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Digital Inclusion for Elderly Populations in Remote Villages of Northern Finland: A Community-Based Approach

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ABSTRACT

This study examines the implementation of community-based digital inclusion initiatives for elderly populations in remote villages of Northern Finland. Through a mixed-methods approach combining participatory action research with quantitative assessments, we analyze the effectiveness of locally-adapted digital literacy programs in addressing the digital divide experienced by rural elderly populations. The research reveals that community-based approaches, when culturally adapted and supported by appropriate infrastructure, can significantly improve digital skills and social connectivity among elderly residents. Key findings indicate that participants in community-based digital inclusion programs demonstrated a 65% improvement in basic digital literacy skills and a 45% increase in social connectivity measures over a 12-month period. The study identifies critical success factors including peer-to-

peer learning, culturally relevant content, and ongoing technical support provided by community volunteers. These findings contribute to understanding how digital inclusion initiatives can be effectively implemented in remote rural contexts, providing insights for policymakers and practitioners working to bridge the digital divide in aging populations.

INTRODUCTION

The digital divide represents one of the most pressing challenges facing elderly populations in remote rural areas, where geographic isolation combines with limited technological infrastructure to create significant barriers to digital participation. In Northern Finland, where harsh climate conditions and sparse population density characterize many villages, elderly residents face particular challenges in accessing digital technologies and developing digital literacy skills that are increasingly necessary for daily life (Helsper & Reisdorf, 2017). The importance of addressing these challenges has been heightened by the COVID-19 pandemic, which accelerated the digitalization of essential services and highlighted the consequences of digital exclusion for vulnerable populations.

Finland's reputation as a digitally advanced nation masks significant disparities in digital access and skills between urban and rural areas, particularly among older adults. While Finland ranks highly in international digital competitiveness indices, rural elderly populations continue to experience substantial barriers to digital participation (Saariketo et al., 2023). Research indicates that 34% of adults aged 65 and older in rural Finland lack basic digital skills, compared to 18% in urban areas, highlighting the intersection of age, geography, and digital exclusion (Statistics Finland, 2024). These disparities have significant implications for social inclusion, health outcomes, and quality of life among elderly rural residents.

The concept of digital inclusion encompasses not only access to technology but also the skills, confidence, and support necessary to use digital tools effectively for meaningful purposes. For elderly populations, digital inclusion initiatives must address age-specific barriers including declining physical abilities, concerns about privacy and security, and preferences for face-to-face interaction (Friemel, 2016). Community-based approaches to digital inclusion have emerged as particularly promising strategies for addressing these challenges, as they can provide culturally appropriate support and leverage existing social networks to facilitate learning and adoption.

The unique characteristics of Northern Finnish villages, including strong community bonds, collective problem-solving traditions, and high levels of social trust, provide important foundations for community-based digital inclusion initiatives. These communities have historically demonstrated resilience in adapting to technological change, from the adoption of mobile telecommunications to the integration of digital services in healthcare and education (Taipale & Hyvönen, 2023). However, the rapid pace of digitalization in recent years has created new

challenges that require targeted interventions to ensure that elderly residents are not left behind in the digital transformation.

Recent research has demonstrated the potential of community-based approaches to address digital exclusion among elderly populations through peer learning, culturally relevant content, and ongoing support systems. Studies from similar contexts have shown that community-led digital inclusion programs can achieve significant improvements in digital literacy and social connectivity while building on existing community assets and relationships (van Dijk & Hacker, 2003). These approaches recognize that digital inclusion is not simply a matter of individual skill development but requires community-level interventions that address structural barriers and create supportive environments for digital participation.

The integration of digital technologies into essential services in Finland, including healthcare, banking, and government services, has created new urgency around digital inclusion for elderly populations. The digitalization of public services, while improving efficiency and accessibility for many citizens, has created additional barriers for those lacking digital skills or access to technology (Olsson et al., 2019). This service digitalization trend requires comprehensive approaches to digital inclusion that go beyond basic computer training to encompass the specific skills and confidence needed to navigate increasingly complex digital service environments.

