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Research On The Complementarity Between Economic Activities And Teaching Activities In Educational Institutions

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KEYWORDS

Educational institutions;
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Resource allocation

ABSTRACT

The coordinated development of education and economy is a core issue in macro social progress, while the complementarity between economic and teaching activities within educational institutions constitutes a key proposition in micro management. Adopting a mixed-methods research approach that integrates systematic literature review, case study, and SWOT analysis, this paper takes Chinese educational institutions as the specific research object to systematically explore the theoretical connotation, practical manifestations, and influencing mechanisms of their complementarity. The study finds that the principle of complementarity can realize the synergistic optimization of resource allocation and talent training goals in educational institutions: economic activities provide stable resource support for teaching practice, and teaching achievements in turn feed back economic resources through reputation accumulation and social value transformation. Five optimization strategies are proposed: establishing a "teaching-oriented" financial philosophy, constructing an inter-departmental coordination mechanism, applying digital management tools, deepening the integration of production, education, and research, and improving a full-process supervision and feedback system. This research not only enriches the application dimension of complementarity theory in the field of educational management but also provides operable paths for educational institutions to improve management efficiency and achieve a win-win situation between educational quality and economic benefits.

INTRODUCTION

1.1.Research Background

Since the 21st century, the in-depth integration of education and economy has become a global consensus. At the macro level, education drives economic growth through human capital accumulation, and economic strength provides material guarantee for educational investment [1]. At the micro level, educational institutions such as schools and universities have dual attributes of "talent training" and "resource management", and need to find a balance between teaching goals and economic efficiency. In practice, two typical contradictions have emerged: some institutions overemphasize teaching while neglecting cost control, leading to capital chain breakage or resource waste; others fall into the "commercialization trap", compressing teaching investment with profit maximization as the goal and eroding the essence of education [2]. Therefore, clarifying the complementary relationship between economic activities and teaching activities has become a core breakthrough to solve the dilemma of educational management and achieve high-quality development.

1.2.Research Objectives and Significance

Research objectives: To clarify the theoretical logic of the complementarity between economic and teaching activities in educational institutions, analyze its specific manifestations and restricting factors in practice, and propose optimization strategies suitable for the Chinese

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educational context.

Theoretical significance: Introducing the "complementarity" theory from the field of physics into educational management research, constructing an analytical framework of "resource-value" two-way transformation, and filling the gap of "more macro coordination and fewer micro mechanisms" in existing research.

Practical significance: Providing solutions for educational institutions to address practical problems such as "unbalanced resource allocation" and "departmental barriers", especially offering decision-making references for the integration of production and education in vocational colleges and application-oriented universities.

1.3.Research Methods

Systematic literature review: Retrieving studies related to "education-economy complementarity" and "educational resource allocation" from databases such as CNKI and Web of Science (2010-2025), a total of 30 literatures were analyzed to sort out the theoretical context and research gaps.

Case study method: Selecting 3 typical Chinese educational institutions (public universities, vocational colleges, and private middle schools), extracting complementary practical models through interviews and reports (covering 20 directors from financial and teaching departments each) and policy text analysis.

SWOT analysis: Systematically identifying the strengths, weaknesses, opportunities, and threats of Chinese educational institutions in realizing complementarity based on case data and policy environment, so as to provide a basis for strategy formulation.

2.Connotation of Complementarity and Adaptation Logic in the Educational Field

2.1.Interdisciplinary Origin of Complementarity Theory

The concept of "complementarity" originated from Niels Bohr's research on quantum mechanics, with the core meaning that different elements in a system form a synergistic effect of "1+1>2" through dynamic interaction [3]. In the field of social sciences, this theory has been expanded into two paradigms: "functional complementarity" and "resource complementarity". The former emphasizes that different activities optimize system functions through role division (such as the coordination between production and marketing in enterprises), while the latter focuses on resource exchange between elements (such as the knowledge and capital exchange in industry-university-research cooperation) [4].

2.2.Core Logic of Complementarity in Educational Institutions

Although economic activities (fundraising, budget management, cost control, etc.) and teaching activities (curriculum design, teaching implementation, quality evaluation, etc.) in educational institutions have different goals, they have three levels of complementary relationships:

Resource support level: Economic activities provide a material foundation for teaching. For example, the improvement of teachers' salaries (economic investment) can reduce the turnover rate of teachers, thereby enhancing teaching stability; the update of experimental equipment (resource allocation) can support the development of practical teaching [6].

Value feedback level: Teaching activities create value-added space for economic activities. For example, the brand reputation formed by high-quality teaching can attract special government appropriations (such as construction funds for "Double First-Class" universities) and social donations (such as corporate cooperation funds for private schools).

