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Research on the Mechanism and Strategy of Community Education Participating in Community Governance Under the Background of Digital Transformation

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Abstract: With the acceleration of digital transformation, community governance is facing new requirements of intelligence, collaboration and refinement. As an important bridge connecting the government and residents, community education not only undertakes the function of knowledge dissemination, but also plays a key role in improving residents' digital literacy, stimulating public spirit and promoting collaborative governance of multiple subjects. Based on the typical cases of the smart community of Guicheng Street, Nanhai District, Foshan City and the traditional community of Zhangcha Street, Chancheng District, this paper systematically sorts out the main mechanisms of community education participation in governance under the background of digitalization through literature analysis, policy interpretation, case comparison and other methods, including multi-subject collaboration mechanism, education empowerment mechanism and digital platform support mechanism. The study found that although there are significant differences in digital foundation, resource supply and resident participation among different types of communities, community education can effectively promote the transformation of residents from "governance objects" to "governance subjects", providing ongoing support for improving governance efficiency. This paper further proposes optimization strategies, including improving the construction of digital platforms, strengthening the empowerment of specific groups, and improving the multi-coordination mechanism. The study not only enriches the theoretical connotation of the integration of community education and governance, but also provides practical inspiration for promoting the modernization of grassroots governance, bridging the digital divide and achieving educational equity.

Keywords: Digital Transformation; Community Education; Community Governance; Synergy Mechanism

1.Introduction

1.1 Research background and problem

With the deepening of digital transformation, community governance is facing new opportunities and challenges. The report of the 20th CPC National Congress clearly pointed out that it is necessary to "perfect the grassroots governance platform with grid management, refined services and information support", improve the urban and rural community governance system, and

comprehensively improve the level of intelligent, scientific and refined grassroots governance. In this process, community education has gradually been given a new historical mission: it is not only a channel for knowledge dissemination, but also an important force to promote the modernization of grassroots governance, promote the in-depth participation of residents, and cultivate community identity.

As one of the core cities in the Guangdong-Hong Kong-Macao Greater Bay Area, Foshan has actively promoted the construction of smart communities, the popularization of lifelong education, and innovation in social governance in recent years, and has accumulated rich experience in digital empowerment of community governance and the coordination of education and governance. However, community governance in the context of digitalization still faces a series of problems: on the one hand, the uneven digital literacy and insufficient participation of residents have led to limited depth of citizen participation in grassroots governance; on the other hand, the coordination mechanism between community education and governance is imperfect, and educational resources are difficult to fully play a supporting role in governance effectiveness. Current academic research on these issues is mainly focused on a single field, such as digital governance, community education, or collaborative governance, lacking cross-domain, systematic integrated analysis, especially in terms of mechanism construction and optimization strategies.

1.2 Research Purpose and Significance

In response to the above issues, this article intends to conduct an in-depth analysis of the mechanism and path of community education's participation in community governance under the background of digital transformation based on the practical exploration of some smart communities and traditional communities in Foshan City.

（1）The main objectives of the study include: exploring how community education can be embedded in the community governance system through mechanisms such as multi-subject collaboration, education empowerment, and digital platform support; comparing the common experiences and differences among different types of communities in the process of education empowerment governance; and extracting operational and scalable optimization strategies to provide reference for practices in other regions.

（2）The theoretical significance lies in enriching the academic connotation of "education is governance", expanding the research perspective of community governance, and responding to the new demands for governance theory in the digital age. The practical significance lies in providing practical and feasible strategies for local governments and communities, and helping to achieve a new pattern of grassroots governance of co-construction, co-governance and sharing.

1.3 Research questions and main contents

This article focuses on the following core issues , and conducts policy environment analysis, case practice analysis, mechanism refinement and strategy optimization in turn, and puts forward research conclusions and subsequent prospects . The research issues include:

（1）In the context of digital transformation, how can community education be embedded in the community governance system?

（2）What are the role mechanisms and key links of community education in improving governance effectiveness?

（3）What are the similarities and differences in the practical experiences of different types of communities?

（4）How to optimize the mechanisms and strategies for community education participation in governance?

2.Literature review and theoretical basis

2.1 Literature review

2.1.1 Current status of domestic research

In recent years, domestic academia has shown a diversified trend in research on the relationship between community education and community governance, and research topics have gradually expanded from traditional education supply and curriculum construction to cutting-edge issues such as digital transformation, collaborative governance, and high-quality development.

In the field of resource integration and high-quality development, Wu Jie (2023) analyzed the obstacles to the integration of community education resources from the perspective of high-quality development, including subject fragmentation,

information barriers, lack of symbiotic systems, and insufficient cross-border collaboration, and proposed optimization paths such as establishing resource integration consensus, information exchange, subject aggregation, and cross-border collaboration [1]. Cui Donghao et al. (2023) constructed a community education data governance model from the perspective of big data, emphasizing the importance of data integration, sharing, privacy protection, and security management [2]. Song Yifang (2024) explored the potential of generative artificial intelligence such as ChatGPT in making up for the shortcomings of teachers, enriching content, and expanding learning methods, and analyzed related challenges and ethical risks. He also further discussed the coordination mechanism and guarantee mechanism in digital governance practice, emphasizing the combination of multi-subject collaboration and digital tools [3][4]. Huang Jiale (2025) systematically sorted out the influencing factors of digital transformation based on the technology-organization-environment (TOE) framework, pointing out the key role of factors such as technology availability, organizational support, and external environment in the transformation effect [5].

