Research on the Reform of Elderly Care and Education Model Under Digitalization: A Case Study of Taizhou City

DING Yaping[a],*

[a] Senior Citizen College, Zhejiang Taizhou Open University, China.
*Corresponding author.

Abstract

Under the dual background of aging and digitalization, the needs of the elderly have gradually shifted from being singular to diverse and from basic to advanced. The urgency of bridging the digital divide among the elderly and promoting the coordinated development of aging-related initiatives with socio-economic progress has become increasingly prominent. Currently, elderly education faces issues such as inadequate resource supply, incomplete institutional mechanisms, insufficient funding for running schools, and uneven development. Taizhou has innovatively explored a practice model that integrates digital empowerment into elderly care and education, placing the elderly at the center and using digital means. By involving multiple stakeholders and fully integrating educational and elderly care resources, this model ensures the elderly's right to integrate into an information-based society, enabling them to enjoy smart living and enhancing their quality of life and life value. This provides practical references for addressing population aging proactively.

Key words: Elderly education; Integration of care and education; Digital empowerment

1. INTRODUCTION

With the improvement of economic conditions and the development of information technology, contemporary seniors are no longer satisfied with the single demand of "adequate support in old age" but also pursue spiritual fulfillment through "learning, enjoying, and contributing in old age." In efforts to meet the personalized and diversified needs of the elderly, the "integration of care and education" model has gained increasing attention. This model enhances the material and spiritual needs of the elderly through the integration of elderly education and care services, promoting both individual development and sustainable development of an aging society. Meanwhile, the widespread penetration of the Internet in social life is reshaping the structure of the elderly industry and the form of elderly services. For the elderly, the double-edged sword effect of the Internet and digital technology is more significant. It can not only bring new energy and opportunities for the elderly to enjoy a better life, but also easily lead to difficulties in digital integration, which in turn triggers new issues of digital poverty and digital inequality. How to make good use of this double-edged sword of digital technology to allow the elderly to fully enjoy the conveniences and benefits of the digital age also poses new challenges to eldercare services and education for the elderly.

According to statistics, by the end of 2023, the proportion of people aged 60 and over in Zhejiang Province accounted for 26.17% of the total population, with Taizhou's ratio reaching 24.78%[1], significantly exceeding the national average. Facing severe aging trends, Taizhou has actively integrated elderly care and education resources around the overall framework of "Zhejiang Elderly Care" and the "Two Pilot Programs," exploring feasible paths for empowering the integration of care and education through digital technology. This aims to provide practical references for high-quality elderly education and proactive responses to population aging.

2. DIFFICULTIES IN THE DEVELOPMENT OF ELDERLY EDUCATION IN THE DIGITAL AGE

The integration of digital technology into education offers more possibilities for the transformation and development of elderly education. However, China's elderly education sector still faces numerous issues, including incomplete mechanisms, imbalanced supply and demand, and uneven development. These issues can be summarized as follows:

2.1 Insufficient Supply of Elderly Education Resources

The vast scale and rapid development of China's aging population mean that the learning demands of the elderly will continue to rise. However, the overall stock of elderly education resources is insufficient, and the growth rate of supply is slow. Currently, various elderly schools remain the main carriers of physical operation in elderly education. Despite their critical role, these schools are few in number but bear heavy responsibilities. Due to limitations in physical space and a shortage of teaching staff, it is common to see a phenomenon where there is intense competition for limited seats. In Taizhou, from municipal to county and township levels, elderly schools (or classrooms) often share office spaces and facilities with vocational schools or government departments. Teaching staff are mostly part-time, leading to many uncertainties and instabilities in resource provision. On one hand, the "marginalized" status of elderly education is difficult to change. The government and social forces are often unwilling to invest heavily in elderly education, prioritizing resources for primary education, higher education, and vocational education. On the other hand, the elitist nature of elderly education has not been broken. Throughout the historical development of elderly universities in China, retired cadres, intellectuals and other special groups have predominantly been the main participants in elderly learning. Until now, elderly education has not fully transitioned from serving elite groups to the general public[2]. Given the current conditions, the supply capacity of elderly education is weak and far from meeting the needs of equitable and inclusive education.

