

Challenges and Strategies of Digital Literacy Education for Elderly in the Context of Aging

Huanle Liang, Yu Song *, Yang Yang, Shiyu Wang, Qing Fang

School of Business Administration, University of Science and Technology, Anshan, Liaoning, CO 114051, China

* Corresponding author: Yu Song (Email: yullasong88@163.com)

Abstract: In this era of aging and digitalization deeply intertwined, enhancing digital literacy of the elderly is of great significance to their integration into modern society and improvement of their quality of life. However, older adults face many challenges in accepting digital literacy education, such as physiological decline, insufficient knowledge reserve, declining learning ability, psychological resistance, and insufficient social support. The problem of how to help the elderly population effectively cross the digital divide is quite serious, and in order to effectively deal with these challenges, it is necessary to formulate strategies at multiple levels, such as policies and regulations, education systems, social support and technological innovation, to promote the development of digital literacy education for the elderly, help them cross the digital divide, and share the convenience and dividends of the digital era.

Keywords: Digitalization; Digital Literacy; Aging; Digital Education.

1. Introduction

The global population is ageing at an unprecedented rate. According to the United Nations' Report on the World Social Situation 2023, by 2050, the number of people aged 60 and over will grow from 1 billion in 2022 to 2.1 billion, and the proportion of the total population will climb from 13% to 22%. As the country with the world's largest elderly population, China has entered a stage of accelerated aging since 2022. According to the National Office on Aging, by 2035, the number of people over 60 years old will exceed the 400 million mark, accounting for more than 30 percent of the total population. By then, China will have officially entered a deeply aging society.

Meanwhile, digital technology is profoundly changing the mode of social operation and people's way of life. Digital elements have permeated every aspect from healthcare, finance, transportation to social entertainment. In this new phase of digital transformation, technological advances are seen as a potential compensatory mechanism for mitigating the erosion of the traditional demographic dividend[1]. As a result of the iterative development of digital intelligence applications, a considerable number of elderly people are being gradually marginalized due to the lack of basic digital skills in the elderly group due to the limitations of physiological, psychological and educational backgrounds, and a large number of elderly people are facing the problems of digital divide and digital aging in adapting to the digital life, which impede the elderly from enjoying the digital dividend. In an era of overlapping digitalization and ageing, digital literacy not only has a bearing on the soft power of the country and the quality of life of its citizens, but is also an important measure to address the imbalance in development among different social groups.

For older populations, digitization is not only about the well-being and quality of life of individual older persons, but is also key to achieving social inclusion and promoting comprehensive social development[2]. Against this backdrop, enhancing the digital literacy of older persons and bridging the digital divide is not only a necessary way to promote the

sharing of the dividends of development in the digital age by older groups, but also an important measure for China to implement its strategy of actively coping with the ageing of the population. How to help the elderly cross the digital divide and realize their digital ageing and digital literacy has become an important issue in the construction of a digital society [3]. Enhancing the digital literacy of the elderly is not only a necessary way to realize their personal development, but also an important cornerstone for building an inclusive digital society. Therefore, this paper aims to explore the challenges of digital literacy education for older adults in China and propose corresponding educational and social support strategies to provide reference for realizing digital inclusion in an aging society.

2. Literature Review

Digital literacy initially refers to people's ability to effectively use information technology in a digitalized environment, covering the full range of areas such as information acquisition, assessment, utilization, creation and dissemination. According to the definition of the National Internet Information Office, digital literacy and skills refer to a series of qualities and abilities that citizens in a digital society should possess in their learning and working lives, including digital access, production, utilization, evaluation, interaction, sharing, innovation, safety and protection, ethics and morality[4]. For the elderly, the emphasis on the ability to safely and conveniently use everyday digital tools to improve quality of life needs to be integrated into the realities of their lives, including: proficiently operating terminal devices such as smartphones or tablets; using applications such as WeChat and Alipay to socialize and make payments; identifying the authenticity of online information; and applying health and safety information to improve quality of life. information to improve the quality of life. This also includes the use of online public services such as health codes and enrollment platforms, as well as the completion of payments through WeChat, Alipay and other applications.

