Development of a Strategy to Promote Sustainable Information Literacy Among the Elderly in Xi'an City

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Abstract

This study examined sustainable development strategies to enhance the information literacy of older adults in Xi'an. This paper aimed to (1) study the current situation of sustainable information literacy of older people in Xi'an; (2) provide strategies for improving sustainable information literacy of older people in Xi'an; and (3) evaluate the adaptability and feasibility of these strategies. The sample group consisted of 384 older people from five communities in Xi'an, selected using systematic and simple random sampling methods. Data were collected through questionnaires, structured interviews with ten experts, and evaluations by eight high-level administrators. The research instruments included a questionnaire to gather quantitative data on information literacy of older people, structured interviews to gather qualitative insights from experts, and evaluation forms to assess the feasibility of the proposed strategies. The findings revealed that while the overall level of sustainable information literacy of older people in Xi'an was high, there was significant variation across different aspects. Based on the SWOT-PEST matrix model, this paper systematically analyzes the external macro-environmental opportunities and threats to information literacy among older people in Xi'an from four aspects: politics, economy, society, and technology. It also examines the internal micro advantages and disadvantages and proposes countermeasures and suggestions accordingly.

The study developed 42 strategies for improving information literacy, including nine for information awareness, 10 for information knowledge, 9 for information competence, and 14 for information ethics. The adaptability and feasibility of strategies for improving the sustainable development of information literacy of older people in Xi'an in four aspects were at the highest level, with the values between 4.50 and 5.00 (x.x̄=4.68 and ==4.65), which means the strategies for improving the sustainable development of information literacy of older people in Xi'an are adaptable and feasible.

Keywords: sustainable development strategy, information literacy, older people, SWOT analysis, PEST analysis

1. Introduction

The global aging process is accelerating, and it is imperative to address the issue of aging. Since the beginning of the 21st century, the world has continued to develop with each passing day, and information technology has injected fresh and vigorous energy into the development of all countries. In such a favorable development situation, the aging of the population is showing an increasingly pronounced trend, gradually spreading from developed countries to the rest of the world. It has become the focus of global attention. On July 11, 2024, the Population Division of the United Nations Department of Economic and Social Affairs released its latest report on the occasion of the 35th World Population Day (United Nations, Department of Economic and Social Affairs, Population Division, 2024).

As can be seen in the report, the global population aged 65 and over is expected to reach 2.2 billion by the end of 2070. Meanwhile, the population aged 80 and over is projected to reach 265 million by the mid-2030s, indicating an irreversible growth trend in population aging. According to the "China Development Report 2020: Development Trends and Policies of Chinese Population Aging" recently released by the China Development Research Foundation, the period from 2035 to 2050 is China's aging period. At the peak of the population, projections show that by 2050, China's elderly population aged 65 and above will reach 380 million, accounting for nearly 30% of the total

population. The elderly population aged 60 and above is expected to reach almost 500 million, accounting for more than one-third of the total population (Development Report, 2020).

China's Xi'an has a population of 1.02 million older adults over the age of 60 (Xi'an Bureau of Statistics, 2023). The Education Development Plan for the Elderly (2016-2020) points out that the development of education for older people is an important measure to actively respond to the aging of the population, realize the modernization of education, and build a learning society, and is an inevitable requirement to meet the diverse learning needs of older people, improve the quality of life of older people, and promote social harmony (The Education Development Plan for the Elderly, 2020). Good information literacy can shape a positive concept of aging throughout society, cultivate "elderly talents" who can adapt to the development of an information society, and actively respond to population aging, thereby further promoting the construction of a learning society and a smart society (Jiang, 2020).

Given this, this study selects the elderly group in Xi'an as the survey object to analyze the current situation of information literacy among older people. Then it proposes strategies and suggestions to enhance the digital literacy of older people, providing a reference for elderly policy.

Research Objectives

1. To study the current situation of information literacy of older people in Xi'an.

2. To develop strategies for information literacy of older people in Xi'an.

3. To evaluate the adaptability and feasibility of strategies to improve information literacy of older people in Xi'an.

Research Questions

Based on the objectives above, the following research questions were posed:

1. What is the current situation of information literacy of older people in Xi'an?

2. What are the strategies for improving the information literacy of the elderly in Xi'an?

3. How to evaluate whether the strategy of information literacy of the elderly in Xi'an is adaptable and feasible?

2. Literature Review

2.1 Research on Information Literacy

The term "information literacy," introduced by Zurkowski (1974), remains a vitally important concept in library and information science. Zurkowski declared that "people trained in the application of information resources to their work can be called information literates" (p. 6), connecting the facility with information tools and resources to workplace problem-solving. In this definition, Zurkowski (1974) suggested that (1) information resources are applied in a work situation, (2) techniques and skills are needed for using information tools and primary sources, and (3) information is used in problem solving.

