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Research on the Construction of Multi-agent Collaborative Management System for Characteristic Public Schools

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Abstract: The transfer of historically-established children-oriented schoos to local education administrative departments represents a key reform for optimizing the supply of basic public educational services. The effectiveness of multi-agent collaborative governance after the transfer directly influences educational sense-of-gain for children from special groups, faculty stability and the sustainable advancement of regional dual-support construction. At present, such public schools commonly face practical dilemmas including blurred division of powers and responsibilities, divergent interest demands among multiple stakeholders, lack of regular communication channels, and imperfect supervision-evaluation constraint mechanisms. From the public-management perspective of cross-sector collaborative governance theory, this paper constructs a three-in-one analytical framework covering content collaboration, process collaboration and organizational collaboration. A full-life-cycle operation mechanism is designed, together with supporting measures such as agreement constraints, data-driven information exchange and third-party performance evaluation. Based on the case study of a co-built public school in China, this paper verifies the practical feasibility of the proposed governance mechanism. The research findings provide theoretical references and operable implementation paths for multi-agent collaborative school-running of similar transferred schools, and bear practical value for consolidating basic-education reform outcomes and promoting high-quality development of public education oriented to dual-support goals.

Keywords: Cross-Sector Collaborative Governance; Education for Children from Special Groups; Full-Life-Cycle Management; Dual-Support Construction; Transformation Reform of Public Schools

1. Introduction

In 2015, multiple central ministries and commissions issued reform documents for children-oriented schools, stipulating that historically-established children-oriented schools should in principle be operated by local governments or subject to integration and closure. The documents specify that transferred schools shall be incorporated into the local public basic-education management system, while on-the-job faculty shall be included in the public-institution staffing system. The schools shall continuously undertake the educational guarantee for children from special groups, and local governments shall provide supporting policy support for these characteristic public schools.

With the advancement of reform, a large number of characteristic public schools have entered the regular-operation phase after transfer. The handover of school-running administrative power to local education authorities does not mark the end of reform tasks. While complying with unified school-running standards for local public schools, schools need to continuously respond to multiple practical demands including educational guarantees for children from special groups, rights-and-interests protection for relevant faculty, and inheritance of characteristic educational curricula. Reliance merely on a single authority of education cannot satisfy multiple school-running objectives simultaneously. Hence it is necessary to establish a stable and standardized cross-sector collaborative system and avoid the extensive management mode of “finishing everything upon handover” [1].

Practical grassroots operation reveals multiple contradictions in transferred schools. On the one hand, powers and responsibilities are defined in general terms. Although schools are administratively affiliated to local education systems, work concerning preferential-policy implementation for children from special groups, construction of characteristic curricula and faculty-rights protection involves multiple competent authorities. Transfer agreements mostly contain only principled provisions without detailed implementable rules, which easily leads to governance vacuum with blurred powers and responsibilities [2]. On the other hand, different stakeholders hold divergent interest demands. Local educational administrations prioritize balanced allocation of regional educational resources and fiscal-cost control; co-building entities attach greater importance to educational quality for children from special groups, inheritance of characteristic school-running traditions and faculty-rights protection. Value differences may cause divergences in investment of school-running resources.

Moreover, temporary coordination bodies set up during the transfer phase are mostly dissolved upon handover completion, and long-term consultation platforms fail to be established in time. When problems such as inadequate implementation of preferential policies, faculty-salary disputes and gradual weakening of characteristic curricula occur, institutional communication channels are absent and contradictions keep accumulating. Such post-reform governance gaps share intrinsic logic similarities with blocked policy implementation across public-management sectors. Existing studies on collaborative governance of public projects indicate that full-life-cycle management thinking can effectively resolve multi-agent management conflicts [3]. This idea offers important references for school-running management after transfer. Accordingly, this paper introduces full-life-cycle management concepts, constructs a three-dimensional collaborative-governance analytical framework, improves corresponding supporting guarantee mechanisms, and provides theoretical support for long-term operation of characteristic public schools.

