Constructing Digital-Intelligent Finance and Taxation Professional Clusters in the New Liberal Arts Context

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Abstract: Under the background of new liberal arts, constructing the Digital-intelligent finance and taxation Professional cluster has become increasingly important. The construction of the Digital-intelligent finance and taxation Professional cluster at Ningbo University of Finance and Economics is grouped according to local industry and job requirements, professional ethics and culture, as well as the technology chain and discipline chain, and a "three-stage and double-sharing" Digital-intelligent financial talent training model has been constructed. This study proposes a construction framework for digital-intelligent finance and taxation Professional clusters through systematically analyzing current challenges and implementing collaborative mechanisms, including curriculum redesign, faculