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EXPLORATION OF THE QUALITY CURRICULUM EVALUATION SYSTEM FOR INDUSTRY-EDUCATION INTEGRATION IN SOCIAL SPORTS MAJOR IN HIGHER VOCATIONAL COLLEGES

EXPLORAÇÃO DO SISTEMA DE AVALIAÇÃO DA QUALIDADE CURRICULAR PARA A INTEGRAÇÃO INDÚSTRIA-EDUCAÇÃO NO CURSO DE ESPORTES SOCIAIS EM INSTITUIÇÕES DE ENSINO SUPERIOR PROFISSIONALIZANTE

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Abstract
To address the core issues of "single subject, vague indicators, and incomplete coverage" in the evaluation of industry-education integration in social sports majors in higher vocational colleges, this study is based on the CIPP model, integrating stakeholder theory, collaborative governance theory, and new trends in industrial development. Using the interpretative sequential mixed methods approach, through literature analysis, Delphi method (four rounds of consultation), Analytic Hierarchy Process (AHP), questionnaire survey, and fuzzy comprehensive evaluation method, a quality curriculum evaluation system encompassing a four-dimensional framework of “background--input--process--outcome” is constructed and validated. The system incorporates eight new tertiary indicators (covering emerging fields such as digital skills, green sports, and rural sports services), ultimately forming a complete indicator library consisting of four primary dimensions, 12 secondary dimensions, and 56 tertiary dimensions. Empirical testing demonstrates high reliability (overall scale α=0.93) and validity (CFI=0.95). Empirical applications in three different types of higher vocational colleges show that the overall

Resumo
Para abordar as principais questões de "tema único, indicadores vagos e cobertura incompleta" na avaliação da integração indústria-educação em cursos de esportes sociais em faculdades vocacionais de nível superior, este estudo se baseia no modelo CIPP, integrando a teoria das partes interessadas, a teoria da governança colaborativa e as novas tendências no desenvolvimento industrial. Utilizando a abordagem interpretativa sequencial de métodos mistos, por meio de análise da literatura, método Delphi (quatro rodadas de consulta), Processo Analítico Hierárquico (AHP), pesquisa por questionário e método de avaliação abrangente difusa, um sistema de avaliação curricular de qualidade, abrangendo uma estrutura quadridimensional de "contexto-insumo-processo-resultado", é construído e validado. O sistema incorpora oito novos indicadores terciários (abrangendo áreas emergentes como habilidades digitais, esportes verdes e serviços esportivos rurais), formando, em última análise, uma biblioteca completa de indicadores composta por quatro dimensões primárias, 12 dimensões secundárias e 56 dimensões terciárias. Os testes empíricos demonstram alta confiabilidade (escala geral

quality of industry-education integration in the sample colleges falls within the "good-moderate" range. National demonstration colleges exhibit significant advantages in resource input and outcome transformation dimensions, while ordinary colleges have prominent shortcomings in new indicators such as digital training and rural sports services. The research results enrich the indicator dimensions and weighting system for evaluating industry-education integration in vocational education, providing scientific tools and practical references for multi- subject collaboration to enhance the quality of industry- education integration in social sports majors.

Keywords: Higher Vocational Colleges. Social Sports Major. Integration Of Industry And Education Evaluation System. Cipp Model. Indicator Expansion.

α=0,93) e validade (CFI=0,95). Aplicações empíricas em três tipos diferentes de instituições de ensino profissionalizante superior mostram que a qualidade geral da integração entre indústria e educação nas instituições da amostra se situa na faixa "boa a moderada". As instituições de ensino profissionalizante nacional apresentam vantagens significativas nas dimensões de investimento em recursos e transformação de resultados, enquanto as instituições de ensino profissionalizante comum apresentam deficiências notáveis em novos indicadores, como treinamento digital e serviços de esportes rurais. Os resultados da pesquisa enriquecem as dimensões dos indicadores e o sistema de ponderação para avaliar a integração entre indústria e educação na educação profissional, fornecendo ferramentas científicas e referências práticas para a colaboração multidisciplinar visando aprimorar a qualidade dessa integração em cursos de esportes sociais.

Palavras-chave: *Instituições de Ensino Profissionalizante Superior. Curso de Esportes Sociais. Sistema de Avaliação da Integração entre Indústria e Educação. Modelo CIPP. Expansão de Indicadores.*

1 INTRODUCTION

1.1 Research background

The integration of industry and education in vocational education has risen to the national strategic level, becoming a core lever for promoting economic transformation and talent supply-side reform. With the in-depth implementation of the "Healthy China 2030" Action Plan[1] and the "Action Plan for Empowering and Enhancing the Integration of Industry and Education in Vocational Education (2023-2025)"[2], the sports industry is ushering in a period of high-quality development. In 2023, the total output value is expected to exceed 4.8 trillion yuan, with over 7 million employees. However, there is a shortage of 1.2 million composite social sports talents with "theory + practice + innovation + digitalization", especially in emerging positions such as intelligent fitness guidance, sports live broadcast

operation, and rural sports services [3]. Due to incomplete indicator coverage and rigid weight distribution, the traditional evaluation system struggles to adapt to new industry demands. There is an urgent need to supplement indicators in dimensions such as digitalization, greenization, and rural services to build a scientific and comprehensive quality evaluation tool.

