Article

The Impact of Community Education Research Community on Residents' Lifelong Learning and Empirical Analysis: Taking Hainan's "Greater Sanya" Economic Circle as an Example

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Abstract: Against the backdrop of building a learning society and developing the Hainan Free Trade Port, community education research communities have emerged as a vital platform for promoting lifelong learning among all citizens. Using the Greater Sanya Economic Zone (Sanya, Lingshui, Ledong, and Baoting) as a case study, this paper employs a mixed-methods approach grounded in four core theories—lifelong education, community-based learning, experiential learning, and regional collaboration. The objective is to systematically analyze the impact mechanisms of community education research communities on residents' lifelong learning across five dimensions: learning willingness, learning behavior, learning capacity, learning satisfaction, and social integration. Through an empirical analysis of 1,126 resident questionnaires, 8,260 pilot participant data points, and in-depth interviews with 23 experts, the study reveals that participants in research communities achieved a 31.6% higher comprehensive lifelong learning score compared to non-participants. Key indicators, including learning motivation, sustained participation, knowledge application, and overall satisfaction, demonstrated significant positive correlations. Furthermore, the research establishes a robust analytical framework encompassing impact mechanisms, empirical validation, and optimization pathways. This framework validates the effectiveness of research communities in addressing critical challenges such as uneven learning resource distribution, limited supply options, and low participation rates. Finally, long-term optimization strategies are proposed across six dimensions: organizational structure, resource allocation, curriculum design, faculty development, funding mechanisms, and evaluation systems, providing empirical evidence and practical models for advancing regional lifelong learning systems.

Keywords: community education; lifelong learning; empirical analysis; regional collaboration; educational optimization

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1. Introduction

National strategies are significantly influencing the evolution of lifelong learning systems. The 20th National Congress of the Communist Party of China has emphasized the importance of "advancing educational digitalization and building a learning society and a learning-oriented nation for all citizens," thereby establishing community education as a cornerstone of the lifelong education framework. The Ministry of Education's "Opinions on Promoting High-Quality Development of Community Education in the New Era" underscores the necessity of integrating community education with cultural tourism, technological advancements, and cultural initiatives. This approach aims to create an inclusive, equitable, and diverse lifelong learning service network. As a result, community education is undergoing a transformation from traditional classroom-based training to more scenario-based, experiential, and universally accessible methodologies, ensuring broader engagement and adaptability to modern learning needs [1].

The development of free trade ports highlights the critical need for equitable access to public services. In alignment with the objective of "a unified provincial strategy and

island-wide urban integration," the Hainan Free Trade Port places service equality at the forefront of its mission. The "Hainan Province 14th Five-Year Plan for Education Modernization" identifies community education initiatives as essential livelihood projects [2]. These initiatives are tasked with creating lifelong learning brands that leverage regional resources to address the diverse educational needs of all age groups. Furthermore, they aim to bridge the gaps in urban-rural and regional educational disparities, ensuring that lifelong learning opportunities are accessible to all residents, regardless of their geographic or socioeconomic status.

The integration of educational research with community education in the Greater Sanya Economic Zone presents several practical challenges [3]. Although the "Greater Sanya" region is endowed with unique resources in ecology, culture, industry, and tourism, significant issues persist. These include uneven distribution of resources, misalignment between curricula and local needs, limited cross-regional collaboration, and barriers to resident participation. Traditional community education programs predominantly rely on lectures, with experiential programs constituting only 3% of the total offerings, despite addressing 78% of residents' preferences. Additionally, resource allocation remains highly centralized in Sanya, while Baoting's resource density is merely one-seventh of Sanya's. This disparity severely restricts the accessibility and quality of lifelong learning opportunities, underscoring the need for more balanced and inclusive resource distribution strategies.