Existing research on the quality literacy of older persons

focuses on three levels: educational interventions, technology-adapted adaptations and social participation. First, educational interventions are seen as a foundational means of enhancing the digital competence of older people. Early studies focused on exploring the mode and content of geriatric education. Drawing on the experience of Spain, Wang et al. (2025) emphasized a curriculum design oriented to the needs of older adults[5]. Li (2025) describes German practices in gerontological education, highlighting the importance of lifelong learning and digital literacy[6]. Secondly, the adaptation of technology for ageing is a key aspect of bridging the digital divide. It is difficult to eliminate the barriers that older people encounter when using digital technology by relying on educational interventions alone. From a deeper perspective, Hu & Zhu (2025) point out that the “opacity” of digital infrastructure is an important reason for the “digital exclusion” from the elderly, and put forward the concept of “digital negative freedom”[7]. Kuang & Meng (2025), on the other hand, explored the path of building a digitally inclusive aging society from a global perspective, emphasizing the synergies of policy, services, technology, and assessment [8]. These studies prompted us to think about how to design more friendly and convenient digital products and services to meet the special needs of older people through technological innovation. Taking digital sports as an example, Cheng (2025) discusses how to expand the digital living space for the elderly through age-appropriate renovation [9]. Yan & Zhou (2025), instead, revealed the key factors affecting the digital integration of the elderly population through empirical research, which provides an important reference for technological ageing adaptation[10].

There are also some scholars who have explored the role of digital literacy enhancement in promoting the social participation and value realization of older adults. Suo & Lv (2025) study shows that digital literacy not only improves the labor participation rate of older adults, but also enhances their social capital and social identity[11]. In the digital economy, older people can also play an active role. Ji & Hao (2025) focus on the social participation of rural “digitally disadvantaged groups” and emphasize the importance of digital infrastructure and digital identity. These studies suggest that digital literacy education should not only focus on improving skills, but also on how to empower older people to find their place and value in the digital society [12].

Germany has one of the highest levels of population ageing in Europe, and for this reason, the country is committed to promoting active ageing and has introduced more policies and innovative practices in the development of gerontological education. A review of the development of German gerontological education policy over the past decade shows that it has focused on four key dimensions: lifelong learning, social participation, vocational training and digital literacy[6].

However, there are still some shortcomings in the existing research. First, there is a lack of unified understanding of the connotation and assessment criteria of digital literacy among older people. Second, there is insufficient attention to the differences in the needs of different types of elderly groups. Finally, there is a lack of in-depth exploration of the ethical risks that digital technology may bring.

3. The Development Status of Digital Literacy among the Elderly in China

3.1. The Current Reality of Digital Literacy Among Older People

Although the trend of “*Silver-Haired Generation Goes Online*” has increased significantly in recent years, from an overall point of view, the digital literacy of the elderly in China is generally low. According to the 53rd Statistical Report on China's Internet Development released by China Internet Network Information Center (CNNIC), by the end of 2023, the proportion of Internet users aged 65 and above in China was 13.5%, which is a significant increase, but there is still much room for improvement in the depth and quality of their digital participation[13]. The main problems include: weak basic operation ability: many elderly people cannot scan codes, use smart payment or inquire about public services; low information discernment ability: they are easily influenced by online rumors and fraudulent information; strong psychological resistance: they are distrustful and fearful of technology; and a single channel for learning: there is a lack of targeted courses and long-term guidance mechanisms.

At present, the development direction of digital literacy education for the elderly is generally good, but there are still some limitations. For example, in Shijiazhuang City, Hebei Province, the elderly patients Mr. Shi in the process of a medical consultation, encountered digital technology barriers that led to the consultation cannot be successfully completed the reality of the dilemma, the hospital requires the patient to arrive at the hospital, through the cell phone applet booking registration, and the use of self-service terminals to complete the consultation process. However, despite completing the online booking with the help of her son, due to the minimal number of manual windows in the hospital, the lack of guidance information, and the lack of visual impairment, she was unable to complete the booking process lack of guidance information, coupled with declining eyesight and unfamiliarity with the equipment's operating procedures, Mr. Shi was ultimately unable to seek treatment after arriving at the hospital. This case highlights the problem of “*lack of elderly appropriateness*” that exists in the current process of intelligentization of medical services, reflecting the common problem of information, operation, and accessibility for the elderly in the face of the digitalization of the medical process. This case highlights the problem of “*lack of suitability for the elderly*” in the current process of intelligentization of medical services, and reflects the information, operational, and emotional barriers to the digitalization of the medical process that exist among the elderly.