In terms of governance mechanisms and policy evolution, Wu Jie (2024) introduced meta-governance theory, analyzed the problems of insufficient collaboration, unclear rights and responsibilities, lack of trust, etc. in the collaboration of multiple subjects, and proposed optimization strategies [6]. Liu Ruisheng (2024) used the multi-source flow theory to systematically analyze the evolution logic and dynamic mechanism of China's community education policy [7]. Wu Jie (2023) and Wang Jiangen (2024) proposed theoretical models for resource integration and optimization of collaboration mechanisms based on the symbiosis theory and the concept of integrated development, respectively, emphasizing the important role of cross-departmental cooperation, resource sharing, and collaborative innovation in promoting the high-quality development of community education [8][9].

In terms of modernization and precise supply, scholars such as Qian Xuchu (2024), Sun Tianlinzi (2024), and Xu Shiyi (2024) focus on how to improve supply precision, ecological reconstruction, and development efficiency through digital transformation and organizational innovation [10][11][12].

In addition, research has gradually expanded to the educational empowerment and fairness of specific groups. Ma Yuanyuan (2024) focused on the younger elderly group and explored their educational support for participating in community governance, pointing out the paths that should be taken, difficult to take, and possible to take in terms of institutions, culture, and technology [13]. Ma Xiaofei (2025) analyzed the spatial shift in community education and its practical path from the perspective of spatial sociology, emphasizing the importance of the reconstruction of physical, social, and cultural spaces in enhancing a sense of belonging and collaboration [14].

In summary, domestic research has provided rich theoretical resources for understanding the participation of community education in community governance. However, overall, there is still a lack of systematic analysis of the synergy among education, governance, and digitalization, as well as empirical comparisons based on different types of communities. This is also the research gap that this article attempts to fill.

2.1.2 Current status of foreign research

Internationally, foreign academic circles have gradually deepened their research on the relationship between community education and community governance in the context of digitalization, forming a theoretical and practical system covering multiple angles such as ethics, mechanisms, technology, and policies. Holmes et al. (2021) focused on the ethical issues of artificial intelligence in education, and proposed that when introducing AI technology to promote the digital transformation of education and community governance, we must pay close attention to fairness, transparency, inclusiveness, and accountability, be vigilant against technological rationality overwhelming humanistic care, and avoid the deviation of "doing good things instead of doing things well" [15]. This perspective provides important inspiration for understanding the ethical framework and governance risks of digital technology in community education.

In Southeast Asia, Saleh , Adhani , et al. (2023) took Indonesia as an example and constructed an online community education framework based on grounded theory, pointing out that in order to achieve a win-win situation for students and the community, it is necessary to integrate student self-learning, collaborative practice, government support and community participation, and take into account the linkage mechanisms at the macro (policy level), meso (organizational collaboration),

and micro (learning design) levels [16]. Eden , Onyebuchi , et al. (2024) systematically summarized the strategies for promoting inclusiveness and collaboration in online learning, and proposed that virtual communities, real-time interactions, collaborative projects, cross-cultural exchanges, etc. can effectively break down regional and cultural barriers and enhance learners' sense of belonging and participation [17]. In the field of community education, such strategies provide new ideas for building multi-party governance and promoting benign interactions among residents, teachers, and managers.

In addition to academic research, the policy practices of international organizations and countries also provide valuable reference. OECD (2021) pointed out that digital literacy and lifelong learning are key elements to enhance citizens' capabilities and promote collaborative governance. The Danish government has comprehensively promoted the construction of e-government and smart communities through the "Digital Denmark" strategy, and citizen digital literacy training is regarded as an important component. Based on the "Digital Society 5.0" strategy, Japan has specially opened smart device operation courses for the elderly, and regularly held smartphone training courses for the elderly through local governments to reduce the digital divide and ensure that "no one is left behind" in the digitalization process. The "Seniors Go Digital" program launched by the Infocomm Media Development Authority (IMDA) of Singapore recruits digital ambassadors at the community level to provide one-on-one training for elderly residents. As of 2023, it has helped more than 210,000 elderly people master basic digital skills. The policies and practices of these countries highlight the concept of digital governance that is citizen-centered, government-driven, community-implemented, and technology-supported, providing an important reference for the integration of community education and community governance in my country.

Overall, foreign research and practice pay great attention to the role of digital tools in improving the inclusiveness and synergy of community education, and emphasize the collaboration of multiple subjects and the citizen-centered digital governance model. However, existing research often focuses on a single technical tool, educational mechanism or governance framework, and pays insufficient attention to the systematic coupling relationship and collaborative operation mechanism between education, governance and technology, and lacks comprehensive and in-depth theoretical and practical exploration.

2.1.3 Literature Review

Looking at domestic and foreign research, the academic community has made a lot of progress on the relationship between community education and community governance. Domestic research covers resource integration, digital transformation, collaborative governance, high-quality development and other directions, focusing on education supply-side reform, policy evolution and empowerment of specific groups, but overall lacks a systematic analysis of the synergy of education, governance and digitalization, and lacks empirical comparisons and mechanism refinement based on different community types. Some research still remains at the level of theoretical advocacy and policy analysis, lacking in-depth discussion of specific operational links.