2. Core Concepts and Theoretical Foundations

2.1. Definition of Core Concepts

The Community Education Research and Learning Community represents a comprehensive system designed to integrate research and learning services, emphasizing lifelong learning as its guiding philosophy. It is built upon the foundation of regional resources, operates through mechanisms of multi-party collaboration, and aims to achieve universal inclusiveness. This system involves active participation from governments, educational institutions, communities, enterprises, and residents, fostering cooperation across regions, disciplines, and diverse stakeholders. Its core principles include resource sharing, shared responsibility, equitable benefit distribution, and collaborative education, which collectively ensure the system's sustainability and effectiveness in addressing community needs [4].

Lifelong learning for residents is defined as a continuous, self-directed process of acquiring knowledge and enhancing skills throughout the entire life cycle of community members, transcending limitations of time and space. This concept is structured around five interconnected dimensions: learning motivation, learning behaviors, learning capabilities, learning fulfillment, and social integration [5]. Learning motivation reflects an individual's intrinsic drive and proactive pursuit of knowledge, shaped by personal interests, career goals, and social contexts. Learning behaviors encompass tangible actions such as enrolling in training programs, participating in online or offline educational activities, and engaging in social practices, serving as external manifestations of motivation. Learning capabilities refer to the comprehensive competencies required for sustained learning, including information acquisition, knowledge comprehension, practical application, problem-solving, and innovation. Learning fulfillment captures the subjective experiences of satisfaction, achievement, and self-worth growth during the learning process, which significantly influence the continuity of learning efforts. Social integration highlights the importance of strengthening connections among residents, their communities, and peers through educational activities, fostering a sense of belonging and active participation within social networks. Together, these dimensions dynamically interact to form a holistic framework for evaluating lifelong learning among residents, ensuring that the process is both meaningful and impactful.

The study mechanism illustrates how research communities positively influence residents' lifelong learning through five mediating variables: resource accessibility,

curriculum adaptability, participation convenience, organizational support, and social interactivity. Resource accessibility focuses on integrating diverse learning resources within study communities, including teaching staff, practical venues, digital learning platforms, and cultural assets provided by educational institutions, enterprises, and local communities. The richness and ease of access to these resources directly affect the breadth and depth of residents' learning engagement. Curriculum adaptability involves designing targeted programs tailored to residents' cognitive development stages, career aspirations, and personal interests. Examples include science education courses for youth, vocational skill enhancement programs for adults, and health preservation or digital technology courses for seniors, ensuring precise alignment between learning needs and available resources. Participation convenience is achieved through flexible learning channels that combine online and offline approaches, streamlined enrollment processes, and reduced time and economic costs. Initiatives such as establishing community learning hubs, providing mobile learning devices, and offering weekend or evening classes enhance accessibility for diverse groups. Organizational support encompasses robust management systems, incentive mechanisms, and service frameworks, including instructional guidance, certification of learning outcomes, and financial assistance for disadvantaged groups, ensuring sustained engagement in learning activities. Social interactivity emphasizes the collaborative learning environment fostered by study communities, where group projects, thematic discussions, and practical exchanges promote knowledge sharing and emotional connections [6]. These interactions strengthen learners' sense of belonging and teamwork skills, further fueling their motivation for continuous learning. Collectively, these five mediating variables interact and progressively build upon each other, forming the essential pathways through which study communities drive lifelong learning among residents.

2.2. Theoretical Basis

The lifelong education theory underscores the importance of learning as a comprehensive, universal, and inclusive process, forming a robust theoretical basis for the development of research-based learning communities. These communities are designed to cater to individuals across all age groups and integrate seamlessly into diverse social and educational contexts [7]. Furthermore, the community theory advocates for the establishment of multi-stakeholder partnerships, which effectively address the limitations of single-source educational provision. By fostering collaboration among various entities, this approach creates a stable and sustainable learning ecosystem. Complementing these ideas, the experiential learning theory emphasizes the cyclical process of "experience--reflection--abstraction--application," which enhances learners' initiative and ensures continuity in their educational journey. This iterative model encourages active engagement and deeper understanding, making it a cornerstone for fostering lifelong learning habits.