2. Practical Background and Prominent Contradictions of Collaborative Governance for Transferred Characteristic Public Schools

2.1 Policy Basis and Core Demands for Collaborative Governance

The 2015 reform documents for children-oriented schools establish the basic institutional framework for collaborative governance of transferred schools, confirming the transfer of administrative power to local authorities while retaining supporting policies including educational preferential treatments for children from special groups. Subsequent preferential-policy documents further elaborate practical rules covering cross-regional school transfer, admission preferences and degree coordination, providing policy foundations for multi-agent collaborative school-running.

Guided by relevant policies, collaborative-governance work covers four core dimensions. First, maintain basic-education quality and steadily improve school performance after public-system incorporation while preserving characteristic educational programs. Second, guarantee faculty stability and implement legitimate rights concerning staffing, salary and professional-title promotion for targeted teachers. Third, safeguard educational rights for children from special groups and form a complete preferential-policy chain for admission, further education and cross-regional transfer. Fourth, inherit core values of characteristic curricula and build a dual-support-oriented educational brand distinct from ordinary public schools [4].

2.2 Four Prominent Contradictions in Post-Transfer Collaborative Governance

1. Blurred division of powers and responsibilities leading to governance vacuum. Statutory administrative authority of schools belongs to local education bureaus, yet guarantees for special-group-related affairs involve multiple co-building entities. Dual school-running attributes result in blurred boundaries of powers and responsibilities. Local education departments focus on regional educational balance and find it difficult to continuously allocate resources for special educational demands. With the transfer of administrative power, co-building entities lack institutional channels for regular participation in school governance. Affairs such as characteristic-curriculum development,

special-student-degree allocation and faculty-right mediation may give rise to governance vacuum caused by mutual buck-passing [2].

2. Divergent demands among multi-agents restricting collaboration depth. Local governments and co-building entities hold objectively different school-running objectives. Co-building entities emphasize educational quality for children from special groups, characteristic-curriculum construction and faculty stability; local education authorities prioritize balanced regional-resource distribution, fiscal pressure and comprehensive regional school-running evaluation. In decision-making links including fund increase, characteristic-resource investment and special-degree allocation, demand divergence reduces willingness for active collaboration and gives rise to the "free-rider" phenomenon in public-service supply [5].

3. Insufficient regular-coordination-mechanism supply. Temporary coordinating bodies are only valid in the transfer transition period and will be dissolved afterwards without long-term consultation platforms. Difficulties in school-running and preferential-policy implementation are addressed through scattered point-to-point communication. Problem-handling cycles get extended, and minor contradictions evolve into long-term school-running risks. Well-operated co-built schools of similar types universally adopt regular communication systems, which proves that stable communication channels constitute the foundation for collaborative governance [6].

4. Imperfect supervision-constraint and closed-loop-evaluation mechanisms. Original transfer agreements mainly focus on power-and-responsibility division in the hand-over phase and lack restrictive clauses for long-term collaborative school-running. When preferential-policy implementation is inadequate or investment in characteristic-school-running resources declines, co-building entities lack formal supervision-feedback channels. Meanwhile, periodic school-running-effect evaluation systems are absent, making it hard to identify collaborative weaknesses and optimize governance schemes iteratively [7].

The main contradictions are shown in Table 1:

Table 1. Summary Table of Multi-Agent Collaborative-Governance Contradictions for Transferred Characteristic Public Schools

Type of contradiction	Specific manifestation	Potential governance risks
Power-responsibility boundary contradiction	Agreements contain only principled statements without detailed implementation rules	Mutual buck-passing and governance vacuum
Stakeholder-demand contradiction	Education departments emphasize balance-maintenance and cost control; co-building entities focus on special-group guarantees	Reduced willingness for resource investment and insufficient collaborative motivation
Communication-mechanism contradiction	Only temporary bodies exist in transition phase; no regular consultation platform	Delayed problem-handling and continuous accumulation of contradictions
Evaluation-supervision contradiction	Lack of periodic-evaluation instruments and restrictive clauses	Absence of external checks for stakeholder performance

3. Construction of Three Dimensional Integrated Framework for Cross Sector Collaborative Governance of Characteristic Public Schools

Drawing on research findings concerning full process collaborative governance of public projects in the field of public administration, this paper constructs a three dimensional analytical framework consisting of content collaboration, process collaboration and organizational collaboration, which covers all school running businesses, the complete operation life cycle and all participating stakeholders [3].