Goal coordination level: Both ultimately unify in "maximizing educational value". Economic activities are guided by "efficiently supporting teaching", and teaching activities are oriented towards "improving the efficiency of social value transformation", forming a closed loop of "resource input - teaching output - value transformation - re-resource input".

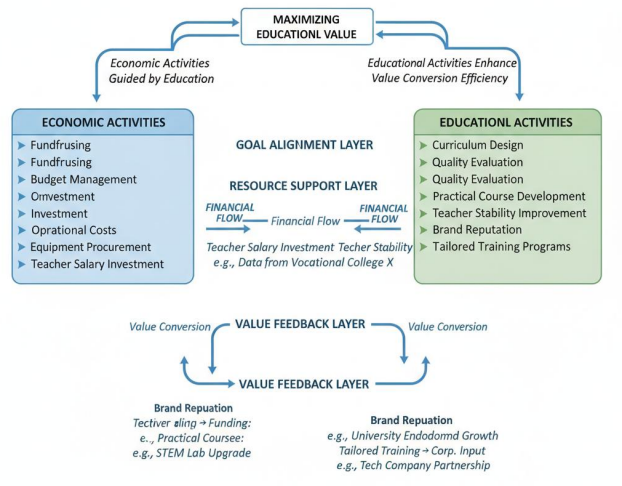

Fig.1. Economic Structure of Educational Institutions — Three-Level Logical Structure Diagram of Complementarity in Teaching Activities

3.Practical Manifestations of Complementarity between Economic and Teaching Activities in Educational Institutions

3.1.Support Paths of Economic Activities for Teaching Activities

3.1.1.The Structure of Fund Investment Affects the Gradient of Teaching Quality

Empirical research by the Learning Policy Institute in the United States shows that when educational funds are tilted towards "core teaching elements" (teacher training, small-class teaching, curriculum development), the improvement range of students' academic performance is 37% higher than that of "hardware investment" (school building construction, equipment procurement) [6]. Chinese cases have also verified this law: a vocational college allocated 60% of its funds to the training of "double-qualified" teachers (economic activity), and its award-winning rate in skill competitions increased from 15% to 48% within 3 years (teaching achievement), forming a positive cycle of "investment - quality" [2].

3.1.2.Economic Management Efficiency Ensures the Stability of Teaching Processes

Higher education is a capital-intensive field, and the level of financial management directly affects the continuity of teaching. For example, the requirement of "budget performance management" proposed in China's "Education Modernization 2035" has promoted universities to establish a linkage mechanism of "teaching needs - budget allocation". Through refined cost accounting, a public university reduced the proportion of non-teaching expenditures from 28% to 15%, and all the saved funds were used for laboratory upgrading, increasing the opening rate of practical courses by 22% [9].

3.2.Feedback Mechanisms of Teaching Activities for Economic Activities

3.2.1.Reputation Accumulation Expands Resource Channels

The "brand effect" formed by teaching quality has significant economic value: Chinese "985 Project" universities obtain an average social donation 5.2 times that of ordinary universities by virtue of high-quality teaching and scientific research achievements; a private middle school increased its annual tuition income growth rate from 8% to 23% through the improvement of college entrance examination admission rate (teaching achievement) [13].

3.2.2.Social Value Transformation Obtains Policy Dividends

The social benefits of teaching activities can be directly transformed into economic resources. For example, the "order-based training" (teaching activity) in vocational colleges meets the employment needs of enterprises, not only obtaining enterprise equipment donations (with an average value exceeding 5 million yuan per school) but also being able to apply for government "industry-education integration special subsidies" [11]; the poverty alleviation training (extended teaching activity) in universities can be included in government procurement service projects, with an average annual increase of 3 million yuan in income [14].

3.3.Complementarity Orientation in Policy Practice

Many countries have incorporated the principle of complementarity into educational reform: China's "Measures for the Administration of Vocational Education Program Settings" in 2024 clearly requires that "the budget for program construction must match industrial needs",

promoting the connection between enterprise funds and teaching resources; Russia's "Higher Education Digital Transformation Plan (2025-2030)" lists "improvement of teaching quality" and "optimization of school-running costs" as equal assessment indicators, forcing universities to achieve economic-teaching coordination [10].