The Regional Synergy Theory aims to dismantle administrative barriers to facilitate resource complementarity and inclusive sharing, thereby reducing disparities in learning opportunities. Central to this theory is the optimized allocation of educational resources across communities within the Greater Sanya Economic Zone [8]. This is achieved through coordinated cross-regional policies, enhanced infrastructure connectivity, and integrated service delivery. Key measures include the implementation of unified curriculum standards, equitable access to high-quality teaching staff, and the sharing of educational research bases. These initiatives ensure that residents across different regions benefit from diverse and equitable learning opportunities. By promoting collaboration and resource sharing, this framework supports the regional development of educational research communities, fostering a more interconnected and inclusive educational landscape.

3. Mechanisms of Community Education and Research Communities on Lifelong Learning

3.1. Direct Impact: Enhancing Intrinsic Motivation for Lifelong Learning

By stimulating learning motivation, immersive, experiential, and localized courses have significantly reduced learning barriers while enhancing engagement. Surveys indicate a 42.7% increase in participants' willingness to learn, demonstrating the effectiveness of these approaches [8]. To ensure sustained participation, the establishment of fixed organizational structures, consistent teaching staff, robust safety measures, and opportunities for peer interaction has successfully transformed one-time involvement into long-term learning habits. Furthermore, the promotion of self-directed learning has shifted the mindset from "I have to learn" to "I want to learn," with post-test data revealing a 35.2% rise in self-planned learning proportions. These findings underscore the importance of creating supportive environments that foster intrinsic motivation and lifelong learning behaviors.

3.2. Indirect Impact: Optimizing External Conditions for Lifelong Learning

Resource expansion has successfully integrated 426 resources across cities and counties, effectively removing barriers to accessing learning opportunities. The curriculum adaptation initiative includes 48 inclusive courses designed to cater to individuals of all age groups, addressing diverse needs based on factors such as age, geographic region, and occupation. Cost reduction strategies have been implemented, encompassing affordable tuition fees, transportation subsidies, and proximity-based participation options. These measures collectively tackle the three primary challenges faced by learners: financial constraints, time commitments, and commuting difficulties [9]. Furthermore, social support mechanisms have been established, including peer assistance programs, mentorship opportunities, and community recognition initiatives. These efforts aim to cultivate a supportive learning environment and enhance social capital, thereby encouraging sustained engagement in lifelong learning activities.

Through the strategic use of technology, a comprehensive digital learning platform has been developed, seamlessly integrating online and offline learning elements. This platform incorporates advanced features such as virtual reality (VR) learning experiences, live-streamed courses, and cloud-based learning portfolios [10]. By eliminating traditional constraints of time and space, the platform enables residents to engage in educational activities at their convenience, with registered users averaging 182 hours of online learning annually. To ensure continuous improvement, a closed-loop mechanism has been implemented, encompassing "demand research -- course development -- effectiveness feedback -- iterative optimization." Community grid coordinators play a pivotal role by regularly collecting residents' learning needs, while experts from universities and enterprises collaboratively refine course content and formats in response to feedback. Notably, in 2023, course satisfaction levels increased by 27.5% compared to the initial pilot phase, demonstrating the effectiveness of these iterative enhancements.

3.3. Comprehensive Impact: Building a Lifelong Learning Ecosystem

The research-based learning community establishes a closed-loop system that integrates "resources---curriculum---teachers---services---evaluation," effectively transitioning lifelong learning from being merely an "activity" into a structured and sustainable "system." This transformation elevates lifelong learning from an individual pursuit to a collective, nationwide endeavor, embedding it as a standard and recurring practice rather than an isolated or sporadic occurrence [3]. By creating this systemic approach, the framework ensures that lifelong learning becomes an integral part of societal development, fostering a culture of continuous education and skill enhancement.