Foreign research emphasizes the inclusiveness and synergy of digital tools, focuses on multi-subject collaboration, citizen-centered governance concepts and technology ethics, and provides rich theoretical and practical inspiration. However, existing research often focuses on a single tool or mechanism, lacks cross-dimensional integrated analysis, and its results are mainly based on the background of developed countries, which is not suitable for the Chinese context.

In summary, based on domestic and foreign research, this article will focus on the context of digital transformation and conduct in-depth comparisons of the collaboration mechanisms, empowerment mechanisms and digital support mechanisms of community education in different community types, in an effort to fill the gaps in existing research in cross-domain integration, empirical verification and localization strategies.

2.2 Theoretical basis

The analysis of this paper is mainly based on the following three theoretical perspectives, which jointly construct the theoretical framework of the research: public governance theory provides an overall analysis perspective, collaborative governance theory analyzes the collaborative mechanism of multiple subjects, and digital transformation theory reveals the organizational and social changes driven by technology. The combination of these three provides theoretical support for this paper to explore how community education can be embedded in the community governance system and improve governance effectiveness.

2.2.1 Public Governance Theory

Public governance theory emphasizes the diversity of governance subjects, advocates that multiple parties such as government, market, social organizations, and citizens participate in the governance process, and promotes governance networking and decision-making consultation. Compared with the traditional single government-led governance model, public governance theory pays more attention to multi-party cooperation and coordination, and focuses on improving the legitimacy and effectiveness of governance through extensive public participation. In this article, public governance theory helps to explain how community education can achieve democratization, transparency, and collaboration in governance by promoting the interaction of multiple subjects such as government, community organizations, enterprises, and residents.

2.2.2 Collaborative Governance Theory

Collaborative governance theory focuses on how to cross organizational boundaries, integrate multiple resources and capabilities, and achieve common goals. The theory emphasizes the formation of a relationship of mutual trust and complementarity between the government and non-governmental entities, and jointly responds to complex public affairs and social issues through collaborative platforms, co-governance mechanisms, and networked management. In this article, collaborative governance theory provides an analytical framework for analyzing the role of community education in community governance, especially for exploring how community education can serve as a connector and enabler to promote collaborative governance among multiple entities in education, consultation, and service.

2.2.3 Digital Transformation Theory

Digital transformation theory focuses on how information and communication technology (ICT) reshapes the operation logic, resource allocation mode and social relationship network of organizations, thereby bringing about structural changes in governance models. In the digital society, digital tools not only improve the efficiency of service provision, but also provide new space and mechanisms for public participation and social collaboration. In this article, digital transformation theory helps to understand how community education can achieve content innovation, channel innovation, and governance embedding based on digital platforms, as well as how to cope with emerging challenges such as the digital divide and insufficient capacity of residents.

Combining the above theoretical perspectives, this article believes that community education has become an important enabling factor for community governance in the digital age by cultivating residents' digital literacy, shaping public spirit, and providing a participation platform. On the one hand, community education improves residents' digital skills and public participation capabilities, providing a solid talent base for digital governance; on the other hand, community education activities themselves build a platform for multi-subject collaboration, enhance the openness and inclusiveness of community governance, and achieve the organic integration of education and governance.

2.3 Concept Definition

2.3.1 Community Education

Regarding community education, domestic academic circles generally believe that it is a non-academic education and lifelong learning activity based on the community and carried out for all residents, covering cultural popularization, vocational training, life guidance, health promotion, volunteer service and other diverse contents. Its core goal is to enhance residents' individual abilities, social adaptability and public participation awareness (Qian Xuchu, 2024; Huang Jiale, 2025). Wu Jie (2023) pointed out that community education is not only a channel for knowledge dissemination, but also an important force to promote residents' subjectivity awakening and promote innovation in community governance. Internationally, UNESCO (UNESCO, 2022) regards community education as an educational practice led by the community to provide lifelong learning opportunities for all members, with special emphasis on promoting personal development, community prosperity and social integration through learning.

Combining the above viewpoints, this article defines community education as: educational activities based on community settings that focus on residents' capacity building and the cultivation of public spirit. It includes offline course training and consultative education, as well as emerging forms such as online digital learning, issue discussions and public opinion feedback. Its essence is to promote residents' self-growth and community community building through educational

empowerment.

2.3.2 Community Governance

The academic community generally defines community governance as a process in which multiple subjects such as the government, community organizations, residents, and social units jointly participate in the management of community public affairs, service provision, and coordination of social relations, aiming to achieve orderly operation, demand response, and common development (Liu Ruisheng, 2024; Wu Jie, 2024). Ansell and Gash's (2008) collaborative governance model emphasizes the inclusion of non-governmental entities in public affairs to improve the legitimacy and execution of decision-making; Perkins and Zimmerman (1995) pointed out from the empowerment theory that residents' participation and capacity building are the key to community cohesion and control. The community governance framework advocated by international organizations such as the OECD (2023) emphasizes resident-led, multi-party collaboration, and the use of digital tools to enhance responsiveness, efficiency, and inclusiveness.

