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Developing an Integrated Talent Cultivation Model of Post-Course-Competition-Certificate-Innovation-Application under the Context of New Quality Productive Forces: A Case Study of the Business Data Analysis and Application Program in Higher Vocational Colleges

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Abstract: In the context of continuous advancements in digitalization and intelligent technologies, New Quality Productive Forces have become a core driver of high-quality economic and social development. This concept emphasizes not only technological innovation and industrial upgrading but also the cultivation of highly skilled talents capable of adapting to emerging industrial structures and the demands of digital transformation within the education sector. Taking the Business Data Analysis and Application program in higher vocational colleges as a case study, this paper explores the construction of an integrated Post-Course-Competition-Certificate-Innovation-Application (GKCZY) talent cultivation model. Through analyzing the current situation, diagnosing existing problems, and proposing targeted strategies, the study develops a comprehensive implementation pathway aligned with the requirements of New Quality Productive Forces. The findings reveal that this model effectively enhances students' job competence and overall professional quality, providing valuable insights and practical experience for the reform and innovation of talent cultivation models in higher vocational education.

Keywords: New Quality Productive Forces; Post-Course-Competition-Certificate-Innovation-Application (GKCZY); Talent Cultivation Model; Higher Vocational Education; Business Data Analysis.

1. Research Background

With the rapid advancement of digitalization and intelligent technologies, New Quality Productive Forces have gradually become the core driving force for promoting high-quality economic and social development. This concept emphasizes technological innovation, industrial upgrading, and the restructuring of production factors to comprehensively enhance industrial structures and economic vitality, thereby placing higher demands on the cultivation of highly skilled technical talents. As the primary institutions for training skilled professionals, higher vocational colleges must implement deep reforms in curriculum systems, teaching models, and industry-education integration to meet the evolving needs of new industrial forms.

The Business Data Analysis and Application program, as an emerging discipline in the context of the digital economy, is characterized by its interdisciplinary and integrated nature. However, in the process of practical implementation, challenges remain, such as misalignment between curriculum content and job requirements, insufficient practical training, and a lack of in-depth school-enterprise collaboration. These issues limit the enhancement of students' job competence and innovative abilities.

In response, this study focuses on constructing an integrated Post-Course-Competition-Certificate-Innovation-Application (GKCZY) talent cultivation model to explore practical pathways for optimizing talent training in the Business Data Analysis and Application program under the framework of New Quality Productive Forces. The goal is to provide both theoretical insights and practical experience to support the transformation of higher vocational education and the development of emerging disciplines.

2. Current Situation Analysis

2.1. Program Positioning and Development Foundation

The establishment of the Business Data Analysis and Application program aligns closely with the urgent demand of enterprises for data-driven decision-making in the context of the digital economy. This program aims to cultivate interdisciplinary talents who not only master data analysis tools and methodologies but also possess a deep understanding of business logic and industrial applications. At present, an initial curriculum framework and practical training infrastructure have been established, including basic laboratories and data analysis platforms, which provide a solid foundation for innovation in talent cultivation models.

2.2. Faculty Composition and Student Structure

The faculty team is generally young, with more than 70% of instructors under the age of 40. This age structure provides advantages in teaching enthusiasm and the ability to learn and adopt new technologies. However, some instructors lack experience with real-world enterprise projects and cross-disciplinary backgrounds, which limits the comprehensive development of the curriculum system. Regarding the student body, there is significant diversity in academic backgrounds. Some students with strong foundations in science and technology adapt quickly to programming and data modeling,

while others with weaker skills in mathematics and logical reasoning encounter difficulties. This disparity has resulted in a "polarization" phenomenon in the classroom: certain students can complete data modeling tasks efficiently, whereas others struggle significantly during programming training.

2.3. Teaching Resources and Industry-Education Collaboration

The institution has established a data visualization laboratory and introduced several enterprise-level software platforms, which generally meet the basic requirements of classroom teaching. However, compared with the rapid development of the industry, there is a lag in the updating of resources, as well as an insufficiency in the number and complexity of case studies used in teaching. Although the college has formed partnerships with several e-commerce and big data enterprises, the collaboration remains limited to internships and guest lectures. There is a lack of mechanisms for deep enterprise involvement in curriculum development and teaching evaluation.

2.4. Overall Development Status

In summary, while the program has achieved a basic level of development, it remains in the exploratory stage. Compared with the demand for high-quality technical and skilled talents driven by New Quality Productive Forces, there are still noticeable gaps in the systematization of the curriculum, the depth of industry-education integration, and the mechanisms for individualized student development. These areas require further breakthroughs in subsequent reforms.

