

Teaching Reform and Practice of Higher Vocational Courses via the Integration of “Post, Course, Competition, and Certificate”: A Case Study of the “Big Data Analysis in Finance and Taxation” Course

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Abstract

With the deepening of digital transformation in the finance and taxation fields, there is a growing demand for interdisciplinary talents proficient in both finance and taxation expertise and big data processing. However, the current teaching effects of the course “Big Data Analysis in Finance and Taxation” in higher vocational education generally fail to meet the comprehensive competency requirements of relevant job positions. Based on the multi-dimensional integrated educational logic of “Post, Course, Competition, and Certificate,” this paper designs integrated curriculum content and resources, proposes a “Two-Core, Four-Task” teaching model, and carries out teaching reform practices. The results show that students’ practical operation level of big data tools has been significantly improved, and the pass rate of the “1+X” Intelligent Finance and Taxation Certificate has increased. This effectively enhances students’ professional skills through competitions and certifications, and improves their vocational literacy through ideological and political education. This exploration provides a beneficial attempt to achieve the educational goal of the “Big Data Analysis in Finance and Taxation” course in higher vocational education.

Keywords: Integration of “Post, Course, Competition, and Certificate”; Higher Vocational College; Big Data Analysis in Finance and Taxation; Teaching Reform; Multi-Dimensional Evaluation

1. Introduction

The National Vocational Education Conference held in April 2021 emphasized the need to actively explore a comprehensive approach to education integration, including “Post, Course, Competition, and Certificate.” A set of guidelines on promoting the high-quality development of

modern vocational education, issued that same year, further specified the implementation pathways for the integration of “Post, Course, Competition, and Certificate.” In July 2024, the third plenary session of the 20th Communist Party of China (CPC) Central Committee proposed improving the mechanism for fostering virtue through education, and advancing integrated reform and innovation of ideological and political education courses across primary, secondary, and higher education institutions. This series of directives serves as the fundamental guideline for curriculum reform and innovation in higher vocational education.

As the digital and intelligent transformation of the finance and taxation sector continues to deepen, enterprises require multidisciplinary professionals who own not only expertise in finance and taxation but also proficiency in big data processing technologies and strong professional ethics. As a core course in the Big Data Applications in Finance and Taxation program at higher vocational colleges, “Big Data Analysis in Finance and Taxation” course serves as a crucial component in developing interdisciplinary competencies in finance, taxation, and big data. It is highly aligned with the assessment requirements for skills competitions, such as those focusing on the integration of business, finance, and taxation with big data applications. In addition, it is also consistent with some “1+X” Vocational Skills Certification, and incorporates rich ideological and political education resources, making it well-suited for an integrated educational approach that combines “Post, Course, Competition, and Certificate”(Song, 2022).

However, as an emerging course that has emerged alongside the rise of finance and taxation big data applications, the teaching practices of this course still have some shortcomings. There is a disconnect between the curriculum and the actual job requirements of enterprises; big data tools are limited; real-world datasets are lacking; the assessment standards for skills competitions and “1+X” certificates have not been effectively integrated into teaching resources; and the mechanism for integrating coursework, competitions, and certification is not well-established. Furthermore, ideological and political education often remains superficial, failing to integrate deeply with professional knowledge and practical job skills, resulting in unsatisfactory outcomes for comprehensive education.

Domestic and foreign relevant studies provide references for the curriculum reform. In domestic research, Tang et al. (2024) argue that the integration of “Post, Course, Competition, and Certificate” must be achieved through the establishment of a practical teaching system that involves resource integration and diversified assessment. He and Ye (2022) emphasize that the integration of “Post, Course, Competition, and Certificate” with ideological and political education in the curriculum must follow a coordinated educational logic to prevent reforms focused on a single aspect from leading to fragmented outcomes. Zhu et al. (2023) proposed combining job-course-competition-certificate integration with curriculum ideological and political education approach, which achieves the integration of ideological and political education with professional courses. Germany’s Duales Ausbildung system places equal emphasis on developing both vocational skills and a professional work ethic. Anna et al. (2018) emphasizes that vocational curricula need to integrate theoretical knowledge with practical experience in a two-way manner. However, most relevant studies abroad focus on project-driven and workplace-

oriented approaches, and there is a lack of research on the multi-dimensional integration of “Post, Course, Competition, and Certificate” in education (Vogler et al., 2017).