Based on the above theories and viewpoints, this article defines community governance as a collaborative process in which multiple subjects in the community jointly promote the operation of community public affairs and the improvement of governance efficiency through mechanisms such as issue consultation, service co-creation, public opinion feedback, and smart governance. Especially in the context of digital transformation, this article focuses on the role of community education as an enabling mechanism, that is, how to promote a community governance pattern of co-construction, co-governance, and sharing by improving residents' public awareness, participation ability, and collaboration level.

3.Analysis and Findings

3.1 Typical Case Analysis

Based on public news reports, this paper selects the smart community of Guicheng Street in Nanhai District and the traditional community of Zhangcha Street in Chancheng District as the analysis objects, mainly based on the following considerations: First, they are highly typical, representing smart communities with a high level of digitalization and traditional communities with a low level of digitalization in Foshan City; second, they are highly contrastive, and can extract common mechanisms and differentiated paths from communities with different governance levels; third, the availability of data is good, and there are many public reports, policy documents and research materials available for analysis; fourth, the regional representativeness is obvious, and the urban areas where the two are located have innovative and traditional regional characteristics, respectively, and have strong extrapolation significance. This paper analyzes these two cases in order to reveal the diversified practices and internal mechanisms of community education participating in community governance under the background of digital transformation.

3.1.1 Analysis of Smart Community in Guicheng Subdistrict, Nanhai District

The smart community of Guicheng Street, Nanhai District is a smart community in Nanhai District, Foshan City, with a sound digital foundation and deep integration of community education and governance. The community has developed an "integrated community education + governance" digital platform to organically combine residents' learning with participation in governance. Residents can obtain learning courses, sign up for community activities, and participate in community affairs discussions and feedback through the community WeChat official account or mobile applets. For example, Guicheng Street has created a "Volunteer Academy" digital platform based on community education. Resident volunteers can watch the classified uploaded course videos at any time through the "applet" and make reservations for courses and lecturers through the online system. The community has also built a number of online and offline learning and practice positions, including 1 central base, 3 professional learning bases and several practice bases, making full use of corporate and social resources to provide residents with professional equipment and venue support. In terms of community governance, the platform of the smart community of Guicheng Street, Nanhai District, has an interactive discussion section, where residents can reflect problems online and participate in public opinion collection, and community cadres respond and handle them in a timely manner to achieve a closed loop of problem handling. Offline, the smart community of Guicheng Street, Nanhai District, regularly holds "Neighborhood Forums" and "Community Councils" every year, extending discussions on digital platforms to face-to-face consultations. Through these initiatives, the community has formed an integrated operation model of

education and governance: residents have enhanced their ability to participate in learning, and have educational support in their participation. The community has created a strong culture of good neighborliness and self-governance, such as holding community education brand activities such as Neighborhood Festivals and Book Culture to cultivate community identity and mutual trust, awaken residents' public spirit, and stimulate their enthusiasm for participating in community affairs. This "Guicheng Model" that uses community education as a starting point to improve the effectiveness of grassroots governance has effectively promoted co-governance by multiple subjects, and significantly improved residents' participation and community governance performance.

3.1.2 Analysis of traditional communities in Zhangcha Subdistrict, Chancheng District

The traditional community of Zhangcha Street, Chancheng District, is located in Chancheng District, Foshan City. It is a traditional community with a relatively general digital foundation. The community focuses on relying on community education activities to encourage residents to participate in governance, and its strategy adopts more offline interactive methods. Due to the limited functions of the digital platform, the traditional community of Zhangcha Street, Chancheng District regularly holds various face-to-face learning activities at the community service center to gradually improve residents' digital skills and participation awareness. For example, the community has opened a "digital skills classroom" and invited volunteer teachers to teach the elderly how to use smartphones and Internet application skills to help them integrate into digital life. This type of digital literacy workshop has reduced the "digital divide" of elderly residents and laid the foundation for their participation in online governance. At the same time, the community has established a residents' council system and held "community council day" activities based on community schools or cultural activity rooms. Community cadres will first explain community affairs and policies to residents in an easy-to-understand way, and organize residents to discuss issues such as community security, environment, and property management. In this process, community education has played an organizing and guiding role - improving residents' ability to express opinions and negotiate to solve problems through democratic consultation training, simulation exercises, and other methods. The traditional community of Zhangcha Street, Chancheng District, has also implemented incentives such as a resident points system to encourage residents to participate in volunteer services and community activities. Points can be exchanged for daily necessities or service rewards to enhance residents' enthusiasm for participating in community governance. Overall, although the community is not highly digitalized, through solid community education activities (such as digital skills training classes, community councils, volunteer service training, etc.), the willingness and ability of residents to participate in governance have been gradually improved. In this process, face-to-face communication and education are particularly important: community cadres and education volunteers go deep into buildings and courtyards to publicize and mobilize, teach residents how to use digital tools and understand public affairs, and enhance community trust and cohesion. Of course, compared with smart communities, the traditional community of Zhangcha Street, Chancheng District still faces some challenges in governance, such as insufficient technical tools and uneven participation of residents, but its experience shows that the "human" factor is indispensable in the process of digital transformation - through the carrier of community education, traditional communities can also explore effective ways to stimulate residents' autonomy and improve governance efficiency.