2.2 Incomplete Institutional Mechanisms for Elderly Education

Elderly education currently lacks clear legal and institutional safeguards, leading to multi-headed management and fragmented governance. There is no unified standard for management and school operations, which significantly hinders the effective supply and rational allocation of elderly education resources. Although the state has issued a series of policy documents guiding the development of elderly-related initiatives, there is a lack of detailed implementation guidelines and

feasible regulations. Local governments also lack clear and unified planning, resulting in unclear responsibilities, overlapping functions, and chaotic management. Currently, public schools primarily dominate elderly education institutions, such as elderly universities overseen by the old cadres bureau, elderly open universities managed by the education bureau, and elderly television universities administered by the civil affairs bureau. However, there is no clear structure for school operations. For example, the municipal-level elderly TV university in Taizhou relies solely on the open elderly university and lacks independent functions and lower-level teaching points. Communication and coordination mechanisms between different systems and levels are lacking, resulting in inadequate overall support for school operations. In some areas, the system advantages are not fully utilized, and there is little support from government departments, leaving individual schools to struggle on their own[3]. Additionally, there is a lack of corresponding entry, evaluation, and supervision mechanisms for private organizations and social forces involved in elderly education, constraining its diversified development.

2.3 Inadequate Funding for Elderly Education

Adequate financial support is crucial for the construction of elderly education venues, facilities, teaching staff, and course resources. Currently, China's elderly education primarily depends on government funding, despite the government's emphasis on elderly affairs, however, in the face of severe aging trends, fiscal funds prioritize basic pension guarantees, limiting support for education. Due to the public welfare nature and low return on investment of elderly education, fewer social funds flow into this area. As a result, most elderly education institutions can only maintain the status quo and lack sufficient funds for infrastructure upgrades, equipment improvements, and technical services required for digital transformation. Consequently, efforts to digitize elderly education are significantly hampered. The municipal-level educational budget in Taizhou does not yet include elderly education, relying instead on special school funds, tuition income, and cooperative education models. The funding mechanism for elderly education needs further improvement.

2.4 Uneven Development of Elderly Education

Due to differences in local policies, economic levels, and cultural perceptions, elderly education development is severely uneven, particularly between urban and rural areas and across different regions[4]. Rural areas and less developed regions lag far behind urban and developed regions in terms of elderly care concepts, the promotion and popularization of elderly education, and the provision of educational facilities. For instance, in some townships and subdistricts in Taizhou, elderly schools do not even have a fixed location for classes. Some have to seek

temporary venues to conduct "guerrilla-style" teaching activities, while others temporarily use office spaces of other departments, facing an uncertain situation where they cannot plan for the next day. In the digital age, while mobile learning has become commonplace for urban elderly, rural elderly may not know how to use smartphones, and disparities in base station construction, Internet usage, and information access in remote areas exacerbate the imbalance in elderly education.

2.5 Widespread Digital Divide Among the Elderly

The elderly have long been at a disadvantage when it comes to digital information technology, and this digital divide is a product of the intersection of modernization, digitalization, and aging[5]. On one hand, the decline in physical functions increases the "digital burden" on the elderly, especially changes in vision, hearing, touch, and cognitive abilities, affecting the use of electronic products and information acquisition efficiency. On the other hand, there is insufficient design consideration for elderly users in technological products. Most products on the market do not take into account the usage needs and expectations of the elderly during the development process, thereby reinforcing their information disadvantage and further widening the gap on both sides of the digital divide[6]. The existence of the digital divide inevitably leads to obstacles in digital learning for the elderly and increases the difficulty of implementing digital teaching and management in elderly education.

3. FEASIBILITY OF DIGITAL EMPOWERMENT FOR INTEGRATING ELDERLY CARE AND EDUCATION

Integrating elderly care and education represents a practical model that embodies the concept of active aging. By reasonably integrating resources, integrating elderly care and education expands the supply of elderly education and enhances service quality, contributing to the improvement of both the elderly care system and lifelong education system. Introducing digital technology in the implementation of integrating elderly care and education offers positive solutions for addressing issues related to resource supply in elderly education and optimizing services in elderly care and education.