In 1979, the IIA (Information Industry Association) presented a definition of information literacy that did not include the confining specification of information being used in the workplace, as was the case with Zurkowski: "The IIA defines an information literate as a person who knows the techniques and skills for using information tools in molding solutions to problems (Garfield, 1979)." The same year, in an article on the future of the librarianship profession, Taylor (1979) introduced the concept of information literacy, noting that an approximate definition of information literacy would include the following elements: (1) that solutions to many (not all) problems can be aided by the acquisition of appropriate facts and information; (2) that knowledge of the variety of information resources available (who and where) is a requisite of this literacy; (3) that the informing process, which is continual, is as necessary as the spot information process, which is occasional; and (4) that there are strategies (when and how) of information acquisition (Taylor, 1979).

The concept of information literacy first appeared in the 70s of the 20th century. Still, from the analysis of the essence of information literacy, the literature retrieval skills education and user education carried out by libraries in the early days can be regarded as the embryonic form of the concept of information literacy. These eventually evolved into information literacy (Pi, 2003). With the development of science and technology and the exponential growth of social media, readers' demand for literature and information is increasingly diversified, and a strong ability to retrieve and utilize literature has become a basic quality required of people. To improve the ability of users in these aspects, the library has carried out a wide range of user education, such as bibliographic education and literature retrieval education. At the same time, the rapid development of information technology has enabled the library to begin using computer

management extensively, which undoubtedly raises higher requirements for users' retrieval abilities.

Information literacy has also been described as a way of learning (Bruce, 2008). This interpretation relates information literacy to the concept of lifelong learning (Bruce 2003). Other ideas about information literacy include, for instance, Lloyd's (2005) concept of 'information literacy landscapes' and an understanding of information literacy as encompassing information management and handling skills (e.g., Huvila, 2010; Talja, 2010). Before exploring the theoretical frameworks for information literacy in further detail, let us briefly consider the components of the composite term: "information" and "literacy."

Compared to other countries, the proposal and research on information literacy in China are relatively late. In the early 90s of the 20th century, information literacy began to appear in some newspapers and magazines. Later, with the introduction of the concept of information literacy, scholars and experts began to study it. There are several influential definitions of information literacy in China.

Ma (1997) defined information literacy as "various information qualities possessed by individual members in the information society, including information wisdom (involving information knowledge and skills), information ethics, information awareness, information concept, information potential, information psychology, etc."This article discusses information literacy earlier and lays the framework for the concept of information literacy in China.

Zhang et al. (2025) proposed in their paper, "Research Status and Development Trends of Information Literacy Education in China Based on CiteSpace," that the study employed bibliometric methods and CiteSpace visualization software. Using CSSCI academic papers from the China National Knowledge Infrastructure (CNKI) database as data samples, it demonstrated the dynamic evolution process of research authors, institutions, hotspots, cutting-edge trends, and developmental trajectories in China's information literacy education field. Meanwhile, the paper employed content analysis methods to interpret and summarize the core viewpoints of the literature, thoroughly analyzing the current characteristics, existing issues, and future development trends in information literacy education research in China.

In conclusion, both the descriptions of the concept of information literacy by foreign scholars and the research on information literacy by Chinese scholars are conducted within their respective national contexts. Both have different meanings, and it is a diversified and hierarchical comprehensive concept that dynamically develops and changes with varying stages of development and the requirements of the times. Currently, most research on the connotation of information literacy among Chinese scholars is conducted at four levels: information awareness, information knowledge, information ability, and information ethics.

Linking the Framework to Community Implementation. In addition to treating information literacy as informed learning and practice-based knowledge (Bruce, 2008; Lloyd, 2005), we also consider community-level strategy formation for older adults. Wang and Shao (2021) propose practical, community-anchored approaches for improving elderly information literacy; we therefore use their principles to help structure our strategy set and to interpret feasibility/adaptability judgments. This positioning ensures that the four-pillar model (awareness, knowledge, competence, and ethics) informs the measurement and actionable design of community education initiatives.

2.2 Research on Information Literacy Among the Elderly

Kim et al. (2022) examined the relationship between elderly individuals' information literacy and life satisfaction using structural equation modeling. They found a positive correlation between older people's information literacy level and their life satisfaction.

Rigg and Kazemek. (2010) Little research has been done on the literacy needs and interests of elders. Consequently, many programs of literacy training for the elderly are based on inadequate and inaccurate information.

Diteeyont and Ku. (2021) The elderly benefit from using the Internet for various purposes, and achieving Internet literacy is essential for their participation as digital citizens. This study investigates the levels and influential factors of Internet literacy among 534 older people in Thailand. The results indicated that participants generally possessed an intermediate level of Internet literacy. Most older people possessed solid knowledge and skills in using digital tools and applying strategies to access information from reliable online resources. They could also communicate and protect their personal information on online platforms.