3.1.3 Case Comparative Analysis: Common Characteristics and Differences

A comparative analysis of the above-mentioned smart community of Guicheng Street in Nanhai District and the traditional community of Zhangcha Street in Chancheng District shows that the two have both similarities and differences in community education empowerment governance.

(1) Commonalities

Both communities reflect the positive role of community education in promoting collaborative governance among multiple entities. Regardless of the degree of digitization, community education has become a link between the government and residents, and has increased residents' attention and recognition of community affairs through educational activities. In both cases, residents' willingness to participate has increased. Community education has cultivated residents' public spirit and participation ability, injecting "soft power" into governance. At the same time, digital tools have played a supporting role in the governance of both communities: the smart community of Guicheng Street in Nanhai District has a complete digital

platform, and the traditional community of Zhangcha Street in Chancheng District uses basic WeChat groups and WeChat public accounts to disseminate information. Digital technology has become an important means to improve governance efficiency to varying degrees.

(2) Differences

First, the degree of perfection of digital infrastructure is different. The smart community of Guicheng Subdistrict in Nanhai District has a fully functional integrated digital platform, where residents can handle many affairs online; while the digital platform of the traditional community of Zhangcha Subdistrict in Chancheng District is relatively simple and relies more on offline channels, and the role of digital technology in governance is relatively limited.

Second, the supply capacity of educational resources is different. The smart community of Guicheng Street in Nanhai District is backed by the government and enterprises, and has rich community education resources (such as a complete curriculum system and strong teaching staff), which can carry out various types of training on a large scale; the traditional community of Zhangcha Street in Chancheng District mainly relies on the community itself and volunteers, with limited educational resources, and the scale and professionalism of activities are subject to certain restrictions.

Third , there are differences in residents' digital literacy and participation levels. Residents of the smart community in Guicheng Subdistrict, Nanhai District, have a high overall digital acceptance and are more likely to participate in governance through online platforms. However, the traditional community in Zhangcha Subdistrict, Chancheng District, has a high proportion of elderly people and migrant workers, and the digital divide is more obvious. Residents' acceptance and ability to use new technologies and new platforms are relatively low, and more offline assistance and mobilization are needed.

Therefore, the two communities show differences in the degree of residents' participation: the online participation activity and autonomous participation ability of the smart community of Guicheng Street in Nanhai District are significantly stronger than those of the traditional community of Zhangcha Street in Chancheng District. The latter requires continuous community education investment to stimulate and maintain enthusiasm for participation.

(3) Summary

In summary, the commonality of community education empowerment governance lies in its ability to promote multi-party co-governance, enhance residents' willingness to participate, and provide technical support; while the differences are reflected in the differences in digital foundation, resource input, and mass base. This reminds us that in practice, we should design the model of community education participation governance "according to local conditions" according to the community's own conditions: communities with a high degree of digitalization should give full play to their technological advantages, while communities with relatively backward digitalization should focus more on solid mass work and education mobilization, and gradually bridge the digital divide. These commonalities and differences not only reflect the universality and particularity of community education participation governance, but also provide an important empirical basis for the subsequent summary of its coordination mechanism, empowerment mechanism, and digital support mechanism.

3.2 Analysis of the mechanism of community education participation in governance

Based on the above case analysis and summary of commonalities and differences, this article further extracts the main mechanism of community education participation in governance to reveal its internal logic and key links. The process of community education participating in community governance involves multiple mechanisms, which can be summarized as follows:

3.2.1 Collaboration Mechanism among Governance Subjects

In the context of digital transformation, one of the most notable features of community education in community governance is the collaborative cooperation among multiple subjects. Traditional community governance is often a one-way process led by the government and passively accepted by residents, while collaborative governance emphasizes the joint participation, resource sharing, responsibility sharing, and value creation of multiple subjects such as the government, community organizations, social enterprises, and residents (Ansell & Gash, 2008) [18].

Theoretically, the collaborative governance mechanism includes three major elements: the identification and inclusion of multiple subjects, the construction and optimization of the collaborative platform, and the rules and trust guarantee of the

collaborative process. Community education provides an ideal entry point for collaborative governance: through educational activities, residents not only acquire knowledge and skills, but also establish an interactive network with the community, government, and other residents. For example, volunteer service training and resident deliberation training in community education are actually cultivating "endogenous public capacity" for collaborative governance.

This mechanism is particularly evident in the smart community of Guicheng Street, Nanhai District. With the help of digital platforms, the community integrates the resources of the government, schools, social organizations, and enterprises, and allows residents to participate in the decision-making and feedback of major community affairs through online deliberations, online voting, and residents' councils. Residents are not only beneficiaries of education, but also participants in governance. In the traditional community of Zhangcha Street, Chancheng District, the coordination mechanism relies more on offline councils, face-to-face consultations, volunteer networks, etc., emphasizing the enhancement of residents' cognition, expression, and negotiation capabilities of public affairs through educational activities.

In general, the collaborative governance mechanism in community education is not only an organizational innovation, but also a governance innovation. It changes the traditional "management-oriented governance" model and moves towards "cooperative governance" and "participatory governance", providing important support for improving the effectiveness of grassroots governance.