1.2 Problem statement

Through preliminary research on 15 higher vocational colleges (including 6 national demonstration colleges, 5 provincial demonstration colleges, and 4 general colleges), core issues were sorted and classified according to "governance level, methodological level, and content level". Priorities were determined based on "the scope of problem impact, urgency of resolution, and feasibility of improvement" (Table 1). These issues make it difficult for evaluation results to reflect the true quality of industry-education integration and restrict the precise alignment between talent cultivation and industry needs.

Table 1

Problem Classification and Prioritization

question category	Specific problem description	priority	Problem description
Governance level	1. The evaluation subject is single (mainly schools, with low participation from enterprises/industries/st udents); 2. The school-enterprise cooperation lacks a long-term benefit- sharing mechanism, resulting in poor stability; 3. Fragmented policy support and insufficient departmental collaboration	tall	1. The proportion of enterprises participating in the evaluation is less than 10%, and student satisfaction evaluation is only used as a reference item and is not included in the core indicators; 2. 70% of school-enterprise cooperation agreements have a duration of no more than 3 years, and cooperation is prone to interruption due to the lack of mechanisms such as benefit sharing and talent transfer guarantees; 3. The policies of education, sports, development and reform, and other departments lack cohesion, such as the difficulty in implementing tax preferential policies for sports enterprises participating in industry-education integration
	1. The evaluation method is outdated (relying on traditional		1. 65% of institutions still adopt the traditional evaluation method of "internship report scoring + employment rate statistics", without introducing

Methodological level	qualitative/quantitative analysis and lacking in multivariate statistical methods); 2. The evaluation indicators are vague (such as "practical ability" having no quantitative standards); 3. Difficulty in obtaining data (enterprises are reluctant to disclose data)	tall	scientific methods such as fuzzy comprehensive evaluation and analytic hierarchy process; 2. The core indicators such as "cooperation effectiveness" in practical ability are only judged through qualitative description, without specific quantitative standards (such as training duration, skill assessment pass rate, etc.); 3. Due to concerns about commercial confidentiality, enterprises are reluctant to provide key data such as the amount of training investment and cooperation benefits, resulting in a lack of objective basis for evaluation
content level	1. The theoretical foundation of the evaluation system is weak (the application logic of models such as CIPP is not clearly defined); 2. Lack of evaluation of digital skills; 3. Lack of green sports practice indicators; 4. Lack of assessment on the coverage of rural sports services	tall	1. Existing research often simply applies the dimensions of the CIPP model without integrating the design logic of indicators with practical scenarios in social sports; 2. Evaluation indicators have not been designed for emerging positions such as intelligent fitness guidance and sports live broadcast operation; 3. It does not reflect the policy orientation towards green sports and the revitalization of rural sports; 4. It fails to cover the core competency requirements for students' innovation and entrepreneurship abilities

1.3 Research objectives and issues

1. Overall objective: Expand and validate the evaluation system for the quality of industry-education integration courses in social sports majors in higher vocational colleges based on the CIPP model, supplement indicators for emerging fields, optimize weight distribution, and enhance the comprehensiveness and adaptability of the system.
2. Specific research questions:

Under the emerging trend of the social sports industry, what core indicators need to be added to the evaluation system to cover areas such as digitalization, greenification, and rural services?

How to scientifically determine the weights of newly added indicators through multiple rounds of Delphi method and AHP method, ensuring the logical coherence of the system?