3.1 Content Collaboration: Clarify Core-Business Scope of Collaborative Governance

Content collaboration answers "what businesses should be managed collaboratively" and is divided into three major business modules.

1. Collaboration on teaching quality and characteristic education. Local education bureaus coordinate routine teaching management, faculty research and academic-performance monitoring to align school-running standards with high-quality local public schools. Co-building entities give full play to resource advantages, jointly develop

characteristic school-based curricula, organize thematic research-and-practice activities and build practical-education bases, balancing standardized public-school teaching and dual-support-oriented characteristic education [6].

2. Collaboration on faculty-rights guarantee. Staffing verification, salary payment, professional-title evaluation and post-management are implemented uniformly by local education and human-social-security authorities. Co-building entities continuously track rights-implementation status of targeted faculty and build multi-party mediation channels for salary or post-development disputes. Transfer agreements stipulate hard requirements that faculty benefits shall not be lower than pre-transfer standards, and establish regular complaint-handling workflows.

3. Collaboration on school-admission rights for special-group children. Relevant co-building units regularly collect statistics on admission, transfer and further-education demands of special-group children and submit data to local education bureaus. Local education authorities coordinate regional public-school degree resources and open green channels for preferential admission, implementing relevant preferential policies for transfer and further education, and forming a complete business closed-loop of "demand collection-resource coordination-result feedback".

3.2 Process Collaboration: Build Full-Life-Cycle Standardized Operation Workflows

Process collaboration focuses on "how to implement collaborative management" and establishes four standardized business workflows for long-term school-running.

1. Regular joint-meeting communication workflow. Hold multi-agent joint school-running meetings no less than twice every year, led by local dual-support authorities. Participants include education bureaus, finance bureaus, human-social-security bureaus, representatives from co-building entities and school administrators. Fixed meeting agendas include reporting school-running status, discussing difficulties in preferential-policy implementation, compiling annual collaborative-work plans and handling historical-legacy contradictions collectively.

2. Cross-agent information-exchange workflow. Build digital-ledgers for admission of children from special groups. Co-building units update information on school-age children and transfer demands monthly. Education departments predict degree-supply pressure for corresponding school-segments in advance. Schools submit reports on teaching quality, faculty development and characteristic-curriculum construction to collaborative units each semester to realize two-way transparent sharing of school-running information [8].

3. Special-handling workflow for school-running contradictions. Set up two special coordination channels for admission guarantee and faculty-rights issues, specify time-related rules for demand submission, multi-party consultation, time-limited completion and result feedback to avoid continuous accumulation of problems.

4. Post-evaluation workflow for periodic school-running effectiveness. Establish hierarchical-evaluation mechanisms to conduct joint evaluations 1, 3 and 5 years after school transfer. Evaluation indicators cover degree-guarantee coverage for children from special groups, faculty-satisfaction level, changes in teaching quality and completion status of characteristic curricula. Evaluation results are fed back to all participating entities and serve as important references for resource allocation and iterative optimization of systems, forming continuous-improvement closed-loops [9].

3.3 Organizational Collaboration: Construct Multi-Level Collaborative-Governance Organizational Architecture

Organizational collaboration clarifies "who undertakes collaborative-management work" and divides four-tier architectures: decision-making layer, coordination layer, execution layer and supervision layer, and defines power-and-responsibility boundaries for each stakeholder.

