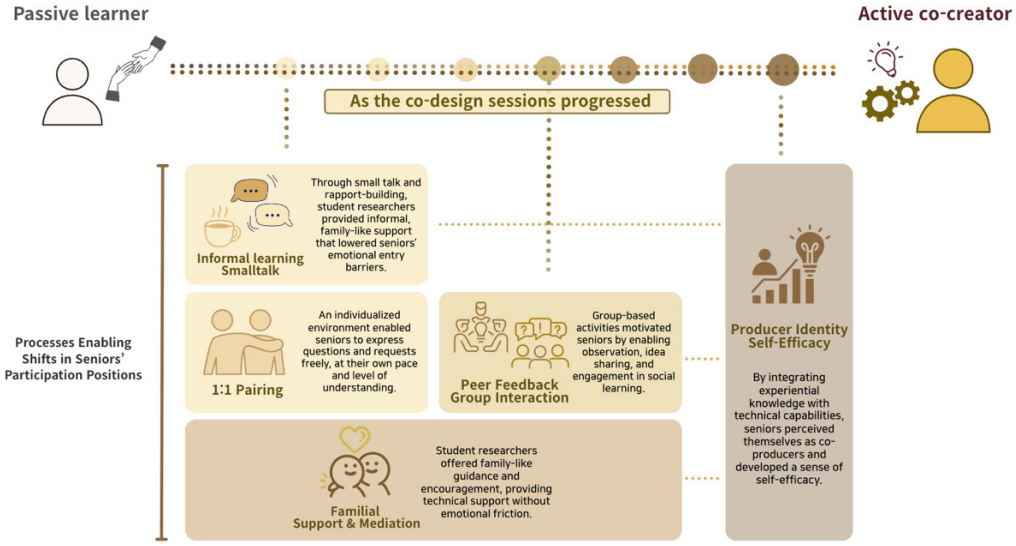
4.2.3 Program Structure

This program was structured around a combination of one-to-one pairing and small group sharing, which together functioned as key conditions enabling seniors' sustained participation. The one-to-one pairing provided an individualized environment in which seniors could ask questions freely and proceed at their own pace. S7 and S8 noted that they initially worried the program would resemble a fast-paced lecture but found the individualized format reassuring and well suited to their needs (R7 journal, Session 3). This structure supported psychological stability and allowed seniors to incorporate personal interests into the collaborative work.

Simultaneously, small group sharing served as a motivational mechanism. By viewing other

teams' outputs, seniors were able to observe alternative uses of digital tools and draw inspiration for their own projects. For example, after watching other teams' videos, seniors expressed interest in incorporating additional technical elements, such as background music, sound effects, or animation, into their own work (R2 journal, Session 4). This shows how group-level interaction facilitated social learning and expanded seniors' awareness of technological possibilities.

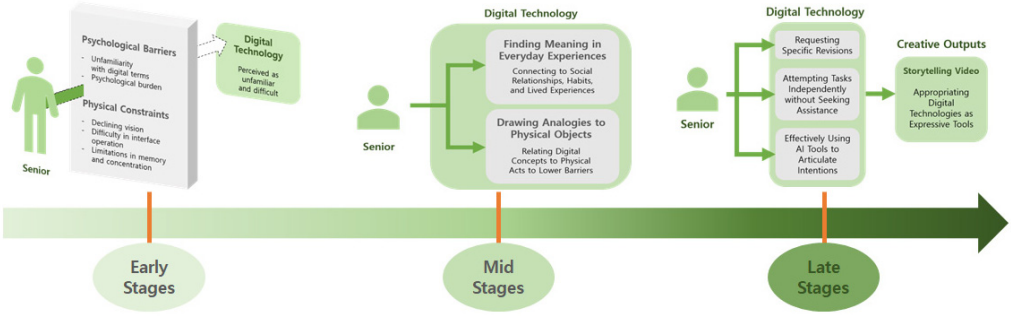
Based on the findings, Figure 1 illustrates the shift in seniors' roles and the processual factors involved.



〈Figure 1〉 Shifts in Seniors' Participation Positions in Co-design Sessions

4.3 Reshaping seniors' meanings of digital technologies

Through the direct production of digital artifacts, seniors appropriated and reshaped the meanings of digital technology. This section analyzes these interpretive processes, focusing on how seniors encounter and decode unfamiliar tools through their lived experiences. In Figure 2, we illustrate the transition from an external challenge into a personal resource for expression. The following subsections detail these experiential interpretations and the subsequent framing of digital tools as expressive media.