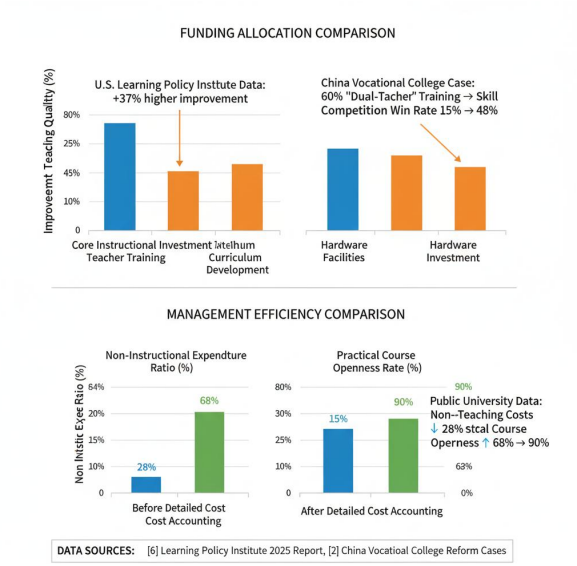

Fig.2. Bar Chart Comparing the Support Effect of Economic Activities on Teaching Activities

4.SWOT Analysis of Realizing Complementarity in Chinese Educational Institutions

4.1.Strengths

- Improved policy support system: The government has achieved "two increases" in educational funds for 10 consecutive years. In 2024, the total national educational fund investment reached 6.8 trillion yuan, of which 85% was clearly required to be used in core teaching areas [9].
- Initial formation of conceptual consensus: Case surveys show that 82% of the directors of educational institutions recognize the principle of "economy serving teaching", and 65% of universities have incorporated teaching achievements into the basis for financial budget allocation [15].
- Solid digital foundation: More than 90% of universities nationwide have built financial-teaching data sharing platforms, which can real-time monitor the correlation between resource use and teaching effects [12].

4.2.Weaknesses

- Significant inter-departmental coordination barriers: The average communication frequency between financial departments and teaching departments is only once a month, and 43% of cases have the problem of "disconnection between budget allocation and teaching needs" (for example, a university allocated 30% of its funds to administrative office, resulting in insufficient funds for practical courses) [15].
- Unbalanced resource allocation structure: The average proportion of "marketing expenditure" in private middle schools reaches 25%, far exceeding that of "teacher training expenditure" (12%); the proportion of non-teaching staff establishment in some universities exceeds 40%, occupying teaching resources [5].
- Shortcomings in management capabilities: 60% of the directors of teaching departments lack financial knowledge, and only 18% of institutions have established an inter-departmental training mechanism for "teaching - finance" [interview data].

4.3.Opportunities

- Policy dividends from industry-education integration: China's "Opinions on Deepening the Construction of a Modern Vocational Education System" proposes that "enterprises participating in school-running can enjoy tax reductions". In 2024, the funds invested by enterprises in education increased by 35% year-on-year, providing resources for economic-teaching complementarity [11].
- Empowerment of digital tools: Big data technology can realize "teaching demand prediction - dynamic budget adjustment". For example, a university optimized the allocation of laboratory resources in advance by analyzing students' course selection data, increasing equipment utilization rate by 40% [12].
- Increased participation of social resources: In 2024, the donation amount of China Education Development Foundation reached 120 billion yuan, of which 70% was designated for teaching-related projects, providing financial supplements for complementarity [14].

4.4.Threats

- Economic fluctuations impact resource supply: In 2023, the local government's educational fund budget was reduced by an average of 8%, leading some universities

to suspend the update of teaching equipment [interview data].

- Increased risk of commercialization alienation: 30% of private middle schools have the phenomenon of "reducing teaching investment to increase profits", such as reducing the class hours of experimental courses and lowering teachers' salaries [case analysis].
- High institutional coordination costs: The average approval process between educational departments and financial departments takes 2 months, resulting in the failure of timely availability of funds urgently needed for teaching [policy text analysis].

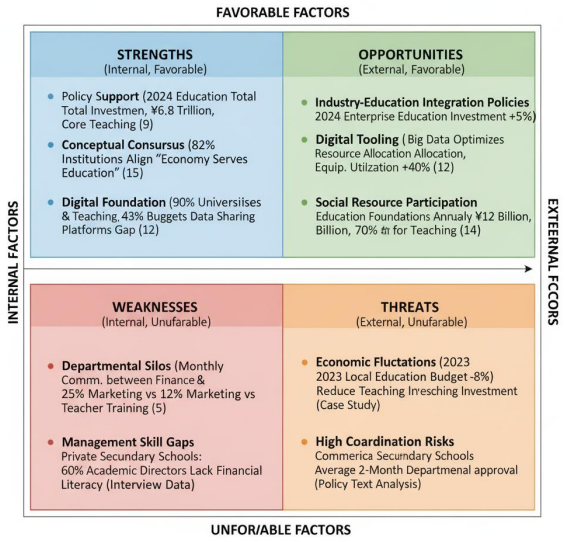

Fig.3.SWOT Matrix of Complementarity in Chinese Educational Institutions

5.Optimization Strategies: Practical Paths to Strengthen Complementarity

5.1.Establish a "Teaching-Oriented" Financial Philosophy

Establish a budget mechanism with priority to teaching needs: Require financial departments to conduct "teaching resource demand surveys" (covering 40% of teachers and 40% of students) before budget formulation, ensuring that the proportion of funds in core teaching areas (curriculum development, practical teaching) is not less than 60%.