3.1 Policy Support from the State for Integrating Elderly Care and Education and Digital Transformation

Current policies generally support the innovative application of emerging technologies such as IoT, big data, AI, and cloud computing in the fields of education and elderly care. These technologies are used to enhance the quality of elderly care services and elderly education through technological empowerment. The national "14th

Five-Year Plan" explicitly states the need to "develop the silver economy, develop age-friendly technologies and products, and foster new industries like smart elderly care." The "Action Plan for the Development of Smart Healthy Elderly Care Industry (2021-2025)" issued by the Ministry of Industry and Information Technology, among others, mentions the need to "create new drivers for information technology industry development," "enrich the supply of smart healthy aging products and services," and "conduct training activities on the application of intelligent technologies in communities, elderly care institutions, and senior universities. [7]" This provides macro-level guidance for the integration of technology and industry in the digital era, as well as the organic connection between education and elderly care.

3.2 Real Needs of the Elderly Population for Digital Access and Usage

With the development of the Internet industry, digital intelligent technology continues to stimulate internal demand potential, and the elderly population's desire to bridge the digital divide and integrate into the digital society has gradually increased. According to the 54th "China Internet Development Status Statistical Report," the "silver-haired group" has become a major force among new Internet users, accounting for 20.8% of new netizens aged 60 and above. The penetration rate of the Internet and digital technology among the elderly population is continuously rising, reflecting that "Internet+" lifestyle services and educational formats are influencing an increasing number of seniors. The use of digital technology helps maintain social interactions, alleviate cognitive decline, increase channels for information acquisition, and positively impacts the psychological state and social participation of the elderly[8]. To promote family integration and gain peer recognition, older adults have a stronger willingness to learn digital technology and keep up with the times[9]. The development of the Internet and smart technology has spawned the digital education and smart elderly care industries, providing more possibilities for seniors to enjoy inclusive and high-quality products and services.

3.3 Effective Assistance of Digital Technology in Elderly Care and Education Services

The rapid development of digital information technology has significantly impacted the fields of elderly care and education while also creating more opportunities and favorable conditions for their integrated innovation. Embedding intelligent technology into elderly care and education models, leveraging the mediating role of online platforms and digital technology, can integrate elderly care and educational resources, enhancing the convenience with which seniors access information resources. Whether in home-based or community/institutional elderly care, smart devices, telemedicine, and other

technologies can provide multidimensional, personalized daily care, nursing, and professional services for the elderly[10]. Learning platforms, social software, and other applications can also offer cultural activities, learning and friendship, and social interaction services, meeting the emotional connection and spiritual companionship needs of the elderly. The empowerment of digital technology in the Integrating Elderly Care and Education model not only improves the quality assurance and support service capabilities of healthy aging but also enhances the resource sharing and inclusive supply capabilities of elderly education.

4. PRACTICAL EXPLORATION OF DIGITAL EMPOWERMENT FOR INTEGRATING ELDERLY CARE AND EDUCATION IN TAIZHOU

4.1 Strengthening Educational Management to Enhance Service Quality

Firstly, diverse courses are offered in a tiered and categorized manner. A rich curriculum system is developed, with flexible teaching plans tailored to different levels of elderly learners to meet their multi-layered and diversified learning needs. For example, differentiated information literacy series courses are offered. For beginners, basic courses on smartphone applications are provided to teach simple skills like WeChat chatting and utility payments. For those with some foundational knowledge, advanced courses like mobile photography and artistic photography are offered, delving deeper into extended functions of smartphones and related software usage techniques. For proficient users, high-level professional courses like video editing and drone operation are provided to expand interests and enrich later life. Additionally, health literacy series courses are set up. Courses like fitness dancing and yoga are offered to enhance physical fitness; courses on meridian health and traditional Chinese medicine therapy guide learners towards scientific health practices; courses on home-based elderly care and food safety improve self-care abilities and ensure health. Among them, "Practical "Secrets" for Home-based Elderly Care" is a course developed for the most common health risks or problems of the elderly. It uses a combination of situational teaching and case teaching to gather the basic knowledge points into catchy and easy-to-understand formulas, so that students can easily master self-protection and self-rescue skills and enhance their active health ability.