This ecosystem is strategically designed around community hubs, which serve as focal points for integrating resources from diverse stakeholders, including government agencies, universities, enterprises, and social organizations. This collaborative framework is guided by principles of "government leadership, market-driven operations, social participation, and resident-oriented benefits." At the resource level, the ecosystem consolidates a wide array of course content and digital platforms while also incorporating physical assets such as cultural venues, training facilities, and volunteer networks [11]. These resources extend beyond the immediate community to establish a robust online-

offline network. The curriculum system is continuously updated to reflect the evolving needs of residents, offering foundational knowledge alongside specialized content such as personal interest development, career progression, and intergenerational education. This ensures that lifelong learning opportunities cater to diverse demographic groups. The teaching team is composed of professional educators, industry specialists, community leaders, and university volunteers, creating a multidisciplinary faculty structure that provides sustained intellectual and practical support. Service delivery employs a hybrid model combining self-directed online learning, interactive offline experiences, and personalized mentoring to comprehensively support learners throughout their educational journey. The evaluation mechanism spans all phases of learning, integrating both process assessments and outcome evaluations. This dual focus not only measures learning achievements but also promotes the development of effective learning behaviors and addresses specific educational needs. By continuously refining these components, the ecosystem enhances its efficiency and service quality, ultimately embedding lifelong learning as a deeply integrated and widely accepted practice within communities.

4. Research Design and Empirical Approach

4.1. Research Hypotheses

The hypothesis suggests that the community education research and study community exerts a positive and significant influence on residents' lifelong learning levels. This relationship highlights the importance of structured educational initiatives in fostering continuous personal and professional development among individuals [2]. By engaging in community-based learning environments, residents can access diverse resources and opportunities that enhance their ability to adapt to evolving societal and economic demands.

The hypothesis posits that the duration, frequency, and format of participation act as mediating factors in determining the extent of the impact on lifelong learning. These variables play a critical role in shaping the effectiveness of educational programs, as consistent and well-structured engagement can amplify learning outcomes. Understanding these dynamics is essential for optimizing program design and ensuring equitable access to educational opportunities [8].

This hypothesis explores the variability of impact effects across different demographic and socioeconomic groups, including age categories, urban versus rural settings, and income brackets. Such disparities underscore the need for tailored educational strategies that address the unique challenges and opportunities faced by diverse populations. By recognizing these differences, policymakers and educators can develop more inclusive and effective lifelong learning initiatives.

The hypothesis emphasizes the mediating role of resource coordination, curriculum alignment, and faculty support in enhancing lifelong learning outcomes. Effective coordination ensures that resources are optimally utilized, while curriculum alignment guarantees relevance to learners' needs. Faculty support further strengthens the learning experience by providing guidance and expertise, thereby fostering a more impactful and sustainable educational environment.

4.2. Variable Design

The dependent variable in this study is the lifelong learning level of residents, which is assessed across five distinct dimensions using a total of 20 items. Each item is measured on a Likert scale ranging from 1 to 5, where higher scores indicate greater levels of lifelong learning. This comprehensive approach ensures a nuanced understanding of the multifaceted nature of lifelong learning.

The independent variables include participation in the study community, the duration of such participation, the frequency with which individuals engage, and the specific forms of participation they undertake. These variables are designed to capture the breadth and depth of engagement, providing a robust framework for analyzing their impact on lifelong learning outcomes.

Mediating variables in this research encompass resource availability, curriculum suitability, participation convenience, organizational support, and social interaction. These factors are hypothesized to influence the relationship between independent variables and the dependent variable, offering insights into the mechanisms that facilitate or hinder lifelong learning.

Control variables include demographic and socioeconomic factors such as age, gender, education level, income, urban or rural residency status, and occupation. These variables are incorporated to account for potential confounding effects, ensuring that the analysis accurately isolates the influence of the primary independent variables on lifelong learning.

4.3. Data Sources

The questionnaire data comprises a total of 1,126 responses, which include 568 participants and 558 non-participants [12]. This dataset provides a comprehensive foundation for analyzing participant engagement and contrasting it with non-participant perspectives, ensuring a robust understanding of the underlying trends and patterns.

The pilot data encompasses a substantial sample of 8,260 participants, among which 1,200 paired pre-test and post-test samples are included. This pairing allows for a detailed examination of changes over time, offering critical insights into the effectiveness of the interventions or programs under study [13].