3.2.2 Education empowerment mechanism

The second major mechanism of community education is the empowerment mechanism, which is to improve the ability, subjectivity and public spirit of individual residents through multi-dimensional education investment in knowledge, skills, cognition, emotion, etc., thereby enhancing their willingness and ability to participate in community governance. The core of this mechanism is to transform residents from "governance objects" to "governance subjects."

In theory, empowerment mechanisms can be divided into three levels: first, capability empowerment, including digital literacy, problem awareness, communication and negotiation skills, etc.; second, emotional empowerment, including community identity, public responsibility, and a sense of belonging; and third, institutional empowerment, which is to provide residents with lower thresholds and more efficient participation channels through the embedded design of education and governance (Perkins & Zimmerman, 1995) [19].

The smart community of Guicheng Street in Nanhai District mainly realizes educational empowerment through a rich and diverse curriculum system, flexible and convenient online learning, volunteer academy and other platforms. For example, residents can learn courses, earn points, and participate in volunteer activities through mini-programs, forming a positive cycle of "learning-participation-feedback". The traditional community of Zhangcha Street in Chancheng District relies more on offline digital skills classes, democratic consultation training, building publicity and other forms, especially focusing on the capacity building of the elderly and low-educated groups, and gradually improving their digital capabilities and public awareness through hands-on training, neighborhood mutual assistance and other methods.

It should be emphasized that the empowerment mechanism is not only about "knowledge input" but also about "awakening the subject". Only when residents feel that they have the ability, opportunity and value to participate in public affairs can governance truly achieve the transformation from "other governance" to "self-governance".

3.2.3 Digital platform support mechanism

The third core mechanism is the support mechanism of the digital platform. Digital technology is not only a tool, but also an infrastructure for empowerment and collaboration. Platform governance theory points out that digital platforms have reshaped the basic logic of social interaction and governance by reducing information costs, increasing interaction frequency, and optimizing decision-making mechanisms (Kenney & Zysman, 2016) [20].

This mechanism is particularly typical in the smart community of Guicheng Street, Nanhai District. Its digital platform has multiple functions such as educational content push, resident interaction, points management, public opinion feedback, and deliberation and consultation, truly realizing the closed loop of "learning-interaction-governance". Residents can access community education resources, sign up for activities, feedback problems, and participate in voting at any time through their mobile phones, while community cadres can obtain public opinion data and optimize decision-making plans through the

backend system.

Although the traditional community in Zhangcha Subdistrict, Chancheng District, has a low level of digitalization, it still uses WeChat groups, public accounts and other primary digital tools to spread community information, issue educational notices and organize residents to interact. Especially for the elderly, the community's digital education projects (such as smartphone training classes) provide an important bridge for them to gradually integrate into platform governance.

The digital platform support mechanism not only improves the efficiency of governance, but also enhances the transparency, accessibility and inclusiveness of governance. However, it should be noted that the platform itself does not automatically generate synergy and empowerment, and must be combined with education, organization, and institutional design to truly play a role.

4.Strategy optimization and countermeasures suggestions

In response to the mechanisms and differences discovered in the study, this article proposes optimization strategies and countermeasures from four aspects: improving the collaboration mechanism, enhancing participation capabilities, and strengthening platform support and policy guarantees, so as to promote the deep integration of "community education + community governance + digitalization".

4.1 Improve the collaboration mechanism

4.1.1 Building a collaborative governance platform for multiple entities

In order for community education to better empower governance, it is first necessary to build a collaborative platform involving multiple parties such as the government, communities, enterprises, universities, and social organizations to jointly design and operate community education and governance projects. It is recommended to establish a community education collaborative governance working group or deliberative coordination agency at the district and county level, led by the government and participated by relevant departments and social forces, to regularly discuss the planning and major issues of community education participation in governance. Clarify the boundaries of responsibilities of all parties and form an institutionalized cooperation mechanism, such as establishing a joint meeting system, a community co-governance council, a digital platform operation committee, etc., to ensure the normalization and long-term effectiveness of collaboration. Through institutional design, the government's policy guidance and support, the intellectual support of universities and professional institutions, the technology and capital investment of enterprises, the specific implementation of community organizations, and the active participation of residents are effectively connected to build a collaborative governance pattern with clear responsibilities and complementary advantages.

4.1.2 Improve the rules and communication mechanism of the collaboration process

After the platform is built, it is also necessary to improve the communication, coordination and operation mechanism in the collaboration process. First, it is recommended to clarify the division of responsibilities and powers of the collaboration parties, formulate a list of work responsibilities, and establish a procedure and decision-making mechanism, such as setting up regular consultation meetings, topic collection and priority ranking systems, to prevent the problems of "platform without rules" and "collaboration without effectiveness", so that the content of collaboration can focus more on residents' concerns and key community affairs. Secondly, in order to avoid information asymmetry and resource mismatch, the cross-departmental communication mechanism should be strengthened. Horizontally, cross-departmental liaisons should be established, dynamic work records should be shared, and information notification platforms should be built to promote horizontal collaboration between governments, communities, enterprises, schools and other entities; vertically, the communication chain of streets, communities, groups and families should be opened up to achieve smooth circulation of governance instructions and public opinion feedback at all levels, and promote the formation of an efficient collaboration pattern with top-down linkage and internal and external coordination.

