AI and Elderly: Co-Designing Meaningful Human-AI Collaboration and AI Education in Aging Contexts and Intergenerational Communities

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Abstract. Human-Artificial Intelligence (HAI) research has concentrated on technical models, system performance and domain-specific applications. However, an often-overlooked group in this discourse is the elderly, who remain distant from many emerging technologies such as AI. As societies age, this exclusion risks widening the digital and social divide. A critical question, therefore, is how we might reimagine Human-AI collaboration and AI education in ways that are inclusive of seniors? By positioning AI not only as a tool for efficiency, but also as a medium for connection, co-creation, and lifelong learning, it may be possible to bring the gap between digital empowerment and social inclusion, particularly within aging and intergenerational communities.

1. Background

As artificial intelligence (AI) systems become increasingly embedded in daily life, there is growing interest in how humans and AI collaborate functionally, relationally and socially [1]. While much of Human-AI research has focused on enhancing productivity, creativity, and industrial applications, far less attention has been given to how these technologies intersect with the everyday lives of seniors. The elderly represent a population often underrepresented in AI research, despite being those who can benefit significantly from supportive technologies. There is limited understanding of how AI systems can enrich the daily routines, memory practices, and social engagement of seniors.

The Singapore government and other relevant organisations have been actively monitoring population trends and conducting studies to better understand the elderly demographic. According to official reports, as of 2024, seniors aged 65 and above make up 19.9% of Singapore's population [2]. This is a notable increase from 15.2% in 2020, reflecting a 4.7% rise over the four years. This phenomenon is not unique to Singapore, but reflects a wider global trend, particularly in Asia. Many Asian societies are undergoing a rapid demographic transition, marked by low fertility and mortality rates [3].

Digital readiness data from the Infocomm Media Development Authority (IMDA) reveals a persistent generational divide in attitudes toward digital technologies in Singapore [4]. While 84% of the general population (aged 15 and above) agree that digital technologies have made their lives easier, only 66% of seniors (aged 60 and above) share this sentiment. Similarly when it comes to enthusiasm for exploring new digital technologies, 65% of the general population express interest, compared to 45% of seniors.

These numbers underscore the pressing need to address the digital divide among seniors, not only in terms of access but also in confidence, motivation, and relevance of technology in their lives. As technology advances, it is critical to ensure no demographic is left behind, especially the elderly. For aging to remain dignified in an AI-driven future, seniors must be thoughtfully supported in adapting to emerging technologies and integrating into evolving digital ecosystems.

2. Research Motivation

This research is motivated by the urgent need to better understand how seniors perceive, experience and co-create with AI technologies. By leveraging participatory design methods and grounded field research, this study aims to highlight the lived experiences, values, and aspirations of seniors in shaping AI technologies and educational tools that are not only beneficial, but also personally meaningful and socially relevant. This research further explores how to reduce fear, foster trust, and increase seniors' willingness to engage with AI systems, exploring how technology can be effective integrated into their daily lives and support their well-being. A key goal is to give voice to elderly individuals, ensuring that technology is not developed solely by designers or engineers detached from lived realities.

Through this inclusive approach, this study hopes to enhance digital confidence among seniors, encourage greater future readiness and potentially foster intergenerational connection through shared technological experiences across different age groups.

As this work represents the initial phase of a PhD project, the direction may evolve over time. The research remains intentionally open to iteration and refinement, as new opportunities, collaborations, or insights emerge throughout the course of the doctoral journey.

3. Research Questions

RQ1. How do current and future seniors perceive and engage with new technologies in the context of their everyday lives, particularly in relation to learning, social connection and overall well-being?

RQ2. What social and psychological factors including barriers, fears and aspirations affect seniors' trust, motivation and willingness to engage with AI systems? How can AI education and technologies be designed to integrate into seniors' daily lives supporting learning, social connection and overall well-being?

RQ3. How can participatory design and intergenerational collaboration be leveraged to engage seniors in envisioning and co-creating new technology-enabled ways of living and interacting within their communities while simultaneously bridging the digital literacy gap?

4. Theoretical Support

The Technology Acceptance Model (TAM) proposed by Davis offers a foundation framework [5] for understanding the factors that influence individual's acceptance and use of technology. TAM consists of two primary factors: (1) Perceived Usefulness (PU), (2) Perceived Ease of Use (PEOU), which determine a user's attitude toward adopting new technology.

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In the context of seniors, PU may relate to how much they believe digital tools or AI applications can support their daily living, health, or social connections. Meanwhile, PEOU is critical for seniors, as cognitive load, physical dexterity, and prior exposure to technology can influence how approachable or intimidating a system feels.

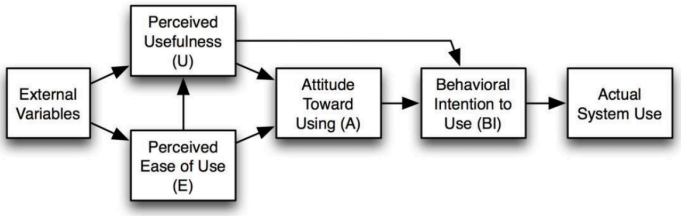

Figure 1. Technology Acceptance Model [5].