The interview and activity data include detailed records of interviews conducted with experts, residents, and staff members. Additionally, it incorporates activity logs and satisfaction surveys, which collectively provide a multidimensional perspective on the operational and experiential aspects of the study [14].

4.4. Reliability and Validity Testing

The calculated Cronbach's α value of 0.927 demonstrates a high level of internal consistency, indicating that the data collected is highly reliable. Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, recorded at 0.891, confirms the validity of the data structure, suggesting that the dataset is well-suited for factor analysis and other statistical evaluations. These metrics collectively affirm the robustness and reliability of the research methodology employed in this study.

5. Empirical Analysis and Results

5.1. Descriptive Statistics

Regarding participation characteristics, individuals aged 18 to 45 accounted for 39.1%, while those aged 46 to 65 represented 41.3%, showcasing a comprehensive age distribution among participants. Weekly participation frequency varied, with 62.3% engaging 1 to 2 times per week, and 58.7% maintaining consistent involvement for over three months. These statistics highlight a notable level of stability and commitment within the participant group, suggesting a strong inclination toward sustained engagement in the activities analyzed.

A comparative analysis of lifelong learning proficiency revealed a mean score of 4.23 among participants, significantly higher than the 3.22 observed among non-participants, indicating a 31.6% improvement. Furthermore, learning willingness increased by 42.7%, learning behavior by 33.5%, learning ability by 29.8%, sense of achievement by 35.7%, and social integration by 28.9%. These findings underscore the positive impact of participation on various dimensions of lifelong learning, reflecting enhanced personal and social development outcomes.

5.2. Correlation Analysis

The analysis revealed a highly significant positive correlation between participation behavior and lifelong learning, with a correlation coefficient of r=0.712 and a p-value of less than 0.001. Additionally, the duration of participation, frequency of engagement, and the type of courses attended were all found to be significantly and positively associated

with improved learning outcomes, highlighting the importance of consistent and diverse educational involvement in fostering lifelong learning.

5.3. Regression Analysis

Using the total score of lifelong learning as the dependent variable, the regression equation was found to be statistically significant, indicating a robust relationship between the variables analyzed. This suggests that the factors included in the model contribute meaningfully to predicting lifelong learning outcomes, providing valuable insights into the dynamics of educational development and resource allocation [10].

The regression equation was Y=0.683X+0.215 resources + 0.187 curriculum + 0.156 faculty + control variables, with an R2 value of 0.627. These findings strongly support Hypothesis H1, demonstrating that the study community exerts a significant positive predictive effect on lifelong learning. The high R2 value underscores the model's explanatory power, highlighting the importance of resources, curriculum, and faculty in fostering continuous educational engagement.

5.4. Adjustment and Difference Testing

The moderating effect reveals that immersive experiences, characterized by participation durations exceeding six months and frequencies of at least two times per week, exhibit a significantly stronger impact on efficacy [3, 13]. This finding underscores the importance of sustained engagement in fostering meaningful outcomes, thereby providing robust support for Hypothesis H2. Such prolonged and frequent participation likely enhances the depth of involvement and the ability to internalize the benefits of the experience, making it a critical factor in achieving desired results.

Significant group differences were observed, with rural residents demonstrating an improvement rate of 41.2%, notably higher than the 26.7% observed among urban residents. The most substantial increases were identified within middle- and low-income groups, highlighting the inclusive potential of the intervention. Elderly individuals exhibited the most remarkable advancements in digital literacy, while adolescents showed the greatest enhancement in scientific literacy. These findings provide strong support for Hypothesis H3, emphasizing the community's ability to deliver greater inclusive value for vulnerable populations. Such outcomes underscore the importance of tailored approaches to address the unique needs of diverse demographic groups.

5.5. Mediation Effect Test

Resources, curriculum, faculty, support systems, and interaction demonstrated significant partial mediation effects, collectively contributing to a total mediation effect of 57.2%. This finding provides robust evidence in favor of Hypothesis H4, emphasizing the interconnected impact of these factors on the observed outcomes.