Secondly, various forms of education are explored innovatively. Teaching is conducted in multiple formats such as "online + offline," "long-term classes + short-term classes," and "theory + practice." Expanding offline teaching spaces, partnerships with social organizations establish eight off-campus teaching points, expanding educational resource supply and providing convenient nearby learning opportunities for the elderly. Courses like happy rehabilitation hand exercises are offered in community centers and welfare homes, and courses such as Tai Chi sword and Tai Chi fan are started in the city gymnasium to promote education and improve the health literacy of the elderly, which promote health literacy among the elderly. Extensive online teaching is widely promoted, creating a "Everyone can learn, learning anytime, anywhere" mobile classroom. For instance, the "the Smart Elderly Assistance" micro-course series is shared via the "Taizhou Community University Hall" WeChat official account and WeChat groups, covering topics like mobile payment, smart travel, smart healthcare, and online shopping to enhance the digital literacy of the elderly. Innovative academic management combines course characteristics and learner needs, offering long-term and short-term classes. Traditional sports and instrumental arts courses are taught in one-to-three-year long-term classes, while science popularization courses like health management and food safety are offered in six-month short-term classes. This ensures high-quality teaching while allowing more students equal access to education. Teaching methods combine theoretical instruction with practical application, making learning both informative and engaging. For example, video editing classes conduct activities like "My Campus I Shoot" and "Romantic Autumn Scenery Photography," applying knowledge practically and reinforcing skills.

Thirdly, platform-driven enhancements boost digital service capabilities. Building on provincial platforms, a local lifelong learning public service platform called "TaiXueTong" was established in Taizhou, achieving the "four ones" action goals: being the first to achieve full coverage of township/street elderly education institution certification; the first to achieve full coverage of internal personnel training; completing digital management of student registration and certification within the jurisdiction upon platform launch, with over 570,000 registrations; and launching credit bank learning point exchange services on the "ZheLiBan" credit bank special zone, with up to 505 exchanges for a single product. Efforts were made to build a bidirectional interactive, multi-screen sharing "smart +" elderly education service system. For example, using platforms like Douyin video accounts and WeChat media, the "elderly education cloud classroom" was promoted, offering live-streamed courses in subjects like vocal music, Hulusi, and Latin dance. The "cloud classroom" meets the strong desire for continuous learning during special periods like pandemics and helps enhance digital learning capabilities. The "ZheXueTong" digital platform supports air classrooms with live-streamed teaching, such as the intergenerational education characteristic series course "Joy in Grandparent-Grandchild Relationships and Intergenerational Parenting", helping many

elderly form scientific child-rearing concepts, promote intergenerational harmony, and build healthy family and social relationships, receiving enthusiastic praise from students.

4.2 Promoting Platform Integration to Facilitate Resource Sharing

4.2.1 Collaboration between School and Community to Establish an Integrated Practice Base for Care and Education

The school collaborates with the Jiaojiang District Social Welfare Institute and Huangyan District Changyou (Taizhou) Nursing Home to jointly establish a dual-system experimental base that integrates care and education (an integrated practice base for care and education). Leveraging the facilities of the nursing institutions, the school utilizes its strengths in curriculum development and teaching management to offer various courses on themes such as smart technology applications and joyful wellness, targeting both the elderly residents of nursing centers and community seniors.

The joint project between the school and community has established a unique operational mechanism characterized by "shared responsibility, cost sharing, course delivery, and collaborative management." Specifically, the nursing institutions assign dedicated personnel to handle daily logistical support, student management, and venue management. Meanwhile, the school is responsible for curriculum development, faculty recruitment, and learning assessment, as shown in Figure 1.