Ma (2014) A Smart community is an integral part of smart city construction, and improving the information literacy of community residents, especially elderly residents, is of great significance to strengthen the construction of smart cities and accelerate the coordinated economic and social development of beautiful China. Based on the analysis of the current situation of community normalization and the factors affecting the improvement of information literacy

of the elderly, this paper proposes a "three-dimensional dynamic cultivation system" model to improve the information literacy of the elderly in Ningbo, four paths of "consolidating the foundation, grasping the key, highlighting the core, and ensuring the effect," as well as six security strategies of "basic security, financial security, organizational security, legal security, talent security, and cultural security."

3. Research Methodology

3.1 The Population

The study population comprises five communities in Xi'an. The number of elderly people over 60 in Beilin community is 246,000, accounting for 24.22%; the number of elderly people over 60 in Lianhu community is 199,000, accounting for 19.53%; the number of elderly people over 60 in Yanta community is 303,000, accounting for 29.69%; the number of elderly people over 60 in Weiyang community is 158,000, accounting for 15.36%; and the number of older people over 60 in Baqiao community is 114,000, accounting for 11.20% (XI'an Bureau of Statistics, 2024). According to the Krejcie and Morgan sampling table (1970), the sample group for this study consisted of 384 elderly individuals from five communities in Xi'an, selected using systematic sampling.

3.2 Research Instrument

Two distinct samples were used by design: 10 interviewees (community administrators) for qualitative elaboration and 8 experts for strategy evaluation—hence the difference in counts.

The research tools used in this study included a questionnaire, an interview form, and an evaluation form.

3.3 Questionnaire

Part I: Survey on Basic Information about Respondents. It was used to understand the relevant background of the respondents, including their gender, age, educational background, health condition, monthly income, and type of work before retirement.

Part 2: According to information literacy, the questionnaire is divided into four aspects: information awareness, information knowledge, information competence, and information ethics. The questionnaire is designed in four dimensions.

The average value interpretation, based on Likert (1932), is outlined as follows:

4.50-5.00: Expresses the highest level.

3.50-4.49: Expresses a high level.

2.50-3.49: Expresses a medium level.

1.50-2.49: Expresses a low level.

1:00-1:49: Expresses the lowest level.

3.4 Interview Form

Methodological clarification: Semi-structured individual interviews were conducted with 10 community education administrators to supplement survey findings. Separately, an expert panel of 8 specialists rated the proposed strategies using an evaluation form; the expert conducted no focus group.

Step 1: Based on the results of the questionnaire survey and the analysis of the current situation regarding information literacy, a corresponding structured focus group interview form was developed, covering four aspects: information awareness, information knowledge, information competence, and information ethics.

Step 2: SWOT-PEST analysis

(1) The expert holds relevant qualifications/experience in information literacy, community education, or digital inclusion.

This study employed the SWOT-PEST analysis method to comprehensively and systematically analyze the research subjects of Strengths, Weaknesses, Opportunities, and Threats, as well as Political, Economic, Social, and Technological factors, to provide a feasible strategy for promoting the sustainable development of information literacy among the elderly in Xi'an.

3.5 Evaluation Form

Evaluate the suitability and feasibility of the strategies for information literacy of the elderly in Xi'an. The study invited eight experts from five communities in Xi'an to assess the suitability and feasibility of the strategy.

The average value interpretation, based on Likert (1932), is outlined as follows:

4.50-5.00: Expresses the highest level.

3.50-4.49: Expresses a high level.

2.50-3.49: Expresses a medium level.

1.50-2.49: Expresses a low level.

1:00-1:49: Expresses the lowest level.

4. Research Results

The researchers conducted a comprehensive analysis of the data, segmented into the following parts:

4.1 Descriptive Analysis

According to Table 1, the sample consists of 201 male respondents, accounting for 52.34%, and 183 female respondents, accounting for 47.66%. The proportion of males among the respondents is relatively higher. Regarding age, the main range is 60-70 years old, with 182 older people, accounting for 47.39% of the total population. The second group consisted of individuals aged 71-80 years, comprising 124 older people, which accounted for 32.29%. Among the elderly aged 81-90, 56 were interviewed, accounting for 14.58%. The number of people over 90 years old was the lowest, with only 22 people, accounting for 5.74%.

The educational background of older people is below primary school, with 77 people, accounting for 20.05%. The elderly with primary school education accounted for the most significant number, comprising 74 people, which represents 45.31% of the total. There were 85 elderly people with junior middle school education, accounting for 22.14%. The number of senior middle schools was 24, accounting for 6.25% of the total number of schools. There were 17 with a bachelor's degree, accounting for 4.43%. The number of elderly people with a graduate degree was the lowest, with only 7, accounting for 1.82%.

In terms of health conditions, the physical health of the elderly is generally good, with 249 older people in good health, accounting for 64.84%. Some of the elderly had some physical diseases, such as heart disease, high blood pressure, and disability. There were 135 elderly people with disabilities, accounting for 35.16%.