The emergence of such problems not only affects the medical experience of the elderly, but also reflects the lack of inclusiveness in the construction of a digital public service system. In terms of service accessibility, blindly promoting intelligent reforms, compressing manual service windows, and ignoring the lack of digital skills and anxiety of the elderly have increased the original service gaps for the elderly, and instead added a layer of technological barriers in addition to the original service gaps between the elderly and digital technology, which has become the “secondary marginalization” of the elderly [8]. The lack of age-appropriate design considerations in the functionality and

interactive logic of digital devices exacerbates negative emotions in older adults, such as feelings of exclusion and helplessness. From the perspective of enhancing access to convenience services for the elderly in the digital healthcare environment, improvements can be made in three areas. First, in terms of safeguarding service diversity, on the one hand, while promoting the digitization of medical services, the necessary manual service windows and manual assistance channels should be retained to provide alternative choices for elderly patients, so as to avoid being marginalized by digital technology due to a lack of technological capacity and increasing the burden of medical services. On the other hand, the interface and process design should need to be strengthened to adapt to the aging design, medical terminals should adopt a simple interface, modular operation process, and set up features such as font enlargement, voice navigation, etc., to enhance the use experience of the elderly. In addition, it is also necessary to strengthen the training of digital medical skills. Depending on community health service centers, geriatric hospitals and university platforms, regular guidance on the use of digital equipment for the elderly should be carried out, and a “teaching-practice-application” integration mechanism should be constructed, so as to help the elderly gradually master the basic operating procedures and enhance their autonomous capabilities.

This will help elderly people gradually master basic operating procedures and enhance their ability to seek medical treatment on their own. Only through the combined efforts of systems and technologies can the “*digital anxiety*” of the elderly be effectively alleviated and a fair and sustainable smart medical service system be built.

3.2. Outstanding Practice Case: “Digital Literacy Classroom for the Elderly” in Haidian District, Beijing, China

Haidian District, Beijing, has launched the “Digital Literacy Classroom for the Elderly” public welfare program since 2021. It combines community resources and the advantages of universities, which has become a highlight case of digital education for the elderly. The program is jointly promoted by the Department of Sociology of Tsinghua University and the Haidian District Office for the Elderly in cooperation with several communities, and provides practical courses on the use of WeChat, anti-fraud knowledge, and smart registration drills. The program combines case study teaching and volunteer “*one-on-one counseling*” to greatly enhance the learning interest and operational ability of participating seniors. Features of the program include: the preparation of a handbook for the elderly with illustrations and text; a maximum of 15 participants in each course, which facilitates individual tutoring; the use of smart TVs and interactive projection equipment to enhance interaction and emotional support; and the long-term pairing of university student volunteers to help lower the threshold of learning, among other things. The project is listed as one of the typical practices in the “Ageing Society in the Digital Age: Characteristics, Opportunities and Challenges”.

Its successful experience shows that the education model of “localized design + continuous accompaniment” is an important inspiration for improving the digital literacy of the elderly.

4. Challenges to Digital Literacy Education for Older Persons

4.1. Physiological Decline Accompanied by Psychological Resistance

As people age, the physiological functions of the elderly, such as vision, hearing, and manual dexterity, gradually diminish. Declining eyesight makes it difficult for the elderly to see the screen content of electronic devices, declining hearing affects the understanding of voice prompts and online course explanations, and insufficient hand dexterity leads to a lack of accuracy and flexibility in operating electronic devices, such as difficulty in accurately clicking on small icons on the screen of cell phones, difficulty in performing complex gesture operations, etc. These physiological factors bring greater obstacles to the elderly's ability to learn digital technology, severely restricting the ability of the elderly to learn and use digital technology has led to a decline in their ability to recognize and operate digital technology, which has a great impact on the recognition and use of digital technology.

The elderly, however, often show obvious psychological resistance and adaptation barriers when facing digital technologies, and this emotional reaction has become an important obstacle in the process of improving their digital literacy. On the one hand, some older people generally believe that digital technology belongs to the exclusive domain of younger groups, and worry that it is difficult for them to master the relevant skills due to their age and weak learning ability; on the other hand, the economic loss, potential safety hazards or social embarrassment that may be caused by operational errors also aggravate their rejection of new technologies in the actual use process, and among some older people, digital technology has been neglected. In addition, the complexity of the technology interface, obscure terminology, and unsystematic learning paths have deepened their sense of powerlessness and frustration. This negative psychology has not only suppressed the motivation of older people to take the initiative to learn, but also reduced the actual effectiveness of digital literacy education. It is worth noting that many older people have a strong dependence on traditional lifestyles and a natural resistance to “online” life, and this cultural inertia has formed a cognitive barrier in a subtle way, further limiting their willingness to accept technology. Therefore, in the process of promoting digital literacy education for the elderly, it is urgent to combine psychological support with educational interventions to gradually dissolve the resistance and stimulate the enthusiasm and initiative to participate in the digital society by enhancing self-confidence, shaping identity and optimizing experience.