This integrated model of care and education expands the reach of senior education, making it more accessible, especially for elderly individuals who are marginalized or in vulnerable positions. Learning in a familiar environment not only facilitates access to smart technologies but also helps alleviate stress and reduce anxiety. The integration of wellness, education, and care enriches the content and form of elderly education and services, addressing the issue of overly monotonous services in traditional nursing homes. This approach enhances the sense of happiness and fulfillment among the elderly.
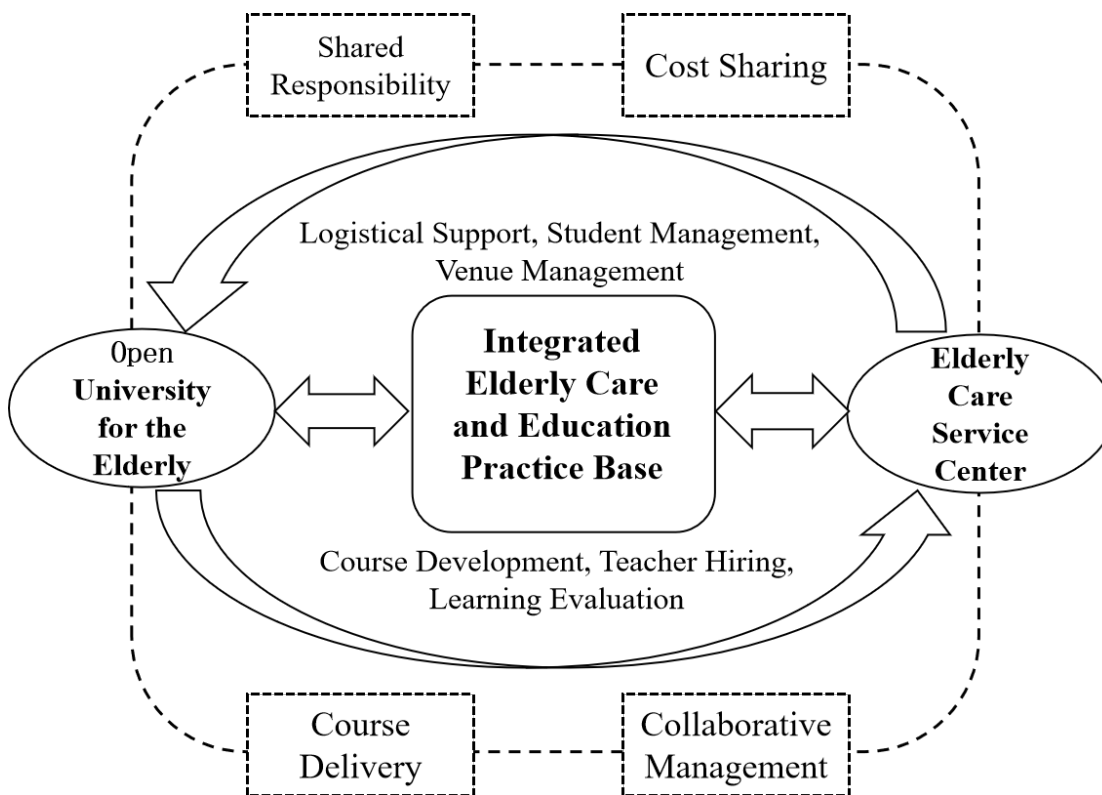

Figure 1
Operational Mechanism of Taizhou Integrated Elderly Care and Education Practice Base

4.2.2 Diversified Collaboration to Optimize the Smart Elderly Assistance Service System

The school adopts a group cooperation model to promote the practical development of regional elderly education, forming several mechanisms: joint conference mechanism, shared faculty mechanism, team co-cultivation mechanism, and collaborative activity mechanism. Leveraging systemic advantages, this approach establishes

a framework for a regional elderly education development community. Under this framework, the "Five-Color Education" experimental base alliance for lifelong learning in Taizhou has been established. Currently, there are 35 member units citywide, creating a concentration of advantages, cluster development, and combined effects (as shown in Figure 2).