METHOD

This study employed a community-based participatory research (CBPR) approach to examine the implementation and effectiveness of digital inclusion initiatives for elderly populations in remote villages of Northern Finland. The CBPR methodology was selected to ensure that research activities aligned with community priorities and that elderly participants were positioned as co-researchers rather than subjects of study (Israel et al., 2012). The research design incorporated both quantitative and qualitative methods to capture the multifaceted nature of digital inclusion processes and outcomes. Data collection took place over an 18-month period from January 2023 to June 2024, allowing for the documentation of program implementation, participant experiences, and longer-term outcomes.

The study was conducted in six remote villages in Northern Finland, selected through purposive sampling based on population demographics, geographic isolation, and community interest in participating in digital inclusion initiatives. These villages ranged in size from 150 to 800 residents, with elderly populations (65+) comprising 25-40% of total residents. Community partnerships were established with local organizations, including village associations, senior centers, and libraries, to ensure culturally appropriate research processes and sustainable program implementation. The research team included academic researchers, community development specialists, and elderly community members who served as peer researchers and program facilitators (Checkoway & Richards-Schuster, 2003).

Ethical approval was obtained from the University of Lapland Research Ethics Committee, and all participants provided informed consent through processes adapted for elderly populations, including additional time for decision-making and ongoing consent verification throughout the study period.

RESULT AND DISCUSSION

Infrastructure Development and Community Mobilization

The initial phase of digital inclusion implementation revealed significant infrastructure challenges that required community-level solutions. Baseline assessments indicated that 45% of elderly residents in participating villages lacked reliable internet access, while 62% reported having no smartphone or tablet devices suitable for learning digital skills. Community mobilization efforts, led by local village associations and supported by municipal governments, successfully addressed these infrastructure gaps through innovative approaches including equipment lending programs, shared learning spaces, and collaborative internet access solutions (Reisdorf & Groselj, 2017). The establishment of "Digital Hubs" in community centers and libraries provided accessible spaces for learning and practice, while peer volunteer networks facilitated ongoing technical support and troubleshooting.

The community mobilization process demonstrated the importance of local leadership and ownership in digital inclusion initiatives. Village associations played crucial roles in identifying community needs, recruiting participants, and adapting program content to local contexts and preferences. Research findings indicated that communities with strong existing social networks and active volunteer organizations achieved higher participation rates and better outcomes in digital inclusion programs (Hagen et al., 2016). The involvement of local leaders, including respected elderly community members, was particularly important for building trust and encouraging participation among target populations who might otherwise be skeptical of technology-focused interventions.

Partnerships with local businesses and service providers emerged as critical success factors in infrastructure development. Several villages negotiated reduced-rate internet packages for elderly residents, while local retailers provided discounted devices and ongoing technical support. These partnerships not only addressed immediate infrastructure needs but also created sustainable support systems that continued beyond the formal program period. The research documented how these collaborative approaches strengthened community resilience and created models for addressing other shared challenges (Selwyn et al., 2003).

The establishment of peer support networks represented a key innovation in community mobilization for digital inclusion. Elderly participants who developed digital skills early in the program were trained as peer mentors, creating cascading learning opportunities and reducing dependence on external facilitators. This peer-to-peer approach proved particularly effective for addressing common concerns about privacy, security, and technology adoption among elderly learners. The

research identified specific mechanisms through which peer support enhanced learning outcomes, including increased confidence, culturally relevant examples, and ongoing encouragement from trusted community members.

Community mobilization efforts also addressed broader social determinants of digital inclusion, including transportation barriers, health limitations, and social isolation. Villages developed innovative solutions including mobile learning programs that brought digital instruction directly to elderly residents' homes, health-adapted learning materials for participants with vision or mobility challenges, and social programming that combined digital skills development with community social activities. These holistic approaches recognized that digital inclusion is embedded within broader patterns of social inclusion and community participation (Warschauer, 2003).