This research will use the Technology Acceptance Model (TAM) as a grounded theoretical support as we discover new findings and co-develop solutions for enhancing digital engagement and empowerment among seniors. TAM provides a robust lens to understand seniors' motivations, hesitations, and usage behaviours, guiding both the design of field studies conducted and the interpretation of findings.

5. Current Efforts

5.1 Reviews of Human-AI Collaboration and Digital Literacy in Aging Populations

A systematic review was conducted, examining 59 peer-reviewed publications on Human-AI Collaboration from 2020 to 2025. This systematic review deepened the understanding of Human-AI Interaction (HAI) literature and revealed that many existing concepts and frameworks were derived primarily from experiments using computer simulations, game-based settings, or student participants. Consequently, this review motivates our research to adopt a different perspective, focusing on aging groups and examining how elderly populations remain largely overlooked in Human-AI studies.

A literature review on digital literacy in aging populations was conducted to understand how seniors engage with technology and identify challenges and opportunities for inclusion. Several key trends emerged from the review.

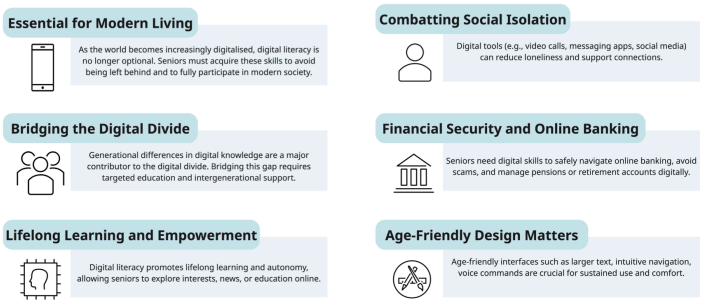

Figure 2. Trends on Digital Literacy and Aging.

5.2 Observational Study of Elderly Engagement with AI

An observational study was conducted in partnership with *MemoryLane*, a technology start-up piloting AI-assisted storytelling and companionship for seniors in Singapore [6], at Active Aging Centres (AACs) and Community Centres (CCs). The participants primarily comprised "young-old" seniors (aged 50-74), who were physically active, each owned a smartphone, and mostly communicated in English.

A notable observation was the strong retention rate: nearly half of those who attended a basic digital literacy session chose to return for a follow-up advanced class, suggesting interest and engagement when the technology felt accessible and relevant.

However, several key challenges were also identified. The most commonly mentioned barrier was fear: fear of misusing smartphones, falling victim to scams, or being unable to keep up with the rapid pace of technological change. Additionally, some participants expressed concerns about over-reliance on AI, voicing apprehension that such technologies might displace meaningful human relationships. These reflections highlight the complex emotional and ethical dimensions of Human-AI Interaction, especially within the aging populations, where the desire for connection, meaning and trust are critical factors influencing technology acceptance and sustained use.

6. Ongoing Efforts

6.1 Questionnaire on Lived Experience with Technology and AI

A questionnaire is currently being developed and piloted with approximately 100 seniors aged 55 to 74 at an intergenerational community centre, Bishan Wellness Hub in Singapore. The study aims to capture comprehensive insights into seniors' lived experiences with digital technologies and AI, focusing on constructs from TAM model such as perceived usefulness, ease of use, positive attitude and behavioural intention. In addition, the questionnaire incorporates open-ended questions designed to elicit personal narratives, attitudes toward technology integration in daily life. The combination of quantitative and qualitative data will facilitate a nuanced understanding of the factors influencing seniors' readiness to engage with AI technologies.

6.2 Co-Design Workshop: AI Co-Creation with Seniors

An upcoming co-design workshop is being prepared to start actively engage seniors in creative, participatory experiences with AI. Together with volunteers at community centre, the research team aims to target the workshop to provide participants with hands-on opportunities to explore generative AI tools for co-creating music, personal narratives and short videos. Designed as a stress-free and enjoyable setting, the session aims to both promote new technologies and foster confidence among senior participants.

In parallel, the workshop will serve as qualitative data collection environment, enabling the documentation of participants' feedback, reflections and design ideas. These insights will inform future iterations of AI education that are more aligned with the values, preferences and lived experiences of elderly participants.

7. Forward Direction

Building on the initial investigation into seniors' perceptions and experiences with AI, this research will progress toward identifying emergent themes in elderly's interactions with AI technologies and develop a participatory framework that empowers seniors to take an active role in shaping how AI supports their communication, retirement lifestyles, social relationships and overall well-being. Central to this effort is the prioritisation of seniors' voices in co-creating AI solutions that are meaningful and socially enriching.

Depending on findings from ongoing fieldwork, an emphasis may be placed on intergenerational use of AI. This direction would explore how younger generations are currently leveraging AI in creative and communicative ways, and investigate how elderly might be included in these ecosystems. By facilitating common AI platforms, the research seeks to foster meaningful cross-generational exchanges. Such interactions may not only bridge the digital generational divide, but also inspire new forms of engagement and mutual learning across different generations.

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