Implement "thrifty school-running" and democratic supervision: Real-time publicize the use of teaching funds through a "financial disclosure platform", establish a supervision committee composed of faculty and staff representatives, and conduct voting deliberation on non-teaching expenditure projects exceeding 100,000 yuan.

Carry out interdisciplinary training: Incorporate "educational economics" into the compulsory courses for directors of teaching departments, and organize joint training between financial and teaching departments no less than 4 times a year to enhance coordination awareness.

5.2.Construct an Inter-Departmental Coordination Mechanism

Set up a resource allocation coordination committee: Led by the principal, the members include the director of the financial department, the director of the academic affairs department, and teacher representatives (accounting for 30%), holding monthly meetings to review teaching resource needs and budget execution.

Implement "teaching - finance" project-based management: For major teaching projects (such as program construction, training base upgrading), set up inter-departmental special teams to realize the whole-process coordination of "demand proposal - budget application - effect evaluation".

Establish performance-linked assessment: Incorporate "the satisfaction of teaching departments with financial services" (weight 40%) into the assessment of financial departments, and "resource use efficiency" (such as equipment utilization rate) into the assessment of teaching departments to force coordination.

5.3.Apply Digital Tools to Improve Management Accuracy

Build an integrated "teaching - finance" platform: Integrate data such as student scores, course offerings, and fund expenditures, and develop a correlation analysis module of "resource input - teaching output" to provide data support for budget adjustment.

Promote dynamic budget management tools: Adopt digital platforms such as FineReport to real-time monitor the progress of budget execution. When the over-expenditure/surplus of funds in a certain teaching area reaches 15%, automatically issue an early warning and suggest adjustment plans [12].

Establish a teaching demand prediction model: Based on historical data (such as the number of students selecting courses, demand for skill competitions), predict the teaching

resource needs for the next year through machine learning algorithms, and optimize the budget structure in advance.

5.4.Deepen the Integration of Production, Education, and Research and Social Cooperation

Promote "order-based" resource connection: Vocational colleges and enterprises co-build "teaching - production" bases. Enterprises provide equipment and teachers (economic resources), and schools carry out targeted talent training (teaching output), forming a closed loop of "resource input - talent transportation - enterprise feedback".

Expand social resource channels: Universities set up "education development funds" to attract enterprise donations (such as naming laboratories), and the donated funds are specifically used for teaching innovation; middle schools cooperate with communities to carry out "after-school services" to obtain community venue support (resource complementarity).

Standardize cooperation management: Establish an "industry-university-research cooperation evaluation system", requiring that the proportion of teaching-related investment in cooperation projects is not less than 70%, so as to avoid "emphasizing cooperation form over teaching effectiveness".

5.5.Improve the Supervision and Feedback Mechanism

Strengthen financial transparency and auditing: Issue a "Teaching Fund Use Report" every quarter, focusing on disclosing the expenditure details of core areas such as "teacher training" and "experimental teaching"; add a special item of "economic - teaching complementarity evaluation" in the annual audit.

Establish multiple feedback channels: Collect opinions on resource allocation through questionnaires (covering students, teachers, and enterprise partners), and departments with a feedback rate lower than 80% need to submit rectification plans.

Carry out complementarity effect evaluation: Set quantitative indicators (such as "input-output ratio of teaching funds", "resource waste rate"), conduct annual evaluations, and link the evaluation results with the budget for the next year.

Conclusion

The complementarity between economic and teaching activities in educational institutions is a three-level unity of "resource support - value feedback - goal coordination", rather than a simple linear relationship of "capital input - teaching output". Chinese educational institutions have advantages in realizing complementarity in terms of policy support and digital foundation, but problems such as departmental barriers and unbalanced resources restrict the synergy effect. Through the five strategies of "concept remodeling - mechanism construction - technology empowerment - cooperation expansion - supervision guarantee", the obstacles to realizing complementarity can be effectively solved, and the efficiency of educational management can be improved.

In the future, we can compare the complementarity models of educational institutions in different countries (such as transition economies like Belarus) to extract adaptive experiences of "low cost and high efficiency"; verify the impact coefficient of economic investment structure on teaching quality through panel data models to provide accurate basis for budget allocation; explore the application of artificial intelligence in "teaching demand prediction - dynamic budget adjustment", such as simulating the teaching effects of different resource allocation schemes based on digital twin technology.

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