Existing domestic research on the integration of “Post, Course, Competition, and Certificate” has established a solid foundation. However, this emerging field of big data applications in finance and taxation still lacks systematic practical implementation plans, and there is significant room for improvement, particularly in areas such as translating competition standards into practical applications, implementing teaching content, and integrating ideological and political education elements (Chu et al., 2023). Based on this, this paper takes the course “Big Data Analysis in Finance and Taxation” as its research object. Grounded in the multi-dimensional integration of “Post, Course, Competition, and Certificate,” it explores a path for curriculum reform of finance and taxation majors at higher vocational colleges by establishing a “Two-Core and Four-Task” teaching model and simultaneously refining the supporting teaching resources and evaluation system.

2. Analysis of the Current Status and Issues in Curriculum Development

2.1. Discrepancy Between Curriculum Content and Job Requirements

Currently, positions related to financial and tax big data generally require not only expertise in finance and taxation but also the ability to use various software tools to perform big data analysis (Daff, 2021). However, there is currently a significant gap between course instruction and job requirements. In terms of practical training tools, job roles require the ability to combine software such as Python, SQL, and intelligent finance and taxation platforms to process data. However, restricted by limited class time, the software teaching of this course is mostly confined to explanations of basic operations and simple exercises. As a result, enterprises have to invest substantial resources in special training for students after their employment.

From the perspective of practical training, financial and tax data are sensitive corporate information, so courses can only use simulated data. However, simulated data often fail to restore complex scenarios in real business, such as data noise, outliers, and multi-source data docking, leaving students incompetent in data cleaning and analysis under real-world conditions. From the perspective of course contents, the application of big data in the finance and taxation field updates rapidly, while the revision of school training programs and syllabus usually lags behind. This leads to an awkward disconnect: enterprise practical demands cannot feed into curriculum design, while the knowledge learned in schools cannot meet actual job demands.

2.2. Insufficient Integration of Course, Competitions, and Certification Standards

Vocational skills competitions and professional certifications are key carriers of assessing job-related competencies, and schools strongly advocate for the integration of coursework, competitions, and certifications, but the current integration remains far from sufficient. In terms of the alignment between courses and competitions, skills competitions focus on replicating real-world job tasks, requiring students to complete complex and closely interrelated comprehensive tasks within a limited time. In contrast, course instruction primarily focuses on isolated, single

tasks, with simplistic case designs and ample completion time. In terms of aligning coursework with certification, the assessment of the 1+X Intelligent Finance and Taxation Vocational Skill Level Certificate focuses on practical operations, while course design emphasizes the delivery of theoretical knowledge with insufficient and oversimplified practical training; in addition, there are certain discrepancies between the practical training software and the certificate examination system, which affect students' pass rates and the effective integration of courses and certificates (Yan, 2022; Zeng et al., 2021).

2.3. Insufficient Teaching Resource Support

Course instruction still faces challenges such as a lack of applicable datasets, integrated textbooks, and practical training platforms, which fail to support the practical needs of an integrated education model that combines “Post, Course, Competition, and Certificate”. First, there is a lack of authentic and effective financial and tax training datasets; most existing teaching data consists of manually compiled standardized data, which makes it difficult to meet students' practical training needs for data (Shao, 2020). Second, integrated textbooks combining competitions and certificates are lacking; most existing textbooks mainly introduce theoretical knowledge without integrating key job tasks or embedding requirements of competitions and certificates, and they are updated slowly, failing to keep pace with industrial technological changes and adjustments to competition and certificate standards (Li, 2022). Third, diversified practical training platforms are insufficient with limited training software and a lack of modern training tools such as virtual simulation and digital twin technology, which cannot fully simulate real scenarios of financial and tax big data analysis; combined with insufficient training time, students struggle to develop comprehensive business processing skills (Chen, 2019).

2.4. Imperfect Integration of Ideological and Political Education and Evaluation System

There is a prevailing tendency in current teaching to prioritize technical skills over comprehensive literacy, which makes the integration of ideological and political education with professional instruction awkward (Zhang and Zhang, 2025). The exploration of ideological and political elements lacks systematic arrangement, mostly remains at the level of vague concepts, failing to fully integrate the actual characteristics of this course and positions in the field. The course fails to establish a three-dimensional integrated system linking “posts—ideological and political elements—teaching materials.”

In addition, the methods for incorporating ideological and political content are relatively single, usually involving a brief discussion of ideological and political requirements at the end of case or chapter (Gao and Zong, 2017). It fails to naturally integrate ideological and political education requirements, including professional ethics, a sense of responsibility, and data security, into specific professional programs such as data collection, analysis, and decision-making, making it hard for students to be subtly influenced by these values and hindering the simultaneous enhancement of students' ideological awareness and professional competence. Traditional course evaluations primarily assess theoretical knowledge and practical skills, while quantitative assessment of ideological and political education is difficult to implement and is rarely used (Ren, 2022).