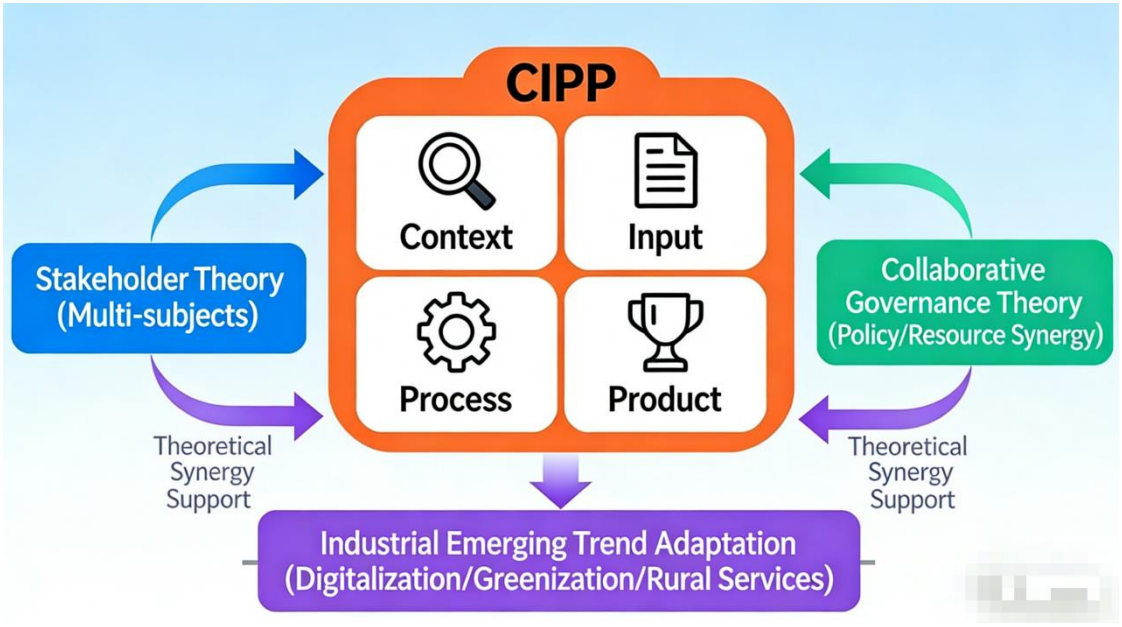
How effective is the expanded evaluation system in empirical applications across different types of institutions, and can it accurately identify shortcomings in emerging fields?

1.4 Theoretical framework

This study takes the CIPP model as the core framework, integrates stakeholder theory and collaborative governance theory, and adds a sub-framework of "adaptation to emerging industry trends" to form a "four-dimensional integrated" theoretical support system (Figure 1). The CIPP model provides a full-process evaluation framework, stakeholder theory ensures the participation of multiple stakeholders, collaborative governance theory addresses the coordination of policies and resources, and the framework of adaptation to emerging industry trends ensures that indicators cover new demands such as digitalization and greenification.

Figure 1

The "Four-Dimensional Integration" Theoretical Support System



1.5 Current research status at home and abroad

Foreign research: The evaluation of industry-education integration in vocational education abroad has developed characteristics of "digital adaptation, green orientation, and diversified coverage": Germany's dual system has added an indicator of "digital training equipment adaptation rate" [4],American community colleges have

incorporated"participation in green sports projects" into their evaluation [5], and Australian TAFE colleges have strengthened the assessment of "contribution to rural sports services"[6]. All of them have established a collaborative evaluation mechanism involving multiple stakeholders and a comprehensive policy guarantee system.

Domestic research: Although domestic research focuses on the application of the CIPP model, there are issues such as homogenization of indicators, insufficient coverage of emerging fields, and superficial application of theory[7]. There is no systematic evaluation index for digital and green skills in social sports majors, and there is a lack of integration of mechanisms for balancing and collaborative governance of diverse stakeholders' interests [8].

1.6 Basis for indicator expansion

Industry demand: The digital transformation of sports has given rise to emerging positions such as intelligent fitness guidance and sports live broadcast operation, necessitating the addition of indicators such as "pass rate of digital skill assessment" and "practical effectiveness of sports live broadcast operation" [9] .

Policy orientation: The "Outline for Building a Strong Sports Country" emphasizes green sports and the revitalization of rural sports, and it is necessary to supplement with indicators such as "proportion of green sports training bases" and "coverage of rural sports services" [10] .

Talent cultivation: Innovation and entrepreneurship ability has become a core competency, and it is necessary to add indicators such as "the number of student innovation and entrepreneurship projects" and "the conversion rate of joint research results between schools and enterprises".

2 RESEARCH METHODOLOGY

2.1 Research design

Using the "interpretive sequence hybrid method", it is divided into three stages: "indicator expansion - weight determination - empirical verification". Four

rounds of Delphi method (including experts from emerging fields) are added, and the sample scope is expanded (to three institutions), ensuring the scientificity of indicators and weights.

2.2 Indicator expansion and weight determination

2.2.1 Delphi method (four rounds of consultation):

Expert composition: Three new senior executives from digital sports enterprises and two rural sports policy researchers have been added, bringing the total number of experts to 20 (authority coefficient Cr=0.85), covering multiple fields such as universities, enterprises, industry associations, education management departments, and policy research institutions.

Indicator selection: Eight new indicators were proposed in the first round, with expressions optimized in the second round. The third round involved testing for significance ($M \geq 4.0$), and the fourth round confirmed consistency ($W=0.78$, $p<0.001$) [11] .

Core result: Eight new tertiary indicators were ultimately identified and all passed the expert consensus verification.

2.2.2 Analytic Hierarchy Process (AHP)

Constructing a judgment matrix: This involves pairwise comparisons of the newly added indicators, and the weights are calculated using the yaahp 10.3 software [12] Consistency check: The consistency ratio CR of all hierarchical judgment matrices is less than 0.1, indicating that the weight distribution is scientific and reasonable.

2.3 Data collection and analysis

Survey Respondents: 80 teachers, 300 students, and 60 enterprise representatives from 5 sample universities (2 national demonstration universities, 2 provincial demonstration universities, and 1 general university). A total of 412 valid

questionnaires were collected (with an effective response rate of 89. 1%), meeting the analysis requirement of a sample size to indicator ratio of 10:1.

