

# Application Fields and Innovative Technologies

## Design and Evaluation of AI-Enhanced Support Systems for Older Adults' Digital Community Participation Y.Nameki, N.Kurashima, K.Chin. *Gerontechnology* 25(s)

**Purpose** In Japan's super-aging society, the digital divide among older adults has become a critical social issue, leading to isolation and reduced quality of life (QoL). Previous studies identified three major barriers to IT adoption: (1) difficulty in building mental models, (2) challenges in skill acquisition, and (3) lack of sustained motivation. Conventional human-support models require extensive resources and impose psychological burdens on supporters, limiting sustainability. This pilot study aims to address these limitations by leveraging AI technologies to enable continuous, personalized support and community engagement, fostering autonomous participation and improving QoL. **Method** We propose two AI-driven approaches to facilitate older adults' digital community participation: (1) AI chat support that interprets users' comprehension levels and emotional states to deliver continuous dialogue at appropriate paces, providing 24/7 availability and unlimited patience for repetitive explanations; and (2) AI avatar-facilitated community activation, where AI avatars serve as moderators in virtual spaces, initiating conversations based on participants' interests and providing cognitive stimulation. (Figure 1) For validation, Experiment 1 involved two older adult participants in voice communication with AI, with interview surveys comparing stress levels, continuation intention, and self-efficacy against human dialogue. Experiment 2 involved an exploratory approach with three participants of varied ages—one older adult and two middle-aged adults (late 50s and early 60s)—to investigate both the general effectiveness of avatar-mediated communication and potential age-related differences. Interviews assessed communication effectiveness, sense of presence, and willingness to continue participation. **Results and Discussion** Experiment 1 confirmed adequate continuity in AI chat interactions, with participants demonstrating more active questioning and learning behaviors when AI responded according to their individual interests and comprehension levels. This suggests that personalized content can significantly enhance learning outcomes. However, we also identified challenges where AI over-responded to participants' backchannel signals, disrupting conversational flow. This reveals that effective AI support requires not only patience but also sophisticated conversation management capabilities. Experiment 2 demonstrated that avatar-mediated communication functioned effectively as a dialogue medium across age groups. Comparative analysis revealed both commonalities and differences: all participants recognized the value of social interaction regardless of age, reconfirming that motivation—including feelings of achievement and social recognition—is essential for sustained digital community participation. However, the older adult participant exhibited greater initial hesitation with interface operations compared to middle-aged participants, suggesting the need for age-appropriate onboarding processes. Additionally, gamification, widely employed in digital content, appeared promising for maintaining engagement across generations. These findings demonstrate viable solutions to the three barriers identified in our previous research while clarifying technical challenges that must be addressed for practical implementation. The system achieved continuous, personalized support with unlimited patience for repetition - capabilities difficult to sustain with human support alone - demonstrating the potential for sustainable digital support models that facilitate mental model construction among older adults. The exploratory multi-generational approach in Experiment 2, though limited in sample size (n=3), provided valuable insights into potential age-related factors and individual variations, identifying specific areas requiring further investigation with larger, stratified samples to establish comprehensive age-specific design guidelines.

### References

1. White Paper on Information and Communications in Japan (2024) <https://www.soumu.go.jp/johotsusintokei/whitepaper/eng/WP2024/2024-index.html>
2. Yoko Nameki, Natsumi Kurashima, Kenwa Chin. (2023) IPSJ SIG Technical Report Vol.2023-ASD-27 No.41, Digital Platform for improving Older Adults' Quality of Life in Today's Super-Aging Society <http://id.nii.ac.jp/1001/00227759/>
3. Koivisto, J., et al. (2021). Gamification for Older Adults <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8437506/>
4. Margrett, J., et al. (2022). Older Adults' Use of Extended Reality: A Systematic Review <https://www.frontiersin.org/articles/10.3389/frvir.2021.760064/full>

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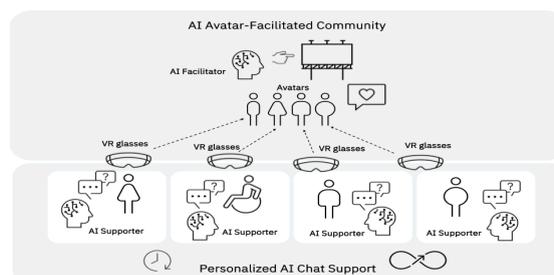


Figure 1. Overview of the proposal