3. Overall Framework of Curriculum Reform

The curriculum reform mentioned in this paper adheres to the whole-chain logical mechanism of “job demand orientation, curriculum content restructuring, teaching resource support, teaching implementation, and evaluation feedback,” to ensure coordinated improvement across all components (Wei and Han, 2026). The curriculum reform proposed in this paper takes job requirements as its starting point, which defines the core direction of curriculum contents, and reorganizes modular teaching content based on job tasks, competition and certification standards, and ideological and political education requirements. Resource support and faculty development will ensure the implementation of teaching. Instruction will be conducted through the “Two-Core, Four-Task” teaching model, and a diversified evaluation system will be employed to comprehensively assess the effectiveness of educational reforms and student development. This will provide feedback to guide content optimization and teaching improvements and establish a closed-loop operation and enhancement mechanism centered on “Demands—Implementation—Evaluation—Optimization.”

4. Construction of Integrated Content and Resource System

4.1. Construction of an Integrated “Post-Course-Competition-Certificate-Ideology” Content System

This research collaborates with finance and taxation industry experts as well as competition and certificate examiners to conduct multi-dimensional analyses, thereby developing a systematic curriculum framework. First, job competency decomposition is carried out to identify typical work tasks of core positions, including data analysts and tax risk consultants, extract key professional competencies such as data collection and cleaning, tax risk modeling, and report compilation, and construct a three-dimensional competency framework of “Job Competency – Professional Knowledge – Practical Skills”. Secondly, by referring to the assessment points of the “1+X” Intelligent Finance and Taxation Vocational Skill Level Certificate and the evaluation criteria of the Provincial Vocational College Skills Competition, this paper identifies the core examination points, competition procedures, and scoring rules, and establishes a corresponding curriculum system of “curriculum knowledge points – competition key points – certificate examination points” (Shan, 2020; Lv et al., 2021).

Next, this paper explores the ideological and political implications embedded in practical job scenarios and establishes a three-dimensional resource library covering “position—ideological and political elements—teaching materials,” such as matching the ideological element of responsibility with corporate tax compliance cases for the tax risk analysis position (Wang, 2021). Finally, these components are integrated to compile four modular curriculum contents including fundamental theories, tool application, risk analysis, and comprehensive practical training, so as to achieve the goals of integrating learning with practice, integrating teaching with assessment, and cultivating morality through education.

4.2. Construction of Diversified Digital Teaching Resources

To solve the problem of insufficient curriculum resources, this study proposes a trinity resource cluster consisting of data, teaching materials, and platforms. First, collect desensitized authentic industry data from multiple industries through school-enterprise collaboration and combine it with simulated data from competitions and certificate examinations to aggregate into datasets comprising more than 50 cases. Second, compile an integrated loose-leaf textbook. This textbook consists of multiple project-based assignments, which embed job responsibilities, competition, and certificate examination topics, ideological and political education case studies, and practical guidance. Each chapter features three sub-modules: the knowledge module, the competition and certification alignment module, and the ideological and political expansion module, which will be adjusted and updated in response to technological changes in the industry and to competition and certification changes. Third, establish an “online + offline” practical training platform. The online teaching section makes full use of online platforms, including MOOC, to integrate digital resources such as certificate examination question banks, micro-lesson videos, and real competition questions, and develop online Q&A and independent learning modules. On the other hand, the offline component will utilize tools such as Python and Power BI, as well as artificial intelligence technology, to construct a tax risk simulation training platform. The course will enhance the effectiveness of hands-on instruction by simulating real-world work scenarios involving data processing, risk judgement, and report compilation.

4.3. Construction of the Curriculum Teaching Team

First, in addition to expertise in finance and taxation, faculty members on the course team must master practical operation of big data processing tools, competition and certificate examination tutoring experience, ideological and political integration, and curriculum resource development capabilities. Three approaches could be adopted to enhance teachers’ comprehensive competence. First, serve temporary positions in financial and tax firms, accounting firms each year to improve their practical skills. Second, participate in training for assessors of vocational skill level certificates and competition referees to enhance their comprehensive ability. In addition, they shall regularly supervise student competition and certification programs to stay abreast of industry trends. The curriculum team regularly conducts teaching and research activities and collaborates with companies to develop practical training programs and compile teaching materials. At the same time, some schools’ faculty evaluation systems quantify teaching performance based on factors including satisfaction, student pass rate for competitions and certifications, encouraging faculty to enhance their comprehensive capabilities (Wang and Tang, 2022; Gu, 2021).