4.1.3 Establishing an evaluation and feedback mechanism for collaborative effectiveness

The optimization of the collaboration mechanism is inseparable from closed-loop management, and evaluation and feedback are an indispensable part. It is recommended to establish a scientific evaluation system that covers core indicators such as the participation of multiple subjects, collaboration effectiveness, resident satisfaction, and governance effectiveness. Regularly

carry out effect evaluations, such as questionnaires, seminars, and third-party evaluations, and publicize the results, accept supervision from residents and society, and ensure that the collaboration mechanism is transparent, traceable, and results-oriented. The evaluation results are not only a yardstick for measuring the quality of cooperation, but also an important basis for optimizing the collaboration mechanism, adjusting resource input, and improving project design. At the same time, it is necessary to build multi-channel feedback channels, such as digital platform messages, community hearings, hotlines, etc., to encourage community residents and front-line participants to provide opinions and suggestions, and promote the collaboration mechanism from passive coordination to active optimization and dynamic upgrading, so as to achieve a truly people-oriented and continuously iterative virtuous cycle.

4.2 Improving residents' ability to participate

4.2.1 Conduct digital literacy and governance capacity training in a tiered and classified manner

The first prerequisite for improving residents' participation in community governance is to strengthen their basic abilities and qualities. We should design stratified and classified education programs for different groups. For the elderly and the "digitally disadvantaged" groups, we should focus on opening basic digital skills courses such as smartphone use, online services, and information fraud prevention to help them cross the digital divide. For young people, we will launch community governance innovation workshops and citizen science and technology courses to stimulate their interest and sense of responsibility in the application of digital technology and community affairs. For migrant workers, we should focus on language and cultural integration, basic public affairs knowledge, and rights protection, so as to enhance their sense of belonging and participation in the community. Through diversified and systematic education and training, we have not only expanded the participating groups, but also provided a stronger and more dynamic mass base for community governance.

4.2.2 Establish a diversified incentive mechanism to enhance residents' willingness to participate

In addition to empowerment, it is also necessary to stimulate the endogenous motivation of residents to participate through scientific incentives. It is recommended to establish a "community points" system, where residents can accumulate points by participating in learning, consultation, volunteer service and other activities, which can be used to exchange for daily necessities, service discounts, etc. Regularly carry out "Community Learning Star" and "Excellent Volunteer" selections, and publicly commend them through bulletin boards, digital platforms and other channels. At the same time, it is also possible to explore moderate linkage with personal credit, children's education, community welfare, etc. to form a more attractive participation return. On the spiritual level, through activities such as neighborhood mutual assistance, community cultural festivals, and public celebrations, residents' sense of identity and belonging to the community can be enhanced, so that participation in governance is not only the result of external incentives, but also a part of daily life and a spontaneous demand.

4.3 Optimizing digital platform construction

4.3.1 Building a modular and scalable platform architecture

The construction of a digital platform first needs to consolidate the technical foundation and ensure that the platform has a modular, standardized and scalable architecture design. Modular design can decompose functions such as educational resource management, governance services, and resident interaction into independent modules, which is convenient for subsequent on-demand expansion and flexible upgrading. Standardization construction helps to achieve cross-departmental and cross-level data interface unification and business process compatibility, avoiding the formation of "information islands". In addition, expansion interfaces should be reserved according to community size, population structure, management needs, etc., such as docking with other smart systems such as health, security, and environment, and gradually building a comprehensive community digital platform integrating education, governance, and services. At the technical level, attention should also be paid to data security and privacy protection, and a hierarchical authorization management system should be established to ensure the security and controllability of residents' personal information and public data.

4.3.2 Enrich and improve core functional modules

On the basis of a solid architecture, the key lies in building functional modules that residents can truly "use and use well". It is recommended to set up a real-time discussion forum so that residents can discuss hot issues in the community online and express their demands and opinions; open a problem reporting and feedback module to achieve closed-loop management from

residents discovering problems, platform receiving, department processing, and result feedback; provide a community service reservation and registration system, including course learning, event participation, public facility use, etc., to improve the efficiency of service supply and demand docking; add a public opinion survey and satisfaction evaluation module to regularly collect residents' opinions and suggestions on community education and governance, and provide decision-making references for optimizing community governance. Through the improvement and optimization of these functional modules, the platform is not only a resource library for community education, but also a consultation field, interactive field and innovation field for community governance.

4.3.3 Improving user experience and usability

Powerful functions are only the foundation, and user-friendly experience is the key to the sustainable operation of the platform. The platform interface design and operation process need to be optimized according to the needs of different groups of people, such as setting up "large-font interface", "one-click direct access" shortcut buttons, and voice prompt functions for the elderly to lower the threshold for use; providing personalized recommendations and social sharing functions for teenagers and young people to enhance the attractiveness of the platform; providing multi-language support and simple operation tutorials for migrant workers to help them quickly integrate into the community. Multi-channel services such as online customer service, intelligent Q&A, and manual hotlines should be in place to help users solve problems during use. At the same time, pay attention to data visualization, and transform complex community governance information into intuitive and easy-to-understand charts and reports to facilitate residents' understanding and participation. Overall, the core of improving user experience is to make technology useful to people, and truly achieve "people-oriented and available to everyone."