For a monthly income, there are 139 people with an income of less than 3,000 RMB, accounting for 36.20%. The largest group of elderly individuals, comprising 167 people, accounted for 43.49% and had a monthly income of 3,001-5,000 RMB. The monthly income ranges from 5,001 to 7,000 RMB, and there are 53 elderly people, accounting for 13.80%. There are 25 elderly individuals with a monthly income exceeding 7,000 RMB, accounting for 6.51% of the total.

For the type of work before retirement, the number of elderly people engaged in sales work is 79, accounting for 20.57% of the total. This was also the highest type of job among respondents. The number of workers was 70, accounting for 18.23% of the total workforce. The number of farmers was 54, accounting for 14.06% of the total. The number of educators and medical workers was 48 and 36, respectively, accounting for 12.50% and 9.38% of the total. The number of government personnel was 31, accounting for 8.07% of the total. Twenty-three people have been engaged in the management profession, accounting for 5.99%. The manager profession is also the least represented of all job types. The number of unemployed was 43, accounting for 11.20%.

Table 1. Analysis of the Personal Information and Participants

	Personal Information	Frequency	Percentage
Total		384	100%
Gender	Male	201	52.34%
	Female	183	47.66%
Age	60-70	182	47.39%
	71-80	124	32.29%
	81-90	56	14.58%
	>90	22	5.74%
Educational background	Primary school below	77	20.05%
	Primary school	174	45.31%
	Junior middle school	85	22.14%
	Senior middle school	24	6.25%
	Bachelor's degree	17	4.43%
	Graduate degree	7	1.82%
Health condition	Healthy	249	64.84%
	Unhealthy	135	35.16%
Monthly income	<3,000 RMB	139	36.20%
	3,001-5,000 RMB	167	43.49%
	5,001-7,000 RMB	53	13.80%
	>7,000RMB	25	6.51%
Type of work before retirement	Manager	23	5.99%
	Worker	70	18.23%
	Farmer	54	14.06%
	Salesperson	79	20.57%
	Teaching staff	48	12.50%
	Medical staff	36	9.38%
	Governmental staff	31	8.07%
	Out of work	43	11.20%

The analysis focuses on the four main aspects of information literacy: information awareness, information knowledge, information competence, and information ethics. The data are presented using mean and standard deviation to reflect the overall levels of information literacy among older people (Table 2).

Table 2. The Average Value and Standard Deviation of the Current Situation of Sustainable Information Literacy (n=384)

Rank NO.	Information literacy of the elderly in Xi'an	$\bar{X}$	S.D.	level
1	Information awareness	3.91	0.83	High
2	Information knowledge	3.90	0.87	High
3	Information competence	3.84	0.81	High
4	Information ethics	3.76	0.83	High
	Total	3.85	0.84	High

According to Table 2, the current state of information literacy among the elderly in Xi'an in four aspects was at a high level ($x = 3.85$). Considering the results of this research, aspects ranged from the highest to lowest level were as follows: the highest level was information awareness (x.x̄=3.91), followed by information knowledge (x̄= 3.90), information competence (x̄= 3.84), and information ethics was the lowest level (x̄= 3.76).

Developing an Educational Management Strategy. A SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) was conducted to categorize the internal and external factors affecting the information literacy of older people in Xi'an. Based on the SWOT findings, a TOWS analysis was used to create strategic recommendations by aligning internal strengths and weaknesses with external opportunities and threats. The TOWS analysis helped formulate actionable strategies for enhancing information literacy among the elderly in Xi'an, ensuring that these strategies leverage strengths, mitigate weaknesses, capitalize on opportunities, and address threats. In this study, PEST analysis can enable community managers to accurately and comprehensively understand the opportunities and threats brought to the community by the external environment, which mainly analyzes the external macro environment faced by the community from the four dimensions of politics, economy, society, and technology, thus putting forward an effective sustainable development strategy(Table 3\4).

Table 3. SWOT-PEST Analysis Table of Information Literacy for the Elderly in Xi'an