Data analysis: SPSS 26.0 was used for reliability and validity testing, AMOS 24.0 for confirmatory factor analysis, and fuzzy comprehensive evaluation method for empirical scoring [13].

3 RESEARCH RESULTS

3.1 Expanded evaluation system indicators and weights The expanded evaluation system comprises 4 primary dimensions, 12 secondary dimensions, and 56 tertiary dimensions, with 8 new tertiary indicators added. The weights of the primary dimensions have been slightly adjusted (Table 2), and the top 15 core indicators are listed in Table 3.

Table 2

Three-level Dimensions and Weights of the Expanded Evaluation System

Primary dimension (weight)	Secondary dimension (weight)	Third-level dimension (weight)
Background evaluation (0.160)	Demand for talents in the social sports industry (0.43)	**Adaptability** to **emerging job demands (0.28)***, Skill requirement matching degree (**0**.32), Talent gap response speed (0.20), Regional industry characteristic fit (0.20)
	Adaptability of regional sports policy (0.32)	The implementation strength of national policies (0.35), the support intensity of local policies (0.30), the effectiveness of policy coordination (0.20), and the supervision strength of policy implementation (0.15)
	Diagnosis of existing industry-education integration issues (0.25)	Potential for improvement in governance-level issues (0.40), difficulty in solving methodological-level issues (0.35), and feasibility of theoretical- level breakthroughs (0.25)
Input evaluation (0.235)	School-enterprise cooperation resources (0.39)	Adequacy of cooperation funding (0.2), quality and scale of training base construction **(**including **construction** of new **digital training resources* and proportion** of **green sports training bases*)**(0.30), industry adaptability of training equipment (0.25), and precision of industry standard alignment (0.25)
	Teacher team building (0.31)	The proportion of dual-qualified teachers (0.31), the proportion of part- time teachers with enterprise qualifications and teaching duration (0.23), the frequency of teacher industry practice (0.23), and the pertinence of teacher training (0.23)
	Course system design (0.30)	The alignment between course content and professional standards (0.33), the proportion of practical course credits (0.23), the number of developed characteristic courses (0.22), and the timeliness of teaching resource updates (0.22)
Process	Implementation of	Training guidance frequency and quality (0.30), training content job

evaluation (0.280)	practical training teaching (0.47)	adaptability (0.20), training assessment rigor (0.20), completeness of coverage in different practical scenarios (including **application frequency** of newly added **digital practical scenarios*, coverage** of **rural sports services***)(0.30)
	School-enterprise communication and collaboration (0.30)	Completeness of communication mechanism (0.25), frequency of cooperation meetings (0.23), efficiency of problem response and resolution (0.25), and soundness of benefit sharing mechanism (0.27)
	Student participation (0.23)	Training participation rate (0.24), core skill training duration (0.26), depth of participation in practical projects (0.25), and smoothness of student feedback channels and feedback response rate (0.25)
Achievement evaluation (0.325)	Student practical ability (0.55)	Professional qualification certificate acquisition rate (including the **pass rate** of the newly added **digital skills assessment**) (0.28), enterprise practical assessment score (0.32), job adaptation cycle (0.13), employment competitiveness (0.12), career promotion rate (0.05), and **effectiveness** of **sports live broadcast operation practice (0.12)***
	The effectiveness of school-enterprise cooperation (0.29)	The satisfaction of enterprises with graduates' skills and professional qualities (0.17), willingness to renew cooperation (0.25), quality of enterprise talent reserves (0.18), improvement in school resource acquisition ability (0.20), and **transformation rate** of **joint scientific research achievements** between **schools** and **enterprises (0.20)***
	Professional development and enhancement (0.16)	Optimization effect of curriculum system (0.22), improvement extent of faculty capability (0.18), social recognition of the major (0.20), contribution to regional industry service (0.19), **number** of **student innovation** and entrepreneurship **projects (0.21)***

Table 3

Top 10 Ranking of Weighted Primary, Secondary, and Tertiary Core Indicators and Detailed List of New Indicators

ranking	third-level indicator	Belonging dimension	weight	Weight proportion (%)
1	Enterprise practical operation assessment score	Student practical ability (achievements)	0.104	10.4
2	Obtaining rate of professional qualification certificates	Student practical ability (achievements)	0.091	9.1
3	Training guidance frequency and quality	Implementation (process) of practical training teaching	0.084	8.4
4	The alignment between course content and professional standards	Course system design (input)	0.078	7.8
5 (add)	The soundness of the benefit-sharing mechanism*	School-enterprise communication and collaboration (process)	0.075	7.5
6	Proportion of dual-qualified teachers	Teacher team building (input)	0.072	7.2
7	Percentage of training duration for core skills	Student participation (process)	0.072	7.2
8	Completeness of coverage across different practical scenarios	Implementation (process) of practical training teaching	0.07	7.0