〈Figure 2〉 Seniors' Meaning-Making Processes of Digital Technologies in Co-design

4.3.1 Early Stages: Difficulties in Using Digital Technologies

In the early stages of the program, seniors appeared psychologically discouraged as they encountered high barriers in specialized digital use, despite having experience with everyday digital devices. Although S2 owned and regularly used a personal laptop, she showed unfamiliarity with understanding the meanings of specific digital terms such as "ChatGPT" and "thumbnail." Similarly, S1 was observed repeatedly checking the names of new tools such as CapCut and the locations of menu items (R4 journal, Session 2). S5 also repeatedly recognized her perceived lack of technological competence, stating that "I only use it when I have to, so I don't remember it well," which reflected an overall decline in confidence regarding technology use (R3 journal, Session 1). These observations indicate the presence of psychological barriers that seniors experience when engaging with digital technologies.

In addition to psychological barriers stemming from low self-efficacy, seniors simultaneously experienced physical constraints such as declining vision and limitations in operational skills. For example, S4 struggled with small text sizes. Compared to the text size on devices she typically used, the applications she was learning to operate displayed smaller text, requiring her to alternate between two pairs of glasses to follow the learning process (R1 journal, Session 1). S2 noted that typing was the aspect she found most challenging when using a laptop. As described by her partner student researcher, "She spent a considerable amount of time trying to locate the desired characters in both Korean and English, and appeared flustered when she could not find the characters she was looking for" (R5 journal, Session 1). S1 also struggled to click a download icon, as she did not understand what the icon represented. Additionally, throughout the program, seniors repeatedly stated, "If I don't write it down, I forget" (S1, S2, S3, S5), indicating the presence of physical barriers related to memory and concentration. These multilayered barriers

were identified as factors that hinder seniors' stable entry into digital environments.

4.3.2 Mid-Stage: Digital Technologies Gaining Meaning

For seniors, digital technologies gained meaning when they were connected to their everyday experiences. To make sense of unfamiliar digital tools, seniors actively drew on their life experiences. When asked about their motivation for participating in the co-design program, S5 explained that family members were able to create their own stories through photographs, adding that she "also wanted to try creating new stories in that way." S3 similarly connected digital technologies to her own life, noting that she had been "recording videos with a camcorder and editing them on a computer since my child was one year old." Other seniors linked their participation to their shared role in storytelling activities, responding that it seemed like "a good opportunity and experience for storytelling performance" (S2, S8).

Seniors also employed comparison with prior experiences as a strategy for understanding difficult digital concepts. For example, upon seeing lines displayed in a photo, S2 asked her partner, a student researcher, "If I want to cut these kinds of lines, how should I do that on a computer?" (R4 journal, Session 3). This indicates that she understood digital editing techniques by relating them to the physical act of cutting. A similar pattern was observed when explaining the "keyframe" function in video editing. As the student researcher described screen movement and angle adjustment, S1 remarked, "It's similar to turning pages in a book to make things move." In response, the partner student researcher reflected that "when communicating with seniors, it is helpful to explain things by drawing analogies to situations or physical objects that are familiar to them" (R5 journal, Session 5).

In this way, seniors' practice of interpreting digital functions through familiar everyday experiences served as an important foundation for making complex technologies more approachable and for lowering the psychological barriers to learning.

4.3.3 Digital Technologies as Tools for Expression

As the intergenerational co-design sessions progressed, seniors began to use digital technologies as a means for expressing their own intentions. For instance, during Session 2, S2 led the production process by repeatedly revising her narration. In Session 4, she expressed dissatisfaction with the background music of the video and requested assistance from her partner student researcher; together, they used the filtering functions of the YouTube Audio Library to search for and select music that suited the genre. In Session 5, she explicitly requested changes to the thumbnail background

to achieve “a feeling with more yellow and green tones,” and specified details such as “the size and thickness of the captions and the differentiation of speech bubbles by character” (R4 journal, Session 5). These instances demonstrate that seniors did not merely accept student researchers’ suggestions, but actively sought to realize their own intentions by applying the digital skills they had learned.

Seniors also employed multiple digital techniques independently, rather than relying solely on student researchers. In Team 2, whose members were relatively familiar with digital technologies from the outset, seniors tended to attempt tasks on their own instead of seeking assistance. S4, for example, requested image generation from Canva but remarked that “although I asked for something dynamic, all the images came out with the same pose, like emergency exit icons, so I didn’t like them” (R1 journal, Session 5). She also stated, “Our team feels a strong sense of pride because the students didn’t do all the editing for us; we did a lot of it ourselves” (R1 journal, Session 5). Similarly, S3 noted in relation to using AI tools that “briefly and clearly stating what you want helps in creating ideal results” (R6 journal, Session 5), indicating that she had reached a stage where she could effectively use digital technologies to articulate her intentions.