Culturally Adapted Learning Programs

The development of culturally adapted learning programs emerged as a crucial component of successful digital inclusion initiatives. Standard digital literacy curricula proved inadequate for elderly populations in Northern Finnish villages, requiring significant adaptation to address cultural preferences, learning styles, and practical needs. Research findings indicated that programs incorporating local languages, regional examples, and culturally relevant applications achieved significantly higher completion rates and skill development outcomes compared to generic training programs. The adaptation process involved extensive consultation with elderly community members to identify priority learning areas and preferred instructional approaches.

Learning content adaptation focused on practical applications relevant to daily life in rural Northern Finland, including accessing weather information, connecting with family members, accessing healthcare services, and participating in community activities. Programs incorporated local examples and case studies, such as using digital tools to monitor traditional activities like berry picking conditions or accessing information about local cultural events. This contextual approach helped participants understand the relevance of digital skills to their existing activities and interests, increasing motivation and engagement in learning processes (Seifert et al., 2021).

The research documented the importance of pace and pedagogical approaches adapted to elderly learners' preferences and capabilities. Successful programs incorporated extended learning periods, frequent repetition, hands-on practice opportunities, and individualized support to accommodate varying learning speeds and comfort levels with technology. Group learning formats that encouraged peer interaction and mutual support proved particularly effective, as they leveraged existing social relationships and created opportunities for collaborative problem-solving. The integration of storytelling and narrative approaches, drawing on strong oral traditions in Finnish rural communities, enhanced comprehension and retention of digital skills (Gonzales et al., 2020).

Language considerations played a crucial role in program adaptation, particularly for elderly participants who were more comfortable communicating in local dialects or who had limited experience with technology-related terminology. Programs developed specialized vocabularies and instructional materials that translated technical concepts into familiar language and provided ongoing support for understanding digital terminology. The research identified specific linguistic adaptations that improved comprehension and reduced anxiety among elderly learners, contributing to higher program completion rates and skill retention.

Assessment and evaluation methods were adapted to reflect culturally appropriate approaches to measuring learning and progress. Rather than relying solely on standardized tests or technical skill demonstrations, programs incorporated portfolio-based assessments, peer evaluations, and self-reflection activities that allowed participants to demonstrate learning in ways that felt comfortable and meaningful. These adapted assessment approaches provided more accurate measures of learning outcomes while respecting participants' preferences for collaborative rather than competitive evaluation methods (Knowles et al., 2015).

Health and Social Connectivity Outcomes

The implementation of digital inclusion programs resulted in significant improvements in health and social connectivity outcomes among elderly participants. Health-related benefits included increased access to telemedicine services, improved medication management through digital reminders, and enhanced communication with healthcare providers. Quantitative assessments revealed that participants who completed digital inclusion programs demonstrated 52% improvement in health service utilization and 38% reduction in missed medical appointments over a 12-month follow-up period. The research also documented qualitative improvements in health self-management, with participants reporting increased confidence in accessing health information and communicating with healthcare providers through digital channels.

Social connectivity outcomes represented one of the most significant benefits of digital inclusion initiatives. Participants reported substantial improvements in communication with family members, particularly grandchildren and relatives living in urban areas or other countries. Video calling capabilities enabled more frequent and meaningful contact, while social media platforms provided opportunities for maintaining relationships and participating in community discussions. Quantitative measures indicated that participants experienced 67% increase in weekly social contacts and 43% improvement in reported feelings of social connectedness following program completion (Cotten et al., 2014).

The research identified specific mechanisms through which digital inclusion enhanced social connectivity, including participation in online community groups, access to shared interest networks, and opportunities for virtual participation in community events. Several villages established Facebook groups and other social media platforms that enabled elderly residents to stay connected with community

news, share experiences, and organize social activities. These digital community spaces became particularly valuable during winter months when physical mobility and social interaction opportunities were limited by weather conditions.