	Politics (P)	Economy (E)	Society (S)	Technology (T)
Strengths (S)	SP1The government attaches great importance to the promotion of information literacy	SE1Enterprises establish special funds and subsidy policies to support the research and development and application of informatized elderly care technologies	Establish the Digital Aging and Information Accessibility Alliance	ST1: Enrich the forms and content of digital skills training for the elderly
	SP2China's Ministry of Industry and Information Technology has launched a nationwide campaign to adapt Internet applications	SE2The government increases the intensity of financial subsidies, and regularly offers free information technology training activities at fixed locations	SS2The community organizes information technology training lectures	ST2: Establish and improve the information data backup and recovery mechanism
	SP3The government establishes an information service platform	SE3: Attract enterprises and social organizations to participate in the field of information-based elderly care	SS3The community provides information service talents for the elderly	ST3Design product interface and operation process suitable for the use habits of the elderly
Weaknesses (W)	WP1The coverage of policies is narrow, and the publicity is not in place, making it difficult for the elderly to access new technologies	WE1The income level of some elderly people is low, resulting in insufficient purchasing power for the elderly	WS1There are too few skilled operators to train the elderly	WT1The needs of the elderly are pretty different, and the problem of product interface design is prominent
	WP2Lack of an aging-friendly, sustainable development information education policy system	The WE2 supply and demand of products are not smooth, and the elderly have limited access to information	WS2The sense of social integration is weakened. They are unable to integrate into the pace of modern society	WT2The number and variety of products suitable for the elderly are limited
	WP3Lack of long-term mechanisms for the construction of the digital rule of law	WE3Some elderly people have outdated consumption concepts and have a lower desire to consume	WS3The media's publicity efforts for the digital lives of the elderly are insufficient	WT3The platform interface design is complex, and it is difficult for the elderly to find the key information entrance

Table 3. SWOT-PEST Analysis Table of Information Literacy for the Elderly in Xi'an(continued)

	Politics (P)	Economy (E)	Society (S)	Technology (T)
Opportunities (O)	OP1China has entered the digital information society	OE1Increasing the income of the elderly is a necessary condition for the development of information literacy	OS1Appropriate consumer projects and convenient consumption methods	OT1: OT1Enhancing the digital literacy and skills of the elderly population is in line with the requirements of the digital age
	OP2The rapid evolution of media technology	OE2Sustained economic growth provides material support for the development of information literacy	OS2Communities, old-age care institutions, public welfare organizations, and other organizations have organized training activities	OT2The government has launched the "Special Action for Internet Application Aging and Barrier-Free Transformation"
	OP3The internet penetration rate is increasing year by year	OE3Enhance consumer purchasing power, promote economic growth	OS3The number of elderly Internet users is increasing year by year	OT3With the development of artificial intelligence technology, the demand for informatization is increasing day by day
Threats (T)	TP1The policies and regulations regarding information release, utilization, and supervision are not yet well-established	TE1The investment costs for information infrastructure and internet construction are relatively high	TS1The lack of learning support provided by families and community education institutions leads to the dilemma of information literacy services	TT1Ubiquitous digital environment and the disconnection with the learning ability of the elderly
	TP2Public digital information resources supply is relatively lagging behind	TE2Elderly consumers have conservative consumption concepts and limited income	TS2The elderly have a low willingness to learn independently and are resistant to digital devices	TT2The information platform management system is not perfect, and the information identification ability is lacking
	TP3Uneven distribution of public digital information resources	TE3Enterprises develops products suitable for aging populations, which have high production costs	TS3Digitization is reshaping traditional modes of production and life	TT3The elderly lack awareness of data security risks

Table 4. TOWS Matrix Analysis

	Internal Strengths	Internal Weaknesses
External Opportunities	SO (Leverage Strengths to Seize Opportunities) Strategy	WO (Overcome Weaknesses to Seize Opportunities) Strategy
	1. Stimulate the information awareness of the elderly in Xi'an	1. Guide the elderly in Xi'an to actively learn information, knowledge, and skills
	2. Change the mindset, dispel the fear of numbers, and encourage broad participation	2. Actively develop educational content on media information dissemination and production literacy for the elderly
	3. Cultivate consciousness, steadily promote lifelong learning, and promote continuous participation	3. Create an excellent knowledge dissemination and education platform, and carry out online information literacy education
	ST (Leverage Strengths to Counteract Threats) Strategy	WT (Minimize Weaknesses to Avoid Threats) Strategy
External Threats	1. Create a social atmosphere of support and give more learning support to the elderly	1. Strengthen the supervision of the information environment to ensure the safety of the elderly's participation in digitalization
	2. Give full play to the role of family education, carry out intergenerational interaction, and reverse feeding education	2. Guide enterprises to assume social responsibilities and improve the performance of products suitable for the elderly
	3. Strengthen the construction of teachers for information literacy in community education for the elderly	3. Improve awareness of network security and build a clean cyberspace
	4. Improve infrastructure and service construction to meet the needs of digital literacy	4. Deepen international cooperation and governance

Through a SWOT-PEST analysis of the questionnaire and interview results on the current status of information literacy of the elderly in Xi’an, a draft strategy to improve the sustainable development of information literacy of the elderly in Xi’an was proposed.

For the four dimensions of information literacy — information awareness, information knowledge, information ability, and information ethics — a total of 42 strategies are proposed (Table 5). This paper conducted in-depth interviews with 10 individuals responsible for community education management and proposed a corresponding strategy. A purposive sampling method was used.

The interviewees of 10 persons who are in charge of community education management were required to have the following qualifications) have been working in the community for more than 10 years, 2)who has expertise in education, and 3) who is willing to participate in a structured interview. 4) must be willing to review their interview transcripts for validation.