4.2. Insufficient Targeted Educational Resources

In an age where education is highly valued, educational resources for seniors are sparse. According to the “Analysis of the Status and Trends of the Elderly Education Industry 2024-2029” published by China Research Network, the market supply and demand imbalance in the elderly education industry is significant, and despite the continuous growth in the demand for elderly education, the supply of high-quality educational resources in the market is relatively insufficient. Many geriatric education institutions are still in the primary stage, lacking systematic curriculum design and professional faculty. Many curricula on the market lack design for older

persons, and course content is often biased in favour of young people, making it difficult for older persons to empathize with them; the marketization of gerontological education has been slow; and although government-led gerontological universities and community-based education have, to a certain extent, met the educational needs of older persons, the quality of education and the level of service varies due to a lack of competition in the marketplace.

4.3. Insufficient Attention to Digital Literacy for the Elderly in Society

Currently, society's overall attention to improving the digital literacy of older people in the process of digital transformation is still insufficient, which is reflected at multiple levels, including policy design, resource allocation, and public opinion. On the one hand, there is a stereotypical perception in society that the mastery of digital technology by the elderly is not necessary, leading to their low priority in digital education policies and limited investment of public resources; on the other hand, when designing digital products and service processes, some service providers tend to ignore the needs and habits of the elderly group and fail to realize ageing-adapted transformations of their functions, which aggravate the feeling of "exclusion" among the elderly. On the other hand, when designing digital products and service processes, some service providers often neglect the needs and usage habits of older people and fail to adapt their functions to ageing, thus exacerbating older people's feelings of "exclusion", and why are some services prioritized and excluded in digital education policies? In addition, the mainstream media and educational institutions have not done enough to publicize and popularize the issue of digital literacy among the elderly, and there is a lack of systematic guidance and positive typical shaping, which leads to the public's understanding of this topic remaining at a shallow level, and it is difficult to form a broad consensus on social consensus and action synergy. Shijiazhuang, Hebei Province, elderly patients Mr. Shi use of smart technology to seek medical treatment is a common occurrence, it is because of the lack of attention, not only to delay the pace of the integration of the elderly into the digital society.

The lack of attention has not only slowed down the pace of integration of the elderly into the digital society, but also objectively widened the intergenerational digital divide. Therefore, to promote the construction of a multifaceted and synergistic support mechanism, and to truly realize digital equity and technological inclusion, it is urgent to raise the level of awareness of digital literacy education for the elderly within the whole society, and to incorporate it into the national digital strategy and lifelong education system, as well as to realize digital equity and technological inclusion within the whole society.

5. Measures to Address Digital Literacy Education Challenges for the Elderly

5.1. Adjust Educational Content and Methods to Suit the Characteristics of the Elderly

From the viewpoint of cognitive function, sensory ability, learning habits and other age characteristics of the elderly, digital literacy education should be based on the actual needs of the elderly, and personalized adjustments should be made

to the content settings and teaching methods of digital literacy education according to the characteristics of age, so as to enhance the acceptance and learning effect of the elderly. First, based on the high-frequency use of life digital skills of the elderly, based on the basic operation of smartphones, social software applications, mobile payment, online medical care, online government affairs, etc., highlighting the practicality and operability of the curriculum. Secondly, highlight the easy-to-understand content of the teaching materials, avoid the use of obscure terminology as much as possible, and adopt easy-to-understand language with illustrations, the font size of the text should take into account the characteristics of the elderly's declining eyesight, and the operation steps should be organized and clarified, which can be appropriately combined with real-life cases to enhance comprehension and memorization.

Secondly, a graded teaching system should be set up according to the differences in learners' starting points, with basic skills at the primary stage, daily life application skills at the intermediate stage, and personalized teaching at the advanced stage; diversified teaching strategies such as situational simulation, group mutual assistance, and video demonstration should be adopted to increase the interactivity and sense of participation in learning; the mechanism of practice and feedback should be strengthened, such as post-course tasks, operation demonstrations, and progress tracking; motivation should be stimulated to improve learning; and the learning process should be improved. Enhance learning confidence and provide timely encouragement and support; Combine digital skills learning with interest activities, such as photography, travel records and other practices to enhance the fun and practicality of learning, and achieve the educational goals of teaching for fun and knowledge for action.