3. Existing Problems

3.1. Misalignment between Training Objectives and the Demand for High-Quality Skilled Talents

The current training objectives of the program remain relatively broad and general, primarily emphasizing the cultivation of "applied talents with data analysis capabilities." However, they lack a detailed breakdown of the core competencies required for specific positions. For instance, competencies such as data governance, data security awareness, and business intelligence applications—which are widely valued by enterprises—are not sufficiently reflected in the current objectives. This mismatch between training goals and job requirements has resulted in outcomes that fall short of the expectations for high-quality skilled talents under the guidance of New Quality Productive Forces.

3.2. Lack of Systematic and Forward-Looking Talent Cultivation Models

The current exploration of the Post-Course-Competition-Certificate approach remains incomplete in terms of its operational mechanisms, with noticeable disconnections between its different components. The linkage between classroom teaching and skill competitions is insufficient, leading students to engage in short-term "crash training" before competitions rather than integrating competition standards into regular learning. Moreover, many certificate assessments are completed independently by students outside the classroom, with little alignment between the certificate content and the courses taught. As a result, the value of these certificates is not fully translated into measurable curriculum outcomes.

3.3. Incomplete Curriculum System and Insufficient Cross-Disciplinary Integration

Curriculum construction is primarily focused on the teaching of tools and methods, such as statistics, Python programming, and database operations. However, this approach remains at a "technical skills instruction" level, making it difficult for students to transfer their Python and other programming skills to real-world business analysis contexts. For example, when analyzing e-commerce sales data or conducting financial risk forecasting, students often struggle to connect programming techniques with business logic, resulting in the limitation of "knowing the code but not understanding the business." Furthermore, cross-disciplinary integration is inadequate, and there is a lack of application-oriented courses that combine data analysis with industries such as e-commerce, logistics, and finance.

3.4. Significant Variability in Student Foundations and Difficulty in Personalized Training

The student body is highly diverse, with some students possessing strong backgrounds in science or information technology, allowing them to quickly master programming and data modeling skills. Others, however, have weaker mathematical and logical reasoning abilities, which leads to anxiety and resistance when learning data modeling and programming courses. Given that current courses adopt uniform pacing and requirements, there is a lack of tiered, modular teaching strategies. This situation results in a "polarization" effect: advanced students are not sufficiently challenged, while less-prepared students are unable to keep up, thereby limiting the overall effectiveness of teaching.

3.5. Insufficient Depth of Industry-Education Integration and Weak School-Enterprise Collaboration

Although the institution has established partnerships with several enterprises, the level of enterprise involvement remains superficial, limited mainly to providing lectures and internships. There is insufficient enterprise participation in curriculum development, project design, and teaching evaluation. For instance, discrepancies exist between the software tools taught in school and those actually used in enterprises, leading to a prolonged adaptation period when students transition into internships. This indicates that industry-education integration has yet to achieve true "synchronization" in meeting the needs of both educational institutions and industry stakeholders.

4. Strategies and Recommendations

4.1. Clarifying Training Objectives and Strengthening Job Orientation

Through research on industry development trends and the demand for specific job roles in enterprises, the key positions related to Business Data Analysis are identified, including data analysis, e-commerce operations, marketing, customer service, and management roles. Initial positions encompass data analyst, e-commerce operations assistant, e-commerce

data analyst, and platform operations specialist. After accumulating 3–5 years of work experience, students can gradually advance to managerial roles such as data analysis manager, operations supervisor, and e-commerce manager, forming a career progression path from "technical-oriented—interdisciplinary—management-oriented."To more clearly illustrate the job competency requirements, this study organizes the knowledge, skills, and qualifications required for typical positions (see Figure 1).

Position Category	Specific Position	Main Responsibilities	Knowledge Requirements	Skill Requirements	Professional Qualities
Data Analysis	Data Analyst	Data collection and analysis	Data analysis tools	Python/SQL, Excel/SPSS	Logical thinking, analytical skills
E-commerce Operations	E-commerce Operator	Online platform management	E-commerce platforms	CRM system knowledge	Communication, team collaboration
Marketing	Marketing Analyst	Market research, promotion strategies	Marketing trends	Data analysis	Creativity, problem-solving skills
Customer Service	Customer Support Specialist	Handling customer queries, service management	Customer service processes	Customer service software	Empathy, communication skills
Management	Project Manager	Managing project execution, team coordination	Project management	Leadership, decision-making	Time management, adaptability

Figure 1. Mapping of Competency Requirements for Business Data Analysis Roles

Research indicates that enterprises generally emphasize the need for graduates to possess core competencies in data collection and processing, modeling and analysis, visualization and business interpretation, as well as cross-departmental communication and business understanding. These competency requirements provide clear direction for curriculum design, certificate integration, competition topics, and innovation and entrepreneurship education. Therefore, the talent cultivation objectives of the Business Data Analysis and Application program should be oriented towards cultivating applied, interdisciplinary new-quality skilled talents who master data collection, analysis, and application skills, possess strong business understanding and innovative spirit, and are capable of taking on positions in e-commerce, internet, retail, and other industries.