Among these, the "Silver Education" experimental bases for elderly services are widespread across urban and rural areas of various districts and counties. These bases play a central role in promoting the popularization of smart technology applications among the elderly, forming a comprehensive lifelong learning map for elderly education that covers the entire region and involves networked collaboration. The experimental bases are distributed across various learning points such as township adult schools, rural cultural halls, elderly care

service centers, and social organizations. In collaboration with departments such as human resources and social security, and civil affairs, they conduct new forms of training for home-based eldercare attendants, promoting the development of professional eldercare teams. This initiative facilitates the integration of elderly education and the eldercare industry, fostering an innovative development model characterized by "integrated care and education, complementary advantages, and mutual benefits."
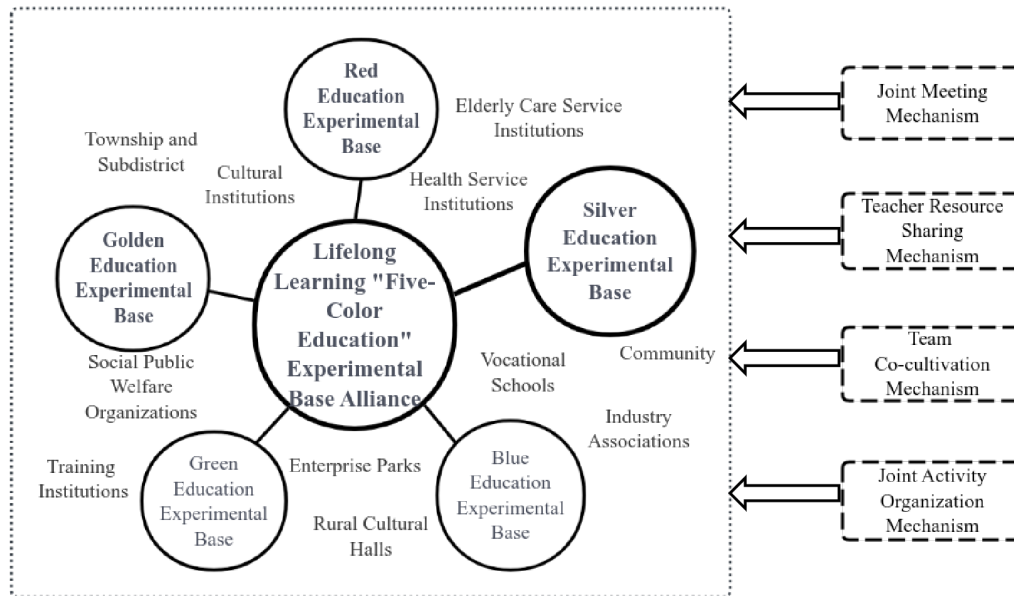

Figure 2
Framework of the Regional Elderly Education Development Community in Taizhou

4.2.3 Multi-party Collaborative Innovation for Shared Educational Resource Mechanism
Fully leveraging the strengths of elderly education and related social organizations, this initiative promotes the joint construction and sharing of quality educational and eldercare resources through inter-departmental collaboration. The Municipal Committee for Retired Cadres, in conjunction with the Municipal Education Bureau, the Municipal Broadcasting Station, Taizhou Open University for the Elderly, and other entities, has established the Taizhou Elderly Education Alliance. This alliance drives cluster development in elderly education through various means such as shared facilities, shared faculty, collaborative learning programs, and joint activities.

The alliance relies on four main platforms for elderly education: the Municipal Elderly University, the Digital Cloud Classroom of the Municipal Elderly University, the Open University for the Elderly, and the Television University for the Elderly. These platforms operate under standardized guidelines, fostering collaboration through regular communication channels. This strengthens connections in areas such as curriculum design, textbook

development, and teaching research, helping to address the fragmented nature of multiple stakeholders in elderly education.

Additionally, the alliance promotes the involvement of other cultural and educational institutions to expand teaching spaces and integrate resources for mutual promotion. Notably, the launch of the "Digital Cloud Classroom for the Elderly University" on television channels and mobile network platforms allows more seniors to pursue education closer to home. The "three-screen" (TV screen, computer screen, smartphone screen) approach also enhances the digital participation of the elderly in society, expanding the reach and impact of educational and eldercare services.

4.3 Deepening Connotative Development to Stimulate Enthusiasm for Lifelong Learning

4.3.1 Promoting Health and Happiness through Club Activities
Five distinctive clubs have been carefully cultivated and established: the Silver Age Photography Club, the Silver Age Wellness Club, the Silver Age Cheongsam Team,

the Silver Age Dance Troupe, and the Silver Age Choir. Tailored smart technology teaching scenarios are designed based on the type of club to meet members' needs for self-directed and peer-assisted learning. For example, photography club members learn image editing and video editing skills using apps like Meitu and Jianying, while wellness club members use the Keep app to improve self-health management.