1. Decision-making layer: Multi-agent joint school-running leading group. Adopt dual-group-leader mechanism, with group leaders from local education-related government officials and principal persons-in-charge of co-building entities respectively. Members include persons-in-charge of education, finance, human-social-security and dual-support

institutions, who are responsible for major school-running-resource allocation, revision of collaborative systems and adjudication of major contradictions.

2. Coordination layer: Permanent joint administrative office. Set up full-time joint offices under local dual-support institutions with fixed staff to undertake meeting preparation, school-running-information collection, demand docking and cross-department-work supervision, acting as the hub for daily multi-agent communication.

3. Execution layer: Schools and grassroots docking units. Schools undertake front-line businesses including daily teaching, characteristic-curriculum implementation and admission-information collection. Grassroots docking units collect admission demands, pre-examine preferential-policy applications and gather school-running feedback. Implement two-way reconciliation of demand lists and resource lists, and complete work via regular checking-off.

4. Supervision layer: Third-party evaluators & dual-support assessment departments. Introduce independent third-party educational evaluators for objective school-running assessment. Local dual-support authorities track preferential-policy-implementation progress and incorporate collaborative-school-running effectiveness into dual-support assessment indicators to realize dual-supervision combining internal control and external evaluation [10].

3.4 Internal Operating Logic of Three-Dimensional Framework

Content collaboration defines business boundaries for collaborative governance; process collaboration outputs standardized operation workflows to guarantee business implementation; organizational collaboration provides personnel and institutional carriers. The three modules inter-nest and operate in closed-loop, constructing a complete governance system of "governance objectives-operation workflows-responsible stakeholders".

4. Long-Term Supporting Guarantee MechAnisms for Multi-Agent Collaborative Governance

4.1 Agreement Rigid-Constraint Mechanism

Add clauses concerning long-term collaborative-governance into official school-transfer agreements as institutional foundations for school-running. Clarify continuous support obligations of local governments with hard stipulations for degree supply, school-running funds and characteristic-curriculum resources. Define compliant channels for co-building entities to participate in school-running and supervision. Establish hierarchical dispute-mediation workflows and add performance-assessment clauses linking collaborative-school-running effectiveness with regional dual-support selections [1].

4.2 Digitalized Information-Sharing Mechanism

Build special-business databases relying on regional educational-digital platforms to realize real-time synchronization of admission demands, degree resources and transfer information. Establish regular notification systems for school-running conditions and push semester-based school reports to all collaborative units. Open online demand-feedback entrances to mitigate governance costs brought by information asymmetry [8].

4.3 Third-Party Independent-Evaluation and Supervision Mechanism

Construct dual external-supervision systems. On the one hand, implement administrative supervision through dual-support assessment and incorporate admission-guaranteeimplementation into annual dual-support assessments. On the other hand, engage third-party institutions for independent evaluation and issue special annual reports on school-running quality and characteristic-education construction submitted to joint leading groups. Conduct regular satisfaction surveys targeting families of special-group children to collect suggestions for school-running optimization [10].

4.4 Two-way incentive-constraint long-term mechanism

Establish parallel incentive-and-constraint management systems. For incentives, administrative departments and schools with outstanding performance in preferential-policy implementation and characteristic-education outcomes receive dual-support-related recognitions. For constraints, entities with

long-term inadequate policy implementation and concentrated public complaints shall receive interview reminders and deduction in dual-support-related selections to raise opportunity-cost for negative performance [5].

5. Case Analsis: Collaborative-School-Running Practice of a Co-Built Characteristic Public School

5.1 Case Overview

This paper selects a full-segment co-built public school covering kindergarten through senior high school as the research sample. The school undertakes admission guarantees for children from special groups. In 2013, local governments and co-building entities signed joint-school-running agreements, introducing high-quality regional middle schools as lead operators. It integrates elite-school management experience, co-building-entity resources and local educational-management capacity for joint operation, and has been awarded national demonstration schools for characteristic education.