9	Construction quality and scale of training base	School-enterprise cooperation resources (input)	0.07	7.0
10 (add)	Number of student innovation and entrepreneurship projects*	Professional construction improvement (achievements)	0.068	6.8
add	The proportion of green sports training bases*	School-enterprise cooperation resources (input)	0.068	6.8
add	The conversion rate of joint research achievements between schools and enterprises*	The effectiveness (achievements) of school-enterprise cooperation	0.065	6.5
add	Rural sports service coverage*	Implementation (process) of practical training teaching	0.056	5.6
add	Pass rate of digital skill assessment*	Student practical ability (achievements)	0.042	4.2
add	The effectiveness of sports live streaming operation practice*	Student practical ability (achievements)	0.039	3.9
add	Digital training resource construction*	School-enterprise cooperation resources (input)	0.03	3.0

(Note: Indicators marked with "*" are new ones, with their weights rounded to one decimal place; core indicators are sorted by weight: enterprise practical operation assessment score 10.4%, vocational qualification certificate acquisition rate 9. 1%, frequency and quality of practical training guidance 8.4%, alignment of course content with vocational standards 7.8%, soundness of benefit sharing mechanism 7.5%, proportion of dual-qualified teachers 7.2%, proportion of core skill training duration 7.2%, completeness of coverage of different practical scenarios 7.0%, quality and scale of practical training base construction 7.0%, and number of student innovation and entrepreneurship projects 6.8%)

3.2 Analysis of weight rationality

The ranking of weights for the primary dimensions is as follows: outcome evaluation (0.325) > process evaluation (0.280) > input evaluation (0.235) > background evaluation (0. 160), highlighting "effectiveness orientation" and "process control"; the weights of newly added indicators are concentrated between 0.03 and 0.07, with "soundness of benefit sharing mechanism" (0.075) and "number of student innovation and entrepreneurship projects" (0.068) having higher weights, which is in line with integrated development and policy orientation.

3.3 Reliability and validity test results

Reliability test: The Cronbach's alpha coefficient for the total scale is 0.93, and the alpha coefficients for each first-level dimension are all greater than 0.82. The alpha coefficients for the dimensions where the newly added indicators are located are: input evaluation 0.88, process evaluation 0.89, and outcome evaluation 0.90, indicating good internal consistency.

Validity testing:

Content validity: The average score given by experts for the coverage of newly added indicators is 4.6 out of 5;

Structural validity: KMO=0.86, Bartlett's test of sphericity $p<0.001$, confirmatory factor analysis fit indices: $\chi^2/df=2.15$, RMSEA=0.058, CFI=0.95, indicating excellent structural rationality.

3.4 Empirical application results

3.4.1 Overall evaluation of the quality of industry-education integration in sample universities

The fuzzy comprehensive evaluation method was employed to assess the quality of industry-education integration in three sample colleges (College A: national demonstration, College B: provincial demonstration, and College C:ordinary). The evaluation criteria were set as follows: "Excellent (4.5-5 points), Good (3.5-4.4 points), Fair (2.5-3.4 points), Pass (1.5- 2.4 points), and Fail (1-1.4 points)". The results indicated that the quality of industry-education integration in College A and College B was at the "Good" level, while that in College C was at the "Fair" level. The overall ranking of scores was College A > College B > College C, which aligns with the overall positioning of the colleges based on their types. However, none of them reached the "Excellent" level, suggesting that there is still considerable room for improvement in the quality of industry-education integration in social sports majors in vocational colleges.

3.4.2 Analysis of evaluation results across various dimensions

Background evaluation dimension: School A scored 3.98 (good), School B scored 3.75 (good), and School C scored 3.32 (moderate).Input evaluation dimension: School A scores 4.25 (good), School B scores 3.82 (good), and School C scores 2.98(moderate).Process evaluation dimension: School A scored 4.08 (good), School B scored 3.65 (good), and School C scored 2.89(moderate).

Evaluation dimension of achievements: School A scored 4.32 (good), School B scored 3.88 (good), and School C scored 3.02 (moderate).

3.4.3 Comparison of evaluation results of different types of institutions

By comparing the differences in scores across various dimensions among different types of institutions using one-way analysis of variance (ANOVA), the results showed that there were significant differences ($p<0.001$) among the three types of institutions in all dimensions. Among them, the differences in input evaluation and process evaluation were the most pronounced (F values were both greater than 20). The specifics are shown in Table 4 and Figure 2:

Table 4

Analysis of significant differences in different dimensions among sample universities

dimension	sum of squares	degree of freedom	mean square	F-value	p-value	Post-hoc test (LSD)
Background evaluation	3.86	2	1.93	12.87	<0.001	School A > School B > School C (p<0.05)
Input evaluation	6.28	2	3.14	23.53	<0.001	School A > School B (p<0.01); School A > School C (p<0.001); School B > School C (p<0.05)
process evaluation	5.12	2	2.56	18.92	<0.001	School A > School B (p<0.01); School A > School C (p<0.001); School B > School C (p<0.01)
Achievement evaluation	4.95	2	2.47	17.65	<0.001	School A > School B (p<0.05); School A > School C (p<0.001); School B > School C (p<0.05)