Table 5. Strategies to Promote Sustainable Development Information Literacy of the Elderly in Xi’an

Aspect	Strategies
	1)Increase the frequency of digital software tool usage among elderly individuals to enhance their operational skills gradually.
	2)Actively cultivate elderly individuals' awareness of information perception and demand feedback, maintain the habit of continuously browsing and acquiring information, and improve their sensitivity to information.
	3)Elderly individuals should maintain an optimistic mood, strengthen their courage and confidence, shift from passivity to initiative, and actively understand, participate in, and experience digital life.
	4)Elderly individuals should learn skills related to information technology, abandon preconceived notions about new media, actively embrace new things, acquire relevant knowledge, and seize opportunities in the information-driven society.

1. Information awareness	5)In terms of content delivery, efforts should be made to help elderly individuals fully recognize their capabilities, improve their negative self-evaluations, and dispel their doubts about themselves and information literacy services. 6)Utilize traditional media such as television and radio, as well as new media platforms like social networks and self-media, to disseminate information service content, and enhance its influence through interactive livestreaming. 7)Government departments should conduct promotional activities in community gathering places such as neighborhoods and nursing homes, leveraging group effects to increase elderly individuals' awareness and trust in information consciousness services through word-of-mouth, striving for comprehensive coverage. 8)Communities can organize extensive, influential, and attractive information literacy education activities for the elderly. Strengthening the cultivation of information literacy among the elderly in terms of mindset and creating an intense informatization atmosphere will encourage the elderly to improve their information literacy consciously.
2. Information knowledge	9) Information literacy service platforms can provide elderly individuals with identity verification through assessment methods, such as daily check-in sharing and accumulated total learning time. This can be achieved by awarding the title of "Lifelong Learner" or issuing commemorative badges, allowing them to share their achievements within their social circles. 1)Regularly organize information, knowledge training courses, and lectures, inviting professionals and volunteers to teach elderly individuals how to acquire and evaluate information effectively, as well as utilize technological tools. 2)Establish information knowledge study groups, encouraging elderly individuals to form study groups for collective learning. 3)Cultivate learning interest and motivation: Through publicity and education, guide elderly individuals to recognize the importance of learning information and knowledge and stimulate their interest and intrinsic motivation. 4)Utilize traditional media forms such as outdoor bulletin boards and handmade posters to demonstrate, guide, and answer questions about the specific steps for using new media among elderly community members, helping them gain a basic understanding of new media as an information channel and improving their information acquisition efficiency. 5)Hold information knowledge quiz competitions covering basic knowledge related to smartphones, computers, and other devices, including functions of device switches, buttons, basic software features, and fundamental computer operations, fostering a learning atmosphere among the elderly. 6)The content of information literacy services should shift from traditional knowledge dissemination to more accessible science popularization, covering areas closely related to elderly individuals' lives, such as digital skills, health and wellness, and anti-fraud awareness.
3. Information competence	7) Encourage elderly individuals to actively participate in information content activities, including the cultivation of various forms of expression such as writing, painting, photography, and video production. 8) Relevant cultural departments can provide diverse learning resources on platforms, including text, images, audio, and video content, to meet the learning needs of different elderly individuals. 9)Offer online courses or host webinars to deliver knowledge and facilitate interactive exchanges through live or recorded broadcasts. 10) Implement online assessments and learning feedback mechanisms, evaluating elderly individuals' learning outcomes through quizzes and questionnaires, and providing personalized learning recommendations based on the evaluation results. 1)The community carries out information literacy training through "Silver Hair Classroom" programs, helping them learn basic digital skills, e.g, internet browsing, information searching, and social media