4.2. Constructing the Integrated "Post-Course-Competition-Certificate-Innovation-Application" Model

The "Post-Course-Competition-Certificate-Innovation -Application (GKCZY)" model achieves deep alignment between the curriculum system and job requirements through the principles of "job-oriented curriculum, competition-driven learning, certificate-based skill development, innovation for added value, and application for implementation." The core idea is to start from the needs of enterprise job positions (Post), dynamically update training goals and course content; reconstruct the curriculum system (Course) by establishing a four-tier structure of "foundation—core—extension—application" to break down the barriers between major courses and interdisciplinary courses; embed vocational skill competitions into the course process (Competition), forming a normalized mechanism of "competition-driven learning"; promote the integration of certificates and courses (Certificate) by breaking down the "1+X" certificate standards into course modules, enabling students to naturally cover knowledge points during their studies; encourage students to initiate innovation and entrepreneurship projects (Innovation) to explore solutions for industry pain points; and, through internships and enterprise projects (Application), achieve the goal of learning by doing.

For example, in the E-commerce Data Analysis course, real competition cases are introduced, allowing students to transition from initial classroom training to more complex tasks at the competition level. This approach not only helps achieve course objectives but also enhances competition performance and increases certificate passing rates, thereby creating a multi-dimensional linkage between the curriculum, competition, and certificates.

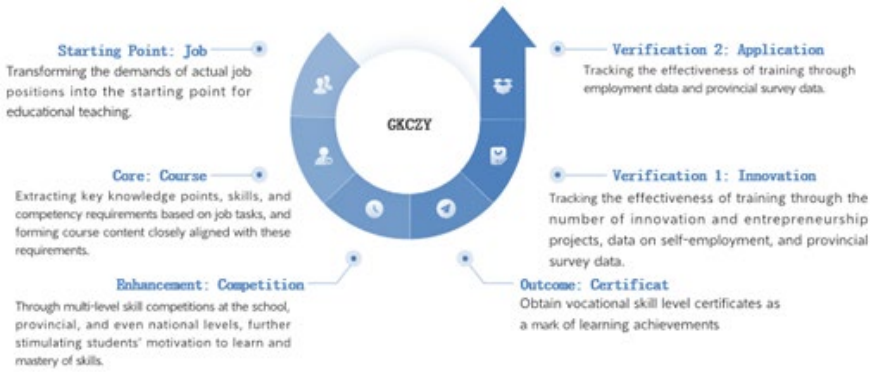

Figure 2. The Six-Dimensional Approach of the "Post-Course-Competition-Certificate-Innovation-Application" (GKCZY) Model

4.3. Deepening Industry-Education Integration and School-Enterprise Collaboration

In the process of deepening industry-education integration and school-enterprise collaboration, it is essential to promote the "deep embedding of industry-education," making enterprises key participants in the entire talent cultivation process. First, in the curriculum development phase, the

school invites enterprise engineers and industry experts to participate in curriculum design and the development of a case study database. This approach integrates the latest business processes and industry data into the classroom, enhancing the courses relevance to current industry needs. For example, in the E-commerce Data Analysis course developed in collaboration with Zhejiang Kuadu Network Technology Co., Ltd., enterprise experts directly participate in case design and teaching, ensuring that the course content accurately matches the skill requirements of the job.

Secondly, in the project practice phase, leveraging the school-enterprise joint laboratory and collaborative innovation platform, the school and enterprises jointly develop real-world projects, such as e-commerce operations, supply chain optimization, and customer profiling analysis. Students directly participate in data collection, cleaning, modeling, and analysis, forming an integrated "learning-research-application" pathway. The e-commerce operations data analysis project, developed jointly by Wenzhou Lichen Network Technology Co., Ltd. and the program, has become a critical part of student training, significantly enhancing their practical skills.

In the assessment and evaluation phase, a "dual-mentor system" is implemented, where enterprise mentors and internal faculty jointly establish evaluation standards and assess student outcomes. This not only ensures the objectivity and authenticity of the evaluation but also highlights job orientation and the application value in real-world business contexts. Through these efforts, industry-education integration has gradually shifted from "formal cooperation" to "deep embedding," forming a full-chain collaborative mechanism that connects curriculum development, project practice, and assessment.