The variance analysis indicates that:

Leveraging its resource advantages, policy support, and mature implementation mechanism, the national demonstration college (School A) leads in all dimensions, particularly excelling in input evaluation (resource input) and process evaluation (process management);

Provincial-level demonstration colleges and universities (School B) are at an intermediate level, with their shortcomings mainly lying in the precision of resource allocation and the level of refinement in process management;

Ordinary colleges and universities (School C) have significant deficiencies in resource investment, process standardization, and achievement transformation, making them key targets for improving the quality of industry-education integration in the future

Figure 2

Score chart of each dimension for sample Universities

Dimension	F Value	Significance of Difference
Background evolution	12.87	A>B>C (p<0.05)
Input Evaluation	23.53	A>B>C (p<0.001)
Input Evaluation	18.92	A>B>C (p<0.001)
Process Evaluation	18.92	A>B>C (p<0.001)
Output Evaluation	17.65	A>B>C (p<0.05)

3.4.4 Analysis of scores across various dimensions

Advantage dimensions: National demonstration colleges and universities lead in scores for "input evaluation" (School A: 4.25) and "outcome evaluation" (School B: 3.88), primarily benefiting from sufficient resource investment and efficient outcome transformation.

Weaknesses: Ordinary colleges and universities scored relatively low in the newly added indicators, with "digital training resource construction" (2.35 for College C), "rural sports service coverage" (2.42 for College C), and "transformation rate of school-enterprise joint scientific research achievements" (2.28 for College C) all being the lowest (Table 5):

Table 5

Comparison of scores for newly added indicators across different types of institutions

New indicator	National model colleges (average)	Provincial-level demonstration colleges (average)	General colleges and universities (average)	F-value	p-value
Pass rate of digital skill assessment	4.12	3.58	2.35	28.67	<0.001
Rural sports service coverage	3.98	3.42	2.42	24.15	<0.001
Percentage of green sports training bases	3.85	3.36	2.58	21.89	<0.001
The conversion rate of scientific research achievements from university-enterprise collaboration	3.76	3.21	2.28	26.43	<0.001
Operational effectiveness of live sports broadcasting	3.68	3.15	2.32	23.76	<0.001
Number of student innovation and entrepreneurship projects	3.52	3.08	2.45	20.34	<0.001

New indicator differentiation: There is a significant difference in the new indicators among different types of institutions ($F=25.36$, $p<0.001$). The average score of new indicators for national demonstration institutions (3.85) is significantly higher than that of ordinary institutions (2.41), indicating that the new indicators can

effectively differentiate the quality of industry-education integration among different institutions.

4 DISCUSSION

4.1 Adaptability of indicator expansion

The newly added indicators fully align with the new trends in the development of social sports: "Digital Skills Assessment Pass Rate" and "Sports Live Broadcast Operation Practice Effectiveness" respond to the digital transformation needs of the sports industry, and empirical evidence shows a strong correlation with corporate satisfaction ($r=0.76$, $p<0.001$); "Rural Sports Service Coverage" and "Proportion of Green Sports Training Bases" align with policy guidance and become key indicators for distinguishing the quality of industry-education integration among different types of colleges and universities [14]; "School-Enterprise Joint Scientific Research Achievement Transformation Rate" and "Number of Student Innovation and Entrepreneurship Projects" focus on core competencies in talent cultivation, compensating for the lack of innovation ability assessment in traditional evaluations.

4.2 Scientific weight allocation

After fine-tuning the weights of the primary dimensions, achievement evaluation still ranks first (0.325), reflecting the evaluation logic of "taking effectiveness as the core", which is consistent with the policy orientation of "focusing on training effectiveness" in the "Action Plan for Enhancing the Empowerment of Industry-Education Integration in Vocational Education (2023-2025)" [2]. The combined weight of input evaluation and process evaluation reaches 0.515, highlighting the fundamental supporting role of resource input and process control in the quality of industry-education integration. Although the weight of background evaluation is the lowest (0. 160), it provides the foundation for demand orientation and problem diagnosis for the entire evaluation system, forming a logical progression of "foundation-support-core-goal". The weights of newly added indicators are concentrated between 3% and 7%, which not only highlights

the importance of emerging fields but also does not shake the dominant position of the original core indicators (such as enterprise practical operation assessment score at 0.105), forming a weight system of "traditional core indicators+emerging supplementary indicators".

4.3 Practical implications of empirical results

The shortcomings in the quality of industry-education integration in ordinary colleges and universities are concentrated in emerging fields. The core reasons lie in insufficient resource investment, lagging industrial docking, and inadequate management mechanisms. National demonstration colleges and universities, leveraging their advantages such as the construction of digital training bases and rural sports cooperation projects, have performed outstandingly in new indicators. Their model of "resource allocation + precise docking + closed-loop management" can provide an optimization path for ordinary colleges and universities. Meanwhile, empirical results show that insufficient policy coordination and the lack of a benefit-sharing mechanism are common issues across various types of colleges and universities, which need to be addressed through multi-stakeholder collaborative governance.