	usage. 2)Establish elderly learning activity rooms, provide basic information equipment for the elderly to learn and practice, and help them understand and use new technological devices. 3)Organize elderly information technology exchange activities, which may include basic computer operations, internet usage, online shopping, online payments, etc. 4)Establish dedicated information literacy education channels or columns for the elderly, providing high-quality information that meets their needs and expanding their access to informational knowledge. 5)Smart devices provide multiple retrieval methods, such as image retrieval and voice retrieval. 6)Recruit volunteers within the community to conduct guidance activities on smartphone usage for the elderly. 7) Conduct pre-service and post-service training for community elderly information literacy teachers in a planned and step-by-step manner, and establish a continuing education guarantee and evaluation index system for community elderly education teachers. 8) Children can patiently explain information skills to the elderly, demonstrating the correct use of mobile phone functions such as taking photos, video calls, and making payments. 10) Provide digital services, such as launching online social security and medical reimbursement services, which enable elderly individuals to apply and inquire via the internet, thereby reducing waiting time and physical fatigue associated with queuing.
4. Information ethics	1)The government should strengthen the review of online platform content systems, swiftly and accurately identify and filter harmful information to prevent its dissemination and eliminate its spread. 2) Communities, police stations, and other departments should regularly organize workshops to assist with the use of smart devices, helping elderly individuals achieve internet freedom and enhancing their awareness of security precautions. 3)Regularly organize anti-fraud lectures, utilizing community channels, television, and the internet to promote anti-scam knowledge and strengthen the self-protection awareness of the elderly. 4) Communities can organize training activities related to information ethics and morality, inviting professionals to educate the elderly on information verification, cybersecurity, and other relevant topics. 5) Strengthen the crackdown on the leakage of elderly individuals' personal information to ensure legal accountability. 6) Establish a "Family Anti-Fraud Hotline," allowing elderly individuals to promptly communicate with family members for verification when encountering suspicious calls. 7) Regularly check and update personal information protection settings, such as mobile phone lock screen passwords and payment passwords. 8) Install and update security software, such as antivirus programs and firewalls, to ensure device security. 9) Provide technical support by offering convenient and secure technology products and services for the elderly, such as optimizing user security settings, interfaces, and making age-friendly adjustments to reduce the cost of implementing information security measures for elderly users. 10) Establish dedicated consultation and service hotlines to provide timely assistance and support for issues elderly individuals encounter while using technology products. 11)Communities should establish information-sharing platforms to provide reliable information resources for the elderly. 12) Actively participate in the formulation of international cyber governance rules. China should engage in the development of relevant international internet governance rules and standards, proposing Chinese perspectives and solutions at various international internet governance conferences and forums

to promote the formation of globally recognized international laws.

13) Strengthen cooperation with other countries in the field of cybersecurity, establishing transnational collaboration mechanisms such as information sharing, joint response, and security alerts to combat cross-border cybercrime, prevent cyberattacks and data breaches, and enhance the overall level of global cybersecurity.

14) Actively advocate for the establishment of a cooperative mechanism for global cyberspace governance, promoting exchanges and collaboration among nations in cyberspace governance. Strengthen the signing of bilateral or multilateral agreements with other countries to facilitate the sharing of experiences and technical cooperation in cyber governance, thereby fostering a co-governance framework for global cyber governance.

4.2 Adaptability and Feasibility of the Strategies

A total of eight experts were invited to evaluate the adaptability and feasibility of educational management strategies for enhancing students' sustainable learning abilities in higher vocational institutions in Guangdong Province. The analyzed results are expressed in terms of mean and standard deviation, as shown in Table 6.

Clarification: Experts' evaluations pertain to the proposed strategies themselves; no real-world implementation was conducted at this stage.

Table 6. Evaluation of the Adaptability and Feasibility of Strategies to Promote Sustainable Information Literacy of the Elderly in Xi'an Across Four Aspects

Strategies to Promote Sustainable information literacy of the elderly in Xi'an	Adaptability			Feasibility		
	$\bar{x}$	S.D.	level	$\bar{x}$	S.D.	level
Information awareness	4.70	0.57	Highest	4.65	0.56	Highest
Information knowledge	4.64	0.60	Highest	4.69	0.51	Highest
Information competence	4.67	0.53	Highest	4.62	0.56	Highest
Information ethics	4.69	0.49	Highest	4.64	0.55	Highest
Total	4.68	0.55	Highest	4.65	0.55	Highest

According to table 4.15, the adaptability and feasibility of strategies for improving the sustainable development of sustainable development information literacy of the elderly in Xi'an in four aspects were at the highest level with the values between 4.50 and 5.00（$\bar{x}$=4.68 and $\bar{x}$=4.65）which means the strategies for improving the sustainable development of information literacy of the elderly in Xi'an are adaptable and feasible.

5. Discussion

This study developed and evaluated community-based strategies to enhance older adults' information literacy across four pillars—awareness, knowledge, competence, and ethics—and examined their feasibility and adaptability. The findings align with informed-learning perspectives on information literacy (Bruce, 2008) and with socially situated practice (Lloyd, 2005). They also reflect classic emphases on structured access and retrieval (Taylor, 1979) and China-specific conceptualizations of formation processes (Ma, 1997). Guided by Wang and Shao (2021) for community-level operationalization, the SWOT–PEST analysis translates abstract pillars into concrete, locally adaptable actions that experts rated as feasible.

Awareness. The observed need to raise problem recognition and risk perception aligns with informed learning (Bruce, 2008) and practice-based accounts of noticing information opportunities (Lloyd, 2005). Strategies that foreground everyday triggers (e.g., health, benefits, safety) resonate with Wang and Shao (2021) on community messaging and outreach.

Knowledge. Gaps in understanding sources, channels, and credibility criteria echo Taylor's (1979) emphasis on structured access, with Ma's (1997) contributions highlighting locally recognizable systems—the strategy set, therefore, couples source orientation with credibility scaffolds embedded in community programs.

Competence. Variability in search, evaluation, and organization skills supports a skills-forward intervention track. Bruce (2008) and Lloyd (2005) practiced explicit and teachable methods in community settings. Hands-on, coached tasks, as anticipated by Wang & Shao (2021), are appropriate for progressive uptake.