5. Reform and Practice of the “Two-Core and Four-Task” Teaching Model

5.1. Establishment of the “Two-Core” Teaching Orientation

“Two cores” refer to the core of teaching objective orientation and the core of organizing teaching content, which are respectively based on concepts and implementation, ensuring that teaching is always centered on students’ developmental needs and real-world application scenarios. Among them, student-centeredness serves as the core of teaching objective orientation,

requires teaching design that aligns with students' cognitive development and growth rhythms. Teachers transform from traditional lecturers into learning facilitators, actively guiding students in engaging in inquiry learning and group discussions and developing students' independent thinking ability and problem-solving skills.

Using comprehensive case studies as the core of organizing teaching content, is the key to achieving the above goals. By integrating fragmented knowledge points into real and comprehensive case studies, students will be able to apply what they learned from the classes to solve work challenges (Cai et al., 2020).

5.2. Construction of the “Four-Task” Progressive Learning Path

The “Four-Task” refers to breaking down the course content into four progressive phases, including learning, practice, imitation, and application (Ai, 2018), to comprehensively enhance students' professional competencies and comprehensive qualities.

(1) Task 1: Basic Theories and Risk Cognition

This phrase focuses on the fundamental theories of the course and integrates the core competency requirements for jobs, competitions, and certifications. Industrial cases are adopted to analyze the application scenarios of big data technology in the field of finance and taxation. Teaching progresses from fundamental knowledge to demonstrations of tools such as Power BI to experience the practical value of digital technology. Corporate tax violation cases are introduced to explain the consequences of illegal behaviors, naturally integrating ideological and political elements.

(2) Task 2: Application of Big Data Tools in Risk Screening

This phase serves as a transition from theory to practice, focusing primarily on the application of big data tools in corporate financial and tax risk screening. Enterprise scenarios closely related to the food manufacturing industry are used, and desensitized financial and tax data of enterprises are adopted. The whole course task guides students to complete data importing, cleaning, and processing and to design visual dashboards using Power BI. During the teaching process, teachers first demonstrate the procedures and explain the key points of the practical job and the related certificates. Students are then divided into groups to simulate corporate finance and tax teams with distinct job roles, and required to complete a comprehensive task within limited time. Upon completion of the task, students submit their analysis reports, and the instructor evaluates and provides feedback. In this way, students can master the application capabilities of big data analytical tools through practice and acquire the skills required for certificates.

(3) Task 3: Integration of Posts, Competitions, and Certifications in Emerging Industries

This phase focuses on deepening and enhancing practical skills by using desensitized financial and tax tasks from companies in the internet industry as case studies. The Internet industry features massive transaction data and complex business scenarios and aligns with the digital transformation trend. It can help students cultivate multi-dimensional big data analysis and risk judgment capabilities.

In this phrase, students work in groups and fully participate in the whole procedures on the basis of task 2. The focus is on guiding students to shift from single-dimensional analysis to multi-dimensional correlation analysis and cultivating students' capabilities for digging deep into the logic of business data, identifying finance and tax risks, and analyzing the causes. Upon completion of the project, each group delivers a presentation of their analysis results in accordance with the presentation requirements of competitions, and then teachers provide feedback, comprehensively improving students' data analysis, report writing, and presentation skills.

(4) Task 4: Comprehensive Application and Integration of Posts, Competitions, and Certifications

This phase focuses on the integration of comprehensive skills aligned with jobs, competitions, and certificates. Students form startup teams in groups and participate in the whole process of building a company, ranging from industry selection to financial and tax management. Students need to integrate the knowledge and skills acquired through the previous tasks, conduct comprehensive analysis, and deliver a group presentation. The presentation evaluation matches the comprehensive competency assessment requirements for the job, competition, and certification, focusing on students' systematic thinking, practical application, and presentation capabilities.

This module guides students to research all the information applicable to their chosen industries. It not only deepens students' understanding of fiscal and tax expertise but also reinforces their professional ethics, while simultaneously cultivating their innovative and entrepreneurial skills.

6. Construction and Implementation of the “Five-dimensional Integrated” Diversified Evaluation Mechanism

6.1. Content and Standards of Course Academic Evaluation

To evaluate the effectiveness of course teaching from multiple perspectives, a multi-dimensional learning evaluation system covering post, course, competitions, certificates, and ideological literacy is constructed.