4.4. Improving the Diversified Evaluation and Continuous Improvement Mechanism

In the implementation of the Post-Course-Competition-Certificate-Innovation-Application (GKCZY) model, establishing a scientific evaluation system and continuous improvement mechanism is crucial to ensuring quality. First, in terms of evaluation methods, a diversified system combining "process + outcome + external" is constructed. Process evaluation focuses on students learning engagement and the completion of stage tasks, highlighting the continuity of skill enhancement. Outcome evaluation, through comprehensive practical training, project defenses, and data reports, assesses students ability to apply knowledge in real-world scenarios. External evaluation, using tools such as the "1+X" certificate, competition results, and feedback from enterprise mentors, ensures that students skills align closely with job standards, thereby realizing the goals of "competition-driven learning, certificate-based skill development, and job-oriented guidance."

Secondly, the Continuous Quality Improvement (CQI) mechanism provides strong support for teaching optimization. Through analysis of course objective attainment, the teaching team can promptly identify students weaknesses and make iterative improvements. For example, in the current semesters achievement analysis, it was found that students lacked proficiency in "data visualization expression." As a result, real-world business visualization cases and tool training were added in the following semester, significantly improving student performance. The school also incorporates both student learning experiences and feedback from employers into the improvement process, forming a "combination of internal and external" improvement loop. Thus, evaluation not only serves as a tool for assessing outcomes but also becomes an important driving force for curriculum optimization and teaching reform.

4.5. Promoting the Expansion and Optimization of the Model

After achieving phase-specific results within the program, the Post-Course-Competition-Certificate-Innovation-Application (GKCZY) model should be further expanded and optimized. On one hand, for horizontal expansion, the model should be extended to related programs such as e-commerce, logistics management, and marketing, promoting the collaborative development of interdisciplinary programs. Through program cluster integration, not only can course resources and case studies be shared, but the integration across disciplines can also enhance the comprehensiveness and adaptability of talent cultivation.

On the other hand, for vertical deepening, the model should be closely aligned with regional industrial clusters, creating a long-term mechanism for multi-party collaboration among schools, enterprises, and industries. For example, in cooperation with Zhejiang Kuadu Network Technology Co., Ltd., the school aligned student projects with the companys supply chain optimization needs. This not only enhanced students analytical and decision-making abilities but also provided the enterprise with practical improvement solutions.

Additionally, there is a need to explore cross-institutional alliances, where schools collaborate to build shared course resource databases, case libraries, and training platforms, achieving regional educational resource sharing. This cross-institutional collaborative innovation not only addresses the resource limitations of individual institutions but also lays the foundation for the sustainable expansion of the model. By combining horizontal expansion, vertical deepening, and regional sharing, the GKCZY model is expected to transition from exploration within a single program to a regional demonstration, providing a systematic pathway for vocational education reform and the cultivation of applied talents.

5. Conclusion

This study, based on the context of New Quality Productive Forces, focuses on the Business Data Analysis and Application program in higher vocational colleges. It systematically analyzes the main issues currently existing in talent cultivation and proposes an integrated talent cultivation model centered on the Post-Course-Competition-Certificate-Innovation-Application (GKCZY) approach. The results indicate that this model effectively integrates key components, such as job requirements, curriculum development, skill competitions, professional certifications, innovation and entrepreneurship, and practical application. This integration forms a closed-loop system where goals, processes, and outcomes align, thereby enhancing students' job competence and practical innovation ability, significantly reducing the gap between educational outcomes and industry demands.

From an academic perspective, this study enriches the exploration of the GKCZY model in vocational education, providing a new theoretical framework and research perspective for talent cultivation under the context of New Quality Productive Forces. By organically combining the theories of industry-education integration and continuous

improvement, this paper proposes a verifiable and replicable pathway for building such models, offering a reference for subsequent researchers studying higher vocational education reforms.

From a practical perspective, this study provides a feasible implementation plan for the construction of emerging programs in higher vocational colleges. The proposed restructuring of the curriculum system, the school-enterprise collaboration mechanism, and the improvement strategies for evaluation provide valuable experiences for other institutions in advancing program clusters, deepening industry-education integration, and enhancing student employment quality. Additionally, through the collaboration with regional industry clusters, this model provides sustained talent support for local industrial development and fosters a positive interaction between vocational education and regional economic growth.

Overall, this research not only provides a new theoretical pathway for the study of talent cultivation models in vocational education but also offers practical solutions for the reform of higher vocational education. Future research can further expand to cross-disciplinary and cross-regional studies, exploring the adaptability and promotion strategies of this model in different industrial environments, continuously driving the high-quality development of vocational education under the context of New Quality Productive Forces.

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