These clubs actively organize and participate in various on- and off-campus events. For instance, during the opening ceremony of the Zhejiang Province Lifelong Learning Week, drone performances by photography club members garnered enthusiastic responses both at the event and online, inspiring more seniors to embrace smart technologies. Such activities showcase positive aging images and promote a healthy, vibrant elderly community, enhancing the overall learning atmosphere and promoting scenario-based smart technology education to help more seniors enjoy and engage in lifelong learning.

4.3.2 Value Leadership Enhances Silver-Age Empowerment

Throughout the educational process, core values and digital literacy are integrated to elevate seniors' ideological realms and information literacy, promoting cultural and smart aging. Value cultivation and guidance empower seniors to shift from passive aging to active adaptation and from passive education to proactive learning, aligning personal development with societal progress.

On one hand, the school emphasizes red leadership, prioritizing political education for seniors. Each semester starts with a "First Class" focused on party and government policies, aiming to cultivate politically steadfast, clear-headed, and proactive elderly learners for the new era. On the other hand, leveraging the Internet and smart technologies, the school promotes positive aging views through media platforms such as live streaming cultural events via multi-media clients and WeChat video accounts. Events like the "Enjoy Learning, Bloom in Life" May Fourth Cultural Evening and the "Graceful Youth, Silver-Age Charm" Children's Day Performance have attracted millions of viewers, allowing seniors to fully integrate into the digital age while showcasing their vitality and enthusiasm. This also advances the construction of an elderly-friendly city.

4.3.3 Volunteer Services Achieve Mutual Support in Aging

The school fulfills seniors' desires to contribute and be active participants by forming the Silver Age Party Member Service Team and the Silver Age Student Union. These platforms enable self-management and self-service, broadening social participation opportunities for learners. Seniors with diverse talents, work experiences, and life backgrounds join volunteer teams, contributing their expertise to school administration and various public welfare activities, fostering a new model of "elderly helping elderly, mutual support in aging." (as shown in Figure 3)
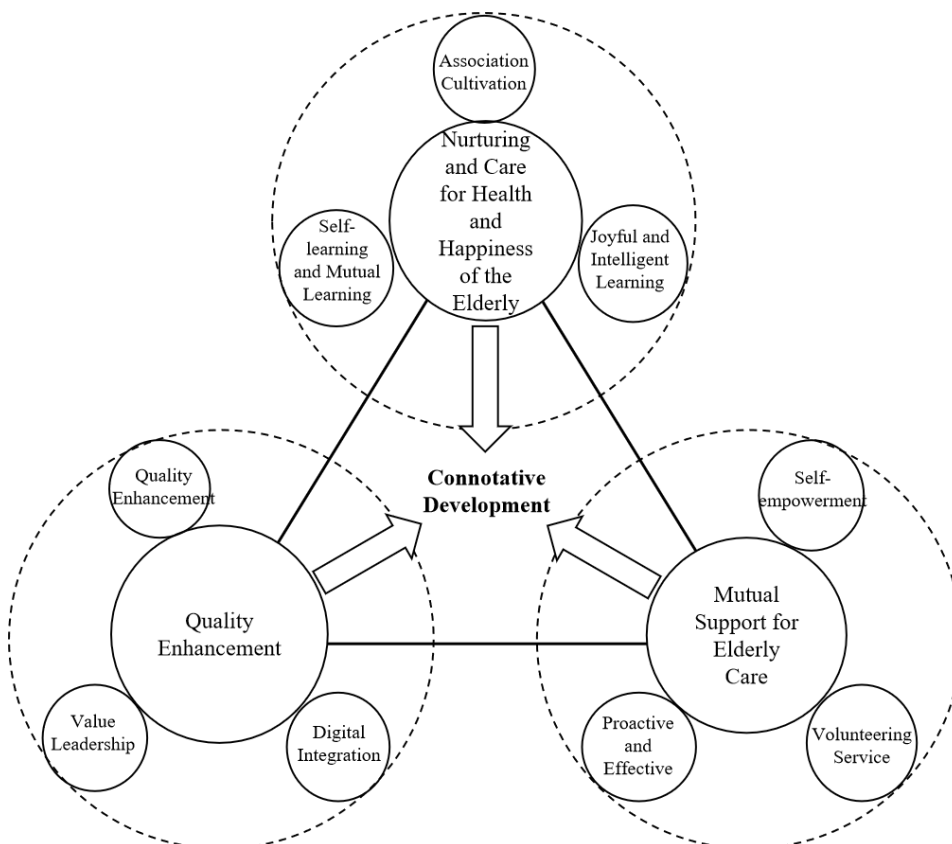