5.2. Promoting the Balanced Development of Educational Resources for the Elderly in Urban and Rural Areas

There has long been a significant gap in the distribution of educational resources for older persons in urban and rural areas in China, especially in rural and remote areas, where teachers, teaching facilities and curriculum provision are relatively weak, which constrains older persons' access to and ability to acquire digital skills. To achieve broad coverage and equity of digital literacy education among the elderly population, it has become imperative to promote regional coordination and structural optimization of educational resources. Based on this, we can learn from the "Digital Literacy Classroom for the Elderly" public welfare project in Haidian District, Beijing.

Firstly, relying on the existing grassroots platforms, such as community cultural service centers, farmers' bookstores, and senior citizen activity stations, we can set up a digital learning space with complete functions to provide education services in a convenient and nearby manner. Secondly, through "sending education to the countryside" and distance learning, we can introduce higher vocational colleges, community colleges and other forces, and jointly run schools with professional social organizations. To realize the sinking of resources and the sharing of teachers, and to improve the quality and continuity of grassroots teaching; to establish an urban and rural interconnected education network, and to form a multilevel linkage mechanism that is coordinated at the county level, organized by townships and implemented at

the village level, so as to ensure the smooth flow of resources and the docking of teaching. [7] The government should play a guiding role in guaranteeing the participation of the elderly in education by setting up special funds, providing financial subsidies and policy incentives, and attracting the participation of social capital and the power of the public welfare.

The government plays a guiding and guaranteeing role, setting up special funds, providing financial subsidies and policy incentives, and attracting social capital and public welfare forces to participate in education for the elderly; establishing an institutionalized mechanism of “urban support for rural areas”, such as opening up high-quality resources in urban universities for the elderly, and organizing volunteer teachers to carry out regular teaching activities; and promoting the balancing of educational resources between urban and rural areas in a systematic and sustainable way, so that education for the elderly in the area of digital literacy will be universalized and made equal.

5.3. Creating a Supportive Learning Environment for Seniors

Improving the digital literacy of the elderly is a social system project with the participation of multiple subjects, requiring the collaboration of the education system, families, enterprises, social organizations, the media and other parties to build a supportive and friendly learning ecosystem. Families play a fundamental role, and their children are the bridge and guide for the elderly to learn. Based on the advantages of affection and trust, they guide the elderly to familiarize themselves with commonly used digital devices and applications, such as voice calls, online registration, mobile payment, etc., through daily interactions; explanations should be concise and easy to understand, operations should be demonstrated, and encouragement should be given in a gradual and orderly manner, so as to help the elderly build up their self-confidence and willingness to use the devices. Secondly, enterprises should implement the concept of ageing-adaptation in product design and service provision, such as optimizing the simplicity of the interface, font size and operation path, adding voice prompts and “one-key-help” functions, and lowering the threshold of use for the elderly. At the same time, enterprises should also bear social responsibility by providing basic user guides and customer support services for elderly users, providing continuous technical assistance and providing a comprehensive range of services for the elderly.

At the same time, enterprises should also assume social responsibility by providing basic user guides and customer support services for elderly users, and provide continuous technical help, while social organizations can fill the support gaps through volunteer services, special lectures, skills training, etc. These gaps are all outside of formal education. For example, the establishment of “silver-age digital lecturers” or “neighborhood mutual-help groups” can stimulate the enthusiasm of the elderly to participate in the network of acquaintances and enhance the effectiveness of learning. Finally, the media should play an active role in guiding public opinion and social cognition, and through special programs, public welfare propaganda and other means, display successful cases of learning for the elderly, break the stereotype that “the elderly can't learn”, and create a good atmosphere of understanding, respect and support for the digital integration of the elderly in the whole society. Only

through concerted efforts and the integration of resources can a systematic support network be formed, so that older persons can have more confidence and ability to adapt to the digital age and truly achieve the dual integration of technology and society.

6. Conclusion

In the context of the ageing population and digitalization, digital literacy education for the elderly is not only related to the individual's ability to adapt to the digital society, but also to the realization of social equity and technological inclusion. Currently, the elderly in China face physiological, psychological, cognitive, resource and institutional obstacles in the process of acquiring digital skills, which leads to their relative disadvantage in the increasingly intelligent social life. By systematically combing the definition, reality, practice cases and problems of digital literacy of the elderly, this paper points out that enhancing digital literacy of the elderly is not only an educational task, but also a social system project, which requires the concerted efforts of multiple subjects.

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