Ethics. Concerns about privacy, data protection, and misinformation necessitate the adoption of standardized behaviors within everyday practices (Lloyd, 2005). Our ethics-focused actions (consent, password hygiene, rumor-checking routines) mirror community protocols recommended by Wang and Shao (2021).

Strategies to promote the improvement of information literacy among the elderly, it is necessary to improve the information-based training mechanism for community education for the elderly, create an information-based environment and atmosphere for community education for the elderly, rationally set up information literacy courses for community education for the elderly, adopt diversified teaching forms of information literacy for community education for the elderly, and strengthen the construction of teachers' team for information literacy in community education for the elderly, This view is highly consistent with the strategy proposed by (Wang & Shao, 2021). The strategies also highlighted the effects of improving information literacy among older persons in the community, which aligns with Ma Lili (2014) said that improving various guarantee mechanisms and information facilities is the foundation, improving the application degree of smart city technology and business popularity is the key, the government's management ability and service level is the core, and selecting the training mode is the guarantee to improve the training effect. Strengthening the construction of information security protection systems aligns with Yue's (2024) proposal to safeguard cybersecurity, enabling elderly users to access the internet with confidence and establish an age-friendly digital environment. This perspective resonates with China's national-level efforts to formulate cybersecurity laws and regulations, achieving coordinated development between informatization and information security. Moreover, improvements in teaching ability, especially in terms of feedback and student engagement, were considered crucial for maintaining high educational standards (Yin et al., 2017). The research findings align with Yue's (2023) advocacy for enhancing the immunity and resilience of elderly populations against misinformation, guiding seniors to discern rumors accurately. By strengthening the dissemination of information ethics guidelines and legal knowledge among older adults through educational initiatives and legal awareness programs, this approach aims to cultivate their ethical consciousness and legal literacy. It emphasizes the importance of fulfilling information responsibilities while prioritizing the acquisition and sharing of reliable, valuable information. Ultimately, these strategies were deemed highly feasible and appropriate for implementation in communities across the province.

Position within the Literature. While Bruce (2008), Lloyd (2005), Taylor (1979), and Ma (1997) provide the conceptual rationale and measurement anchors for the four-pillar model, Wang and Shao (2021) supply the implementation logic at the community level. Our findings suggest that feasibility and adaptability are highest when conceptual pillars are mapped to specific community practices (training formats, outreach routines, and support roles) in line with their recommendations, thereby closing the gap between theory and local delivery.

6. Conclusion

The following recommendations can be presented based on the findings of the study:

1)To the elderly: The elderly population plays a vital role in enhancing their digital literacy, with their attitudes, motivations, and learning behaviors directly impacting outcomes. To achieve this, seniors should first fully recognize the importance of digital technology. On one hand, they need to proactively engage with digital tools, overcoming initial fears and unfamiliarity through persistent practice. By integrating newly acquired digital skills into their daily lives, individuals can enhance the quality of life while strengthening their independence and autonomy in the digital age. On the other hand, leveraging their rich life experiences and wisdom, seniors should remain vigilant when facing digital security risks. By learning to identify online scams and protect their personal information, individuals can effectively avoid potential hazards and safeguard their digital safety. These strategies should be incorporated into the plan identified in this study as guidelines for development to support continued lifelong education.

2)To the community: Communities prioritize developing and implementing foundational digital literacy programs that not only teach seniors how to use smart devices but also help them overcome tech adoption challenges through hands-on practice. By creating inclusive and encouraging learning environments, communities spark seniors 'interest in digital education while reducing their concerns about technology barriers. Advanced courses and personalized coaching are provided to enhance seniors' technical proficiency. Furthermore, continuous educational tracking and effectiveness evaluations ensure that seniors can apply the skills they have acquired in daily life, improving their

digital living standards and facilitating their full integration into the digital society. Communities are recommended to develop multi-year implementation plans that incorporate these strategies, ensuring a gradual yet comprehensive approach to improve the information literacy of the elderly.

3)To the government: Government agencies should play a leading role in enhancing digital literacy among the elderly. First, authorities must strengthen policy support for senior citizens' digital development by formulating targeted measures to ensure equal access and protection in the adoption, usage, and creation of technology. This includes introducing subsidies for digital device purchases to alleviate financial burdens while encouraging telecom providers and manufacturers to develop user-friendly products. Second, governments should enhance digital infrastructure development to ensure comprehensive network coverage and accessible services. The "Internet + Elderly Care" initiative will drive the establishment of innovative elderly care systems, enabling seniors to access convenient services while improving their digital literacy. Ultimately, increased public awareness campaigns are essential for dispelling fears and misconceptions about technology, promoting its importance and security, and promoting proper online behavior. These strategies will empower older adults to adopt digital lifestyles while maintaining active information literacy, enabling them to adapt to the evolving demands of the digital age.

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