Figure 3
Logic Diagram of the Integrated Elderly Education Development Model

For instance, during the "Silver Age Smartphone Mutual Assistance Love Relay" campaign, volunteers enter communities and nursing homes to teach smart technology applications, empowering information-disadvantaged groups and ensuring their right to education and digital inclusion. Volunteers also play significant roles in teacher recommendations, enrollment, classroom teaching, academic affairs management, and campus activities, addressing human resource shortages in elderly education. Many Silver Age students take on multiple roles as learners, teachers, and volunteers, actively practicing elderly education and lifelong learning.

This comprehensive framework and collaborative approach aim to create an inclusive and supportive environment for elderly learners, ensuring they can fully benefit from modern educational resources and technological advancements.

5. REFLECTIONS AND SUMMARY

The practice of digital empowerment in integrated elderly education in Taizhou has achieved preliminary success. In terms of teaching resource development, four quality courses for smart elder assistance have been approved by the Ministry of Education, along with two distinctive elderly education courses under Zhejiang Province's "Learning in Old Age" initiative. Regarding talent team building, six teachers have been selected into Zhejiang Province's elderly education quality faculty database, among whom five were designated as "Leading Goose" teacher training candidates.

Through the stages of "Exploration - Development - Maturity - Promotion," the digital empowerment model of integrated elderly education has become a distinctive feature and brand of elderly education in Taizhou. The relevant projects have successively won accolades such as the Ministry of Education's Quality Case for Smart Elder Assistance and the National New Era "Lifelong Learning Brand Project." The brand's radiating and demonstrative effects are significant, receiving multiple reports from provincial or higher-level media. One report on the People's Daily client garnered over five million views.

During the process of digital technology empowering integrated elderly education, the advantages of all parties involved have been fully utilized, effectively expanding the supply of elderly education and innovating mechanisms for integrating elderly care and education. This allows seniors to share in the benefits of the digital age, fulfilling their developmental needs and social participation requirements. It holds positive significance for promoting the modernization of elderly education. However, it is undeniable that some issues remain unresolved at this stage, which deserve attention. For example:

•**Insufficient Investment and Support:** Overall investment and support for elderly education remain inadequate. Human, financial, and material resources invested by various departments do not match the actual needs of elderly education. There is a lack of special funds for elderly education, constraining its transformation and development in the digital era.

•**Imbalance and Insufficiency:** Even under the new model, elderly education remains imbalanced and insufficient. The integration of digital technology with education has exacerbated the uneven distribution of resources. Hardware infrastructure in rural areas or mountainous islands cannot meet the needs of digital learning, leading to more learning and technical barriers for the elderly, thereby widening the gap in elderly education development between urban and rural areas and regions within Taizhou.

In the context of a continuously growing elderly population and deepening aging process, the increasing demand for a better life among the elderly stands in stark contrast to the imbalanced and insufficient development of the elderly cause and industry. Building a coordinated elderly care service system that aligns with economic and social development and adapts to the aging process is an important task for the present and the foreseeable future.

The exploration and practice of the integrated elderly education model have injected new vitality and momentum into the elderly cause. However, further efforts are needed to establish and improve long-term mechanisms for effective integration of elderly education and the elderly care industry. Emphasizing the core role of people and the driving potential of digital technology will gradually optimize the effective supply of elderly care services, making basic elderly care services accessible and promoting innovative, coordinated, and sustainable development of elderly education and the elderly cause.

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