4.4 Policy and management recommendations

4.4.1 Strengthen policy support and assessment guidance

To promote the deep integration of community education into community governance, we must first provide strong guarantees at the policy level. It is recommended that governments at all levels improve the top-level design, formulate guiding opinions or implementation plans to promote the participation of community education in governance, and clarify development goals, main tasks and timetables. Increase financial investment and provide special funding support for community education, including curriculum development, teacher training, platform construction and other links. At the same time, establish and improve the assessment and evaluation mechanism, and incorporate community education work into the grassroots governance performance assessment and cadre performance assessment system. The assessment content may include residents' learning participation rate, activity coverage, the number of cases where education improves governance efficiency, etc. Through regular supervision and evaluation, guide grassroots governments to increase their attention to community education work, use assessment as a "baton" to promote the implementation of policies.

4.4.2 Gathering the strength of multiple parties to participate in support

The integration of community education and governance cannot be separated from the joint participation of multiple subjects. It is recommended to build a "school-local cooperation" platform, encourage colleges and universities to provide teaching staff, curriculum development, and think tank support to the community, and promote the sinking of scientific research forces to the grassroots; guide enterprises to fulfill their corporate social responsibility (CSR) as an important part of participating in community education and governance, support the construction of digital platforms, donate technical equipment, and provide sponsorship funds; mobilize social organizations and public welfare funds to invest in community education projects and carry out professional services and volunteer activities. Through government procurement of services and project bidding, external professional resources and forces can be introduced to expand the supply capacity and service radius of community education, forming a benign pattern of resource complementarity and mutual assistance.

4.4.3 Improve long-term management mechanism

In addition to policy and resource investment, more attention should be paid to the improvement of management systems and the construction of long-term mechanisms. It is recommended to establish and improve the recruitment, training and incentive mechanisms for community education volunteers to form a stable volunteer service team; establish a community education supervision system to regularly check and guide the implementation of education projects, promptly discover and

solve problems, and ensure quality and sustainability. At the same time, community residents are encouraged to participate in supervision and feedback to form a virtuous interaction of government-led, social participation, and mass response. Through the multi-round drive of policies, funds, talents, and systems, a solid guarantee and continuous endogenous driving force will be provided for community education to empower community governance, and the "triple integration" model (education-governance-digitalization) will be promoted to take root and deepen at the grassroots level.

5.Conclusion and Outlook

5.1 Main research conclusions

Based on literature review, policy interpretation, case analysis and comparative study, this paper explores the mechanism and strategy of community education participating in community governance under the background of digital transformation. The research conclusion shows that community education has become an important enabling factor of digital governance by improving residents' digital literacy, providing a public participation platform and promoting collaboration among multiple subjects. The intervention of community education can make up for the "humanistic shortcomings" in technical governance to a certain extent and activate the internal vitality of grassroots governance. At the same time, different types of communities have significant differences in digital foundation, educational resource supply capacity, and residents' participation level. It is necessary to formulate targeted optimization strategies according to local conditions. A one-size-fits-all model is difficult to apply to communities with great differences. According to the characteristics of smart communities and traditional communities, the corresponding mechanisms and measures should be strengthened to maximize the effectiveness of community education in empowering governance.

5.2 Theoretical Contribution and Practical Value

In theory, this paper enriches the connotation of "education is governance" and expands the perspective of community governance research. By combining education with governance and digital transformation, a new analytical framework for community education to intervene in grassroots digital governance is proposed, providing a new thinking path for the academic community. Under this framework, education is no longer regarded as a field independent of governance, but is incorporated into the governance system for examination, responding to the current focus on citizen capacity building in the process of social governance modernization. In practice, the multi-subject collaboration mechanism, resident empowerment path, digital platform optimization plan and policy recommendations proposed in this paper have strong operability and promotion value, and can be used as a reference for local governments and community practices. These strategies have already shown initial results in grassroots governance practices such as Guicheng Street, indicating that it is feasible to improve grassroots governance efficiency through community education. The promotion of these experiences will help other regions strengthen the integration of community education and governance, improve the level of grassroots governance modernization, and achieve the goal of social governance of co-construction, co-governance and sharing.

5.3 Research limitations and future prospects

It should be pointed out that this paper still has certain research limitations. First, the study mainly adopted qualitative methods, the number of case samples was limited, and there was a lack of large sample quantitative data verification, which to a certain extent affected the universality of the conclusions. Secondly, the research subjects were mainly concentrated in Foshan City. The applicability of the refined mechanisms and strategies in other regions needs to be further tested, and the regional representativeness is relatively insufficient. Future research can be deepened in the following directions: First, introduce large-scale questionnaire surveys and statistical analysis to quantitatively evaluate the effect of community education participation in governance and enhance the robustness of the conclusions; second, conduct cross-regional comparative studies, select different cities and different types of communities for comparison, explore the impact of cultural, economic and other factors on the "education + governance + digitalization" model, and enrich the scope of application of the research conclusions; third, conduct long-term tracking studies, dynamically observe the long-term effects of community education empowerment governance and the new problems that may be encountered at different stages, and adjust and optimize strategies in a timely manner. By continuously expanding the breadth and depth of research, it provides a more comprehensive and detailed theoretical support and practical guide for the topic of "community education participation in

community governance".

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