5. Discussion

5.1 Public Libraries as Community Hubs Where Public Technological Capital and Psychological Safety Coexist

Addressing RQ1, this study demonstrates that public libraries function as vital social infrastructure mediating intergenerational collaboration. By providing “public technological capital,” libraries ensure seniors are not excluded due to equipment gaps, while their familiar environment offers a “psychologically safe space” for experimentation, extending prior work that frames libraries as non-stigmatizing social safety nets (Yoon, 2012).

Beyond physical resources, the presence of librarians and open spatial design alleviate fear associated with new technology. These findings suggest that library-based digital programs should evolve into community hubs where technological trust (infrastructure) and psychological trust (human mediation) coexist, mitigating both the digital divide and social isolation.

Koh et al. (2024) argued that makerspaces function as organizational infrastructures that broaden

library missions and foster participatory learning environments. Domestic research on intergenerational co-design in library makerspaces similarly shows that such spaces support agency and rapport between participants and facilitators (Lee et al., 2024). Consistent with these findings, the present study shows that the makerspace acted as a socially supportive ecosystem that enabled seniors to experiment and sustain engagement, indicating that spatial resources function as active mediators of participatory digital practices.

5.2 Building Horizontal Partnerships and Mutual Learning through Intergenerational Co-design

Addressing RQ2, this study highlights how 1:1 intergenerational co-design shifts seniors from passive recipients to active information producers. The initial “expert-user” hierarchy evolved into a horizontal partnership as emotional mediation and collaborative production validated seniors’ life experiences, demonstrating that co-design is a social learning process that fosters digital identity.

Practically, this model offers a solution to the personnel constraints that often prevent librarians from providing personalized support (Kim et al., 2019). By leveraging local youth as mentors, libraries can deliver 1:1 support seniors prefer while fostering intergenerational empathy, repositioning the public library as a dynamic platform for broader community interaction.

These findings reflect Malmborg et al.’s (2016) concept of mobilization, as seniors transitioned from service users to active stakeholders through sustained participation. This shift was supported by the relational dynamics between seniors and student researchers, echoing Sakaguchi-Tang et al.’s (2021) emphasis on collaborative partnerships and mutual learning. By validating seniors’ lived experiences as primary design assets, the co-design process fostered a bidirectional exchange that disrupted the unidirectional knowledge transfer, indicating that intergenerational co-design functions as a mechanism for participatory infrastructuring.

5.3 Restructuring Digital Literacy Education for Seniors

Addressing RQ3, this study identifies a shift in seniors' technology appropriation: from passive adaptation to active reinterpretation through their lived experiences. Initially, seniors viewed digital tools as obstacles to producing a “finished output,” which fueled anxiety and dependency on student researchers. However, they gradually began to bridge technical gaps by linking digital tasks to their own life histories, echoing Kim and Koo’s (2023) finding that older adults connect

to the digital world through their personal contexts. This transition shifted their focus from technical perfection to the meaning of their stories, repositioning seniors as agents of meaning-making rather than mere beneficiaries.

These findings challenge the “deficit-based” approach prevalent in current library programs, which often limit seniors to passive learning of basic functional skills (Eom & Kim, 2023). This study argues for a paradigm shift from “how to use” (functional instruction) to “how to make” (creative experience). When technology is reframed as a medium for self-expression rather than an end, seniors’ attitudes move toward greater agency. Consequently, future library initiatives can transcend one-directional lectures on device operation and adopt participatory models that integrate seniors' rich experiential assets with digital creation.

6. Conclusion

This study demonstrates how intergenerational co-design in public libraries enables seniors to reconstruct their digital experiences from passive learning to active creation. The findings reveal how the space of the library functions as a “psychologically safe hub” where institutional trust and librarian mediation lower the barriers to technological experimentation.

The collaborative process with student researchers further transformed the traditional educational hierarchy into a partnership of mutual agency. By exchanging technical guidance for life wisdom, seniors reclaimed their roles as creators, redefining digital tools not as skills to be mastered, but as expressive media for storytelling.

These results suggest a shift in library digital initiatives, from instruction-centered training toward participatory models that honor seniors' lived experiences. While this study is limited by its focus on a specific storytelling group at a single library and by its short-term and context-specific nature of the program, the present findings provide process-level insights into how seniors’ participation roles and digital meaning-making are constructed through intergenerational co-design. Future research is needed to examine more diverse populations, including male seniors and other digitally marginalized groups, and to explore the longer-term trajectories of participation and digital engagement. Ultimately, such participatory approaches will be essential in positioning public libraries as inclusive digital ecosystems in aging societies.

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