5.6. Pre-Post Test Comparison of the Pilot Study

Following the pilot implementation, the total score for lifelong learning exhibited a notable increase from 2.87 to 4.19, marking a substantial 46.0% improvement. Additionally, resident satisfaction reached an impressive 91.2%, while resource coordination achieved a score of 90 points, and service supply capacity attained 92 points. These results underscore the significant empirical benefits observed during the study.

6. Empirical Conclusions and Summary of Impact Mechanisms

6.1. Core Conclusions

The community education research community demonstrates significant positive driving effects, exerting stable, strong, and sustained influence on residents' lifelong learning, with comprehensive performance improvement exceeding 30%. This mechanism operates through a well-defined pathway: "resource integration → curriculum adaptation → faculty support → accessible participation → social interaction → lifelong learning," establishing a robust transmission system with pronounced mediating effects. Its inclusive equity benefits are particularly evident, offering greater advantages to rural communities, low-to middle-income groups, seniors, and adolescents,

thereby advancing educational equity. Long-term sustainability is notable, as prolonged participation correlates with enhanced learning outcomes and the potential for cultivating lifelong learning habits [12]. The "1+4+N+X" framework and six core mechanisms have proven effective in both urban and rural pilot programs, demonstrating replicability and scalability for regional implementation. This framework ensures adaptability across diverse contexts, fostering a culture of continuous education and equitable access to learning opportunities.

6.2. Panoramic View of the Impact Mechanism

The incentive mechanism emphasizes how experiential engagement fosters interest, particularly through precise alignment with specific demands. The safeguard mechanism ensures robust support across resources, funding, safety protocols, and organizational structures, creating a stable foundation for operations. The collaborative mechanism highlights the importance of coordination across regions, disciplines, and scenarios to achieve seamless integration. Finally, the feedback mechanism establishes a comprehensive closed-loop system encompassing evaluation, optimization, and continuous improvement, ensuring iterative advancements in effectiveness and efficiency.

7. Existing Issues and Optimization Pathways

7.1. Existing Issues

Rural areas face significant challenges, including inconvenient transportation networks and limited access to information, which result in persistent coverage gaps. Additionally, time constraints among young and middle-aged populations contribute to low participation rates in educational initiatives. These issues highlight the need for targeted interventions to improve accessibility and engagement in rural regions.

The digital platform supporting educational programs remains underdeveloped, characterized by weak online services that fail to meet user expectations. Furthermore, long-term funding and incentive mechanisms lack stability, undermining the sustainability of these initiatives. The quantitative evaluation of learning outcomes requires further refinement to ensure accurate assessments of program effectiveness. Some study tour programs are inadequately aligned with the practical needs of residents, exhibiting homogenization tendencies that fail to address the diverse and personalized learning demands of individuals across various age groups, professions, and interests. Cross-regional collaboration mechanisms encounter obstacles such as high communication costs and inefficient resource sharing, compounded by unclear role definitions among partner organizations, which weaken coordination efforts. The faculty structure also requires optimization, as the proportion of specialized and practice-oriented instructors remains relatively low. Moreover, the absence of systematic training and competency enhancement mechanisms for study tour mentors hampers the delivery of high-quality educational experiences. Traditional promotional strategies for community education initiatives are insufficient, resulting in limited outreach and appeal, which in turn leads to low awareness and understanding of these programs among potential participants.

7.2. Path Optimization

The organizational mechanism has undergone significant optimization through the refinement of the "1+4+N+X" framework, which now incorporates a joint conference and performance evaluation system spanning four regions. Resource allocation has been strategically enhanced by developing a provincial-level study tour resource database, complemented by resource-sharing lists and cross-regional coordination mechanisms to ensure equitable distribution. The curriculum system has been meticulously upgraded to accommodate learners of all age groups, adopting a tiered structure that emphasizes local contexts while expanding offerings in family education, wellness, digital technologies, and vocational skills. Efforts to strengthen the teaching faculty have resulted in the establishment of a robust "1+3+N" mentor team, supported by financial subsidies,

comprehensive training programs, and recognition incentives to foster professional growth. Additionally, the support system has been significantly improved through the creation of a funding mechanism involving provincial, municipal, and social stakeholders, the introduction of dedicated study tour routes, and the promotion of evening and weekend classes to maximize accessibility. The evaluation system has been refined with the implementation of a "five-in-one" assessment model, which prioritizes lifelong learning enhancement as its core indicator, ensuring that all initiatives align with the overarching goal of fostering continuous education and development.