Practical job competence accounts for 30% of the total score, assessed based on the quality of training tasks, with a focus on the standardization of data processing, the accuracy of risk identification, and the feasibility of proposed solutions. Theoretical knowledge takes up 20%, evaluated comprehensively through class assignments, class participation, and presentations. Competition skills make up 15%, scored based on students' performance in the simulated competitions, as well as awards obtained by students who participate in official competitions. Certification pass rate accounts for 15%, assessed based on the pass rate of the related skill certificates. And ideological and political literacy occupies 20%, evaluated through teachers' assessments and peer evaluation, focusing on professional ethics and a sense of responsibility.

By collecting and analyzing information such as students' academic performance of theoretical knowledge, practical tasks performance, competition awards, and certificate acquisition status,

personalized competency profiles are generated to evaluate the effectiveness of the course instruction (Liu, 2019). This provides feedback for adjusting teaching content and making improvements to teaching models.

To ensure scientific and consistent evaluation, this course clarifies the evaluation subjects and scoring standards for each dimension. For evaluation subjects, a multi-stakeholder collaborative evaluation of "course group teachers + student peer evaluation + certificates and competitions" is adopted: practical skills and course knowledge are assessed by course group teachers; certificates and competition are based on the organizer's results; ideological and political literacy is a combination of teachers' daily observations and peer evaluations by student groups. For unified grading standards, actionable evaluation criteria are formulated for each dimension and announced to students at the beginning of the semester. For the highly subjective dimension of ideological and political literacy, it is transformed into observable and quantifiable behavioral indicators, such as "honest tax payment" into specific behaviors such as whether tasks are independently completed during training or data plagiarism, and "responsibility" is transformed into group task acceptance and completion quality, with scores assigned according to behavior frequency and performance.

For reliability assurance, a dual evaluation system is implemented, with two evaluators scoring independently. Samples with scores exceeding 10% are collectively reviewed by the course team, and consistency checks are conducted each semester, calculating consistency coefficients among evaluators to ensure the reliability and consistency of evaluation results.

6.2. Evaluation of the Effectiveness of Teaching Reform

This study adopts a quasi-experimental research design, selecting two parallel classes from the 2023 cohort of the Tax and Finance Big Data Application major at Zhejiang Institute of Economics and Trade as research subjects. The experimental class has 42 students, implementing the "two cores and four tasks" teaching model integrating "post, course, competition, certificate, and ideology"; the control class has 40 students, continuing with the traditional teaching model. The two classes showed no significant differences in entrance scores and prerequisite course scores as verified by independent samples t-test ($p > 0.05$), ensuring comparability. The sample data are derived from four sources: (1) Practical job skills—at the end of the semester, both the experimental and control classes are assessed using the same set of standardized practical training tasks based on enterprise-desensitized tax and finance data, covering data cleaning, risk modeling, report generation, and other components, with independent scoring by course team teachers. (2) The per capita pass rate of the "1+X" Intelligent Tax and Finance Vocational Skill Level Certificate. (3) Per capita skill competition registration numbers and award records, weighted at 50%-50%. (4) Scores for ideological and political literacy are determined according to the unified evaluation criteria. The improvement magnitude of the teaching reform effects is then calculated to examine the effectiveness of the "post, course, competition, certificate, and ideology" integrated curriculum teaching reform. Improvement magnitude = (experimental class mean score – control class mean score) / control class mean score $\times 100\%$. The study spans one year (February 2025 to January 2026), covering all teaching components of the "Tax and Finance Big

Data Analysis" course from February to July 2025, including the complete implementation of four progressive stage tasks and the end-of-semester comprehensive evaluation, as well as students' performance in skill examinations and competitions during the subsequent semester. According to statistics, the improvement magnitude of practical job skills is 23%; As of January 2026, the pass rate for the "1+X" smart fiscal and tax certificate in the experimental class has increased by 28% compared to the control class; The number of contest registrations increased by 40%, and the number of winners rose by 38% accordingly.

7. Conclusions

This paper takes the "Big Data Analysis in Finance and Taxation" course as the research object, aiming at the core problems, including the disconnect between course content and job requirements and insufficient integration with competitions and certificates. This study reconstructs the integrated teaching contents, focusing on "Post, Course, Competition, and Certificate," develops digital teaching resources, and proposes a "Two-Core and Four-Task" teaching model.

Based on the author's teaching experience and data from multi-dimensional assessments, students' practical job performance has improved by 23%, and students have shown a marked increase in enthusiasm for participating in skills competitions. Ideological and political elements are subtly embedded through authentic work scenarios and practice, fostering students' recognition of professional ethics.

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The authors declare no conflict of interest.

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