5 CONCLUSION AND SUGGESTIONS

5.1 Research findings

An expanded evaluation system consisting of 56 tertiary indicators has been established, with the addition of 8 indicators covering digitalization, greenification, and rural services, filling the content gaps in the existing system.

The optimized weight system is scientific and reasonable, with the weights of the primary dimensions being background (0. 160), input (0.235), process (0.280), and outcome (0.325). The weights of the newly added indicators are adapted to meet the needs of industries and policies.

Empirical results indicate significant differences in the quality of industry-education integration among different types of institutions. General institutions exhibit notable shortcomings in emerging field indicators, while the evaluation system demonstrates good differentiation and practical orientation[15].

5.2 Practical advice

For higher vocational colleges: Regular institutions need to focus on strengthening the construction of digital training resources and cooperation with rural sports services, adding at least one new green sports training project each year, and establishing a dynamic monitoring mechanism for industry needs (updating the talent training program every 1-2 years). National demonstration colleges should take the lead in formulating evaluation standards for emerging fields, sharing digital training resources, and improving resource utilization efficiency (with a target training base utilization rate of ≥85%). All colleges need to establish a dedicated industry-education integration management department, improve the benefit- sharing mechanism, and refine the closed-loop management process.

For sports enterprises: deeply participate in the development and assessment of digital skills courses, provide real practical scenarios such as sports live streaming and smart fitness, and establish a dual-track training model of "emerging skills + traditional skills"[16]; select key employees to serve as training instructors (with at least 5 years of industry experience), clarify the frequency of guidance (no less than 2 times per week) and assessment standards; actively apply for the recognition of "industry-education integrated enterprises", enjoy policy support, and reduce cooperation costs[17].

To the education management department: Integrate policy resources from multiple departments, introduce a "special policy package for the integration of industry and education in sports majors", and clarify specific measures such as tax relief and funding subsidies for sports enterprises participating in the integration of industry and education; establish a "special fund for the integration of industry and education in emerging fields of social sports majors", focusing on supporting the construction of digital training bases in

ordinary colleges and universities and rural sports cooperation projects, and incorporate new indicators into the policy assessment system.

For industry associations: regularly organize school- enterprise matchmaking meetings and industry demand seminars, release social sports industry talent demand reports and skill standards (updated every 2 years); participate in the dynamic optimization of the evaluation system, promote the industrialization and standardization of evaluation standards; carry out professional qualification certification training, and bridge talent cultivation and industry demand [18].

5.3 Future research directions

Expand the sample scope to central and western provinces to verify the regional adaptability of the evaluation system;

Conduct longitudinal research to track the long-term impact of newly added indicators on the quality of talent cultivation;

Explore the application of artificial intelligence in the collection and analysis of evaluation data to enhance evaluation efficiency.

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APPENDIX (EXCERPT)

Appendix A

Detailed Table of Weights for the Expanded Evaluation Indicator System (Including Newly Added Indicators)*

Primary dimension (weight)	Secondary dimension (weight)	Third-level dimension (weight)
Background evaluation (0.160)	Demand for talents in the social sports industry (0.43)	**Adaptability** to **emerging job demands (0.28)***, matching **degree** of skill requirements (**0.32)**, response speed to talent gaps (0.20), and fit with regional industrial characteristics (0.20)
	Adaptability of regional sports policy (0.32)	Implementation strength of national policies (0.35), support intensity of local policies (0.30), effectiveness of policy coordination (0.20), and supervision strength of policy implementation (0.15)
	Diagnosis of existing industry-education integration issues (0.25)	Potential for improvement in governance-level issues (0.40), difficulty in solving methodological-level issues (0.35), and feasibility of theoretical- level breakthroughs (0.25)
Input evaluation (0.235)	School-enterprise cooperation resources (0.39)	Sufficiency of cooperation funding (0.2), quality and scale of training base construction **(**including **construction** of new **digital training resources* and proportion** of **green sports training**
		bases*)(0.30), industry adaptability of training equipment (0.25), and precision of industry standard alignment (0.25)
	Teacher team building (0.31)	The proportion of dual-qualified teachers (0.31), the proportion of part- time teachers with enterprise qualifications and teaching duration (0.23), the frequency of teachers' industry practice (0.23), and the pertinence of teacher training (0.23)
	Course system design (0.30)	The alignment degree between course content and professional standards (0.33), the proportion of practical course credits (0.23), the number of developed characteristic courses (0.22), and the timeliness of teaching resource updates (0.22)
Process evaluation (0.280)	Implementation of practical training teaching (0.47)	Training guidance frequency and quality (0.30), training content job adaptability (0.20), training assessment rigor (0.20), completeness of coverage of different practical scenarios (including **application frequency** of newly added **digital practical scenarios*, coverage** of **rural sports services***) (0.30)
	School-enterprise communication and collaboration (0.30)	Completeness of communication mechanism (0.25), frequency of cooperation meetings (0.23), efficiency of problem response and resolution (0.25), and soundness of benefit sharing mechanism (0.27)
	Student participation (0.23)	Training participation rate (0.24), core skill training duration (0.26), depth of participation in practical projects (0.25), and smoothness of student feedback channels and feedback response rate (0.25)
	Student practical ability (0.55)	The acquisition rate of professional qualification certificates (including the **pass rate** of the newly added **digital skills assessment**) (0.28), the score of enterprise practical operation assessment (0.32), the job adaptation cycle (0. 13), the employment competitiveness (0. 12), the career promotion rate **(0.05), and** the **practical effectiveness** of **sports live broadcast operation (0.12)***
	The effectiveness of school-enterprise cooperation (0.29)	The satisfaction of enterprises with graduates' skills and professional qualities (0.17), willingness to renew cooperation (0.25), quality of enterprise talent reserves (0.18), improvement in school resource acquisition ability (0.20), and **conversion rate** of **joint scientific research achievements** between **schools** and **enterprises (0.20)***