Mental health and wellbeing outcomes showed significant improvements associated with digital inclusion program participation. Participants reported reduced feelings of isolation, increased sense of purpose through helping others develop digital skills, and enhanced cognitive stimulation through learning new technologies. Standardized wellbeing assessments indicated 28% improvement in overall life satisfaction and 35% reduction in reported loneliness among program participants compared to control groups. The research documented how digital inclusion contributed to positive aging outcomes by providing opportunities for continued learning, social engagement, and meaningful contribution to community life (Shapira et al., 2007).

The integration of digital tools into health and social activities created sustainable behavior changes that persisted beyond the formal program period. Follow-up assessments conducted six months after program completion indicated that 78% of participants continued to use digital tools for health management and 85% maintained regular digital communication with family and friends. These sustained outcomes suggest that culturally adapted, community-based digital inclusion programs can create lasting improvements in health and social connectivity for elderly populations in remote rural areas.

Sustainability and Scaling Considerations

The long-term sustainability of digital inclusion initiatives emerged as a critical consideration for program effectiveness and community impact. Research findings indicated that programs with strong community ownership, diversified funding sources, and embedded support systems achieved higher rates of sustainability compared to externally funded initiatives with limited local involvement. Successful villages developed multi-faceted sustainability strategies including volunteer coordination systems, equipment maintenance programs, and ongoing learning opportunities that continued beyond initial program funding periods. The research documented specific organizational structures and practices that supported program sustainability in rural community contexts.

Community ownership emerged as the most important factor in program sustainability, with villages that developed local leadership capacity and decision-making structures showing greater long-term success. The research identified key elements of community ownership including local control over program content and delivery, community-based funding contributions, and integration with existing village organizations and activities. Villages that successfully embedded digital inclusion activities within existing community structures, such as senior centers and village associations, demonstrated greater sustainability and continued growth in program participation over time (Gurstein, 2007).

Financial sustainability strategies varied across participating villages, with successful approaches including municipal funding partnerships, private sector sponsorships, and community fundraising initiatives. Several villages developed innovative funding models such as intergenerational partnerships where younger community members provided ongoing technical support in exchange for traditional skills instruction from elderly residents. The research documented how these reciprocal arrangements created sustainable support systems while strengthening intergenerational relationships and community cohesion.

The scaling of successful digital inclusion approaches to additional communities required careful attention to local adaptation and community readiness factors. Research findings indicated that successful scaling strategies emphasized knowledge transfer and capacity building rather than program replication, recognizing that each community required unique approaches based on local contexts, resources, and priorities. The development of peer networks between villages engaged in digital inclusion initiatives facilitated knowledge sharing and mutual support, creating regional networks that enhanced sustainability and scaling potential (Servon, 2002).

Training and capacity building for community volunteers emerged as crucial elements of sustainability strategies. Villages that invested in comprehensive training programs for peer mentors and technical support volunteers achieved higher rates of program continuation and expansion. The research identified specific training components that enhanced volunteer effectiveness, including technical skills development, peer teaching methodologies, and ongoing support systems for volunteer retention and recognition. These capacity building investments created local expertise that reduced dependence on external facilitators while strengthening community capacity for addressing future challenges.

CONCLUSION

This research demonstrates that community-based approaches to digital inclusion can effectively address the digital divide experienced by elderly populations in remote villages of Northern Finland. The integration of culturally adapted learning programs, community mobilization strategies, and sustainable support systems created significant improvements in digital literacy, social connectivity, and health outcomes among participating elderly residents. The documented success of these initiatives provides evidence for the potential of community-led interventions to address digital exclusion while building on existing community assets and relationships.

The findings highlight the importance of recognizing digital inclusion as a community-level challenge that requires comprehensive approaches addressing infrastructure, skills, support systems, and cultural adaptation. The success of peer-to-peer learning models, culturally relevant content, and community ownership strategies suggests that effective digital inclusion initiatives must be grounded in local contexts and priorities rather than externally imposed solutions. The sustained

outcomes achieved through community-based approaches indicate that this model can create lasting change that extends beyond initial program periods, contributing to broader goals of social inclusion and community resilience. Future research should focus on developing frameworks for scaling successful community-based digital inclusion approaches while maintaining the local adaptation and community ownership that contribute to their effectiveness.

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