A comprehensive "five-in-one" evaluation system will be established, integrating formative assessment, summative evaluation, satisfaction surveys, social impact analysis, and sustainability metrics. This framework will utilize both quantitative scoring criteria and qualitative descriptors, ensuring a balanced approach to evaluation. Third-party professional agencies will conduct regular monitoring of educational programs, focusing on curriculum quality, participant engagement outcomes, and the practical application of residents' learning achievements. Core evaluation indicators will emphasize the enhancement of lifelong learning awareness, the improvement of learning competencies, the mastery of knowledge and skills, and the demonstration of tangible impacts on community development. Assessment results will be strategically applied to refine curricula, optimize resource allocation, and evaluate instructor performance, thereby creating a self-reinforcing "evaluation-feedback-optimization" cycle. This iterative process ensures that the community education research initiatives consistently meet residents' lifelong learning needs through effective implementation and continuous improvement. By aligning evaluation outcomes with strategic goals, the system fosters a dynamic environment that supports sustainable educational development and community empowerment [11].

8. Conclusion and Prospects

The community education research and study community significantly enhances residents' willingness, behaviors, capabilities, sense of achievement, and social integration in lifelong learning through its "five-in-one" approach encompassing resources, curricula, services, interactions, and safeguards. This model serves as an effective framework for advancing a learning society by systematically addressing diverse educational needs. Empirical evidence demonstrates that participants' lifelong learning proficiency improved by 31.6%, with disadvantaged groups benefiting more substantially due to targeted interventions and inclusive strategies. The model's scientific validity, universality, and replicability make it a promising blueprint for broader implementation. Furthermore, its adaptability across different socio-economic contexts highlights its potential to bridge educational gaps and foster equitable access to lifelong learning opportunities. By integrating these elements, the framework not only enhances individual capabilities but also contributes to the collective development of a more cohesive and informed society.

At the provincial level, it is essential to incorporate this model into lifelong education plans, allocate dedicated funding, establish standardized service protocols, and develop advanced digital platforms to ensure scalability and efficiency. At the municipal and county levels, fostering collaborative mechanisms, promoting resource sharing, and enhancing public welfare initiatives are critical, with particular emphasis on addressing the needs of rural areas to reduce disparities. At the grassroots level, strengthening site-specific services, conducting precise needs assessments, diversifying activity formats, and improving accessibility are vital for ensuring inclusivity and effectiveness. At the social level, encouraging active participation from enterprises, intangible cultural heritage organizations, and universities can significantly contribute to cultivating a culture of lifelong learning among all citizens. These multi-tiered strategies collectively aim to create a robust and sustainable framework for lifelong education, ensuring that learning opportunities are accessible, equitable, and impactful across all societal strata.

This study primarily focuses on the Greater Sanya region, which presents certain limitations, including the absence of long-term tracking mechanisms and insufficient evaluation of digitalization outcomes. Future research should prioritize expanding regional validation to encompass diverse geographic and socio-economic contexts, thereby enhancing the generalizability of findings. Establishing a smart platform with integrated functionalities can facilitate real-time data collection, personalized learning experiences, and efficient resource management. Additionally, implementing internationally recognized curricula can broaden the scope of educational offerings and foster cross-cultural exchange. Deep integration of grassroots governance with rural revitalization efforts is essential to address systemic challenges and promote sustainable development. By addressing these areas, future studies can provide a more comprehensive understanding of the model's long-term impact and its potential to transform lifelong learning practices on a global scale.

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