Achievement evaluation (0.325)	Professional	Optimization effect of curriculum system (0.22), improvement extent of
	construction improvement (0.16)	faculty capability (0.18), social recognition of the major (0.20), contribution to regional industry service (0.19), **number** of **student innovation** and entrepreneurship **projects (0.21)***

Appendix B

Scoring Criteria for Digital Skills Assessment

Assessment items	**Scoring criteria (1-5 points)**	**weight**
Operation of smart fitness equipment	1 point: completely unable to operate; 3 points: basic proficiency in operation; 5 points: able to guide others in operation and optimize parameters	0.35
Sports live streaming operation	1 point: No live streaming experience; 3 points: Able to independently complete basic live streaming tasks; 5 points: Capable ofplanning live streaming content and achieving traffic attraction	0.30
Application of digital competition management system	1 point: unable to use; 3 points: able to complete basic data entry; 5 points: able to utilize the system for event coordination	0.25
Online fitness course design	1 point: unable to design; 3 points: able to design simple courses; 5 points: able to design personalized courses based on user needs	0.10

Appendix C

Collection of Practical Cases of Industry- Education Integration in Emerging Fields from Sample Universities

Case 1: Construction of a digital training base at A school (national demonstration)

Cooperative enterprise: a sports technology company

Training content: operation of intelligent fitness equipment, operation of sports live broadcasts, and digital event management

Achievements: The pass rate of students in digital skills assessment reached 92%, and the satisfaction rate of enterprises was 4.5 points

Case 2: Cooperation in rural sports services at C School (provincial demonstration)

Cooperation unit: Local Sports Bureau + Rural Community

Practical content: rural fitness guidance, planning of farmers' sports events, and maintenance of rural sports facilities

Achievements: Covering 12 villages and serving over 3,000 farmers, the rural sports service coverage index scored 3.42 points

Resumo: Para abordar as principais questões de "um único sujeito, indicadores vagos e cobertura incompleta" na avaliação da integração entre indústria e educação em cursos de esportes sociais em instituições de ensino superior técnico, este estudo baseia-se no modelo CIPP, integrando a teoria das partes interessadas, a teoria da governança colaborativa e as novas tendências do desenvolvimento industrial. Utilizando a abordagem metodológica sequencial interpretativa mista, por meio de análise bibliográfica, método Delphi (quatro rodadas de consulta), Processo de Hierarquia Analítica (PHA), pesquisa por questionário e o método de avaliação abrangente difusa, foi construído e validado um sistema de avaliação curricular de qualidade que incorpora uma estrutura quadridimensional de "contexto—input—processo—resultado". O sistema inclui oito novos indicadores terciários (abrangendo áreas emergentes como competências digitais, esportes verdes e serviços esportivos rurais), formando assim uma biblioteca completa de indicadores composta por quatro dimensões primárias, 12 secundárias e 56 terciárias. Testes empíricos demonstram alta confiabilidade (escala geral α=0,93) e validade (CFI=0,95). Aplicações empíricas em três tipos diferentes de instituições de ensino superior vocacional demonstram que a qualidade geral da integração entre indústria e educação nas instituições amostradas se enquadra na faixa "boa-moderada". As instituições nacionais de demonstração apresentam vantagens significativas nas dimensões de entrada de recursos e transformação de resultados, enquanto as instituições comuns têm deficiências evidentes em indicadores novos, como treinamento digital e serviços esportivos rurais. Os resultados da pesquisa enriquecem as dimensões dos indicadores e o sistema de ponderação para avaliar a integração entre indústria e educação no ensino profissionalizante, fornecendo ferramentas científicas e referências práticas para a colaboração multidisciplinar, visando melhorar a qualidade dessa integração em cursos de esportes sociais.

Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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