5.2 Organizational Collaboration: Co-Management Architecture with Clarified Powers and Responsibilities

The school charter clearly defines powers-and-responsibilities of each stakeholder. Co-building entities are responsible for campus-building-asset maintenance; local education bureaus take full charge of teaching-research and academic evaluation and incorporate the school into local public-education management systems. Lead-operator elite schools export management systems and assign administrative cadres and core teachers for regular teaching guidance. Local educational supervision departments have summarized five operating mechanisms for the school: joint-consultation mechanism, resource-guarantee mechanism, admission-support mechanism, faculty-right-guarantee mechanism and characteristic-curriculum-development mechanism, providing institutional support for high-quality school-running.

5.3 Content Collaboration: Implementation of Three Major-Business Modules

First, implement admission guarantees: open admission channels for children from special groups while enrolling part of ordinary local students, and build green transfer channels to resolve educational difficulties for families with cross-regional mobility. Second, optimize faculty construction: integrate teachers assigned by lead-operator schools, publicly-recruited teachers and original in-service staff, and implement salary and professional-title guarantees for targeted faculty. Third, promote characteristic education: adopt dual-track education combining subject teaching and characteristic curricula, develop school-based courses and carry out thematic research-and-practice activities to balance conventional teaching and characteristic-education demands.

5.4 Process Collaboration: Full-Life-Cycle Regular Collaborative Operation

The school-running quality has been steadily improved, and many children from special groups have been admitted to high-level institutions of higher education. Regular multi-party symposiums are held for co-building entities, education authorities and school administrators to discuss school-running difficulties. Joint reviews are carried out at important school-running nodes to iteratively optimize collaborative-governance systems and form iterative full-life-cycle governance workflows.

5.5 Case Implications

First, clarify powers-and-responsibilities through official school charters to reduce inter-department buck-passing. Second, regular consultation-and-communication constitutes the key to long-term operation for resolving school-running contradictions timely. Third, multi-agent resource complementarity effectively improves public-school-running quality. Fourth, characteristic-education curriculum system forms the core competitive advantage distinguishing this category of schools from ordinary public schools.

6. Research Conclusions and Practical Optimization Suggestions

6.1 Core Conclusions

1. Transferred characteristic public schools commonly suffer from blurred power-responsibility boundaries, divergent stakeholder demands, insufficient

communication channels and imperfect supervision-evaluation systems. Administrative transfer does not mean the end of educational-guarantee responsibilities. Long-term multi-agent collaboration serves as the key to guarantee educational rights for children from special groups and consolidate reform outcomes [2].

2. The three-dimensional collaborative-governance framework of "content-process-organization" constructed in this paper covers school-running businesses, operation workflows and governance stakeholders. Together with four supporting guarantee mechanisms, it forms operable governance solutions validated by case-study practice.

3. Agreement rigid constraints, digitalized information sharing, third-party evaluation and two-way incentive-constraint mechanisms serve as critical supports for stable operation of the three-dimensional governance framework.

6.2 Practical Optimization Suggestions

1. Insert long-term collaborative clauses into official transfer agreements in the transfer-handover phase, clarify power-and-responsibility boundaries, consultation systems and school-running-evaluation criteria to avoid "transfer-only-neglect-subsequent-governance".

2. Build regular-communication platforms relying on local dual-support institutions, set-up joint-administrative windows and simplify dispute-handling workflows for admission guarantees and faculty-rights issues.

3. Construct digital-ledgers for admission guarantees, connect data links of co-building entities, education departments and schools, predict degree demands in advance and improve implementation efficiency of preferential policies [8].

4. Incorporate collaborative-school-running effectiveness into regional dual-support evaluation indicators, and force implementation of guarantee policies via assessment incentives and constraints.

5. Conduct multi-round joint evaluations 1, 3 and 5 years after transfer, dynamically allocate school-running resources and iteratively optimize management systems based on evaluation outcomes.

6.3 Prospects for Future Research

Future research may explore differentiated collaborative-governance paths for similar schools of varied regions and scales. Further explore application potential of digital platforms in cross-sector information exchange and online collaborative office to continuously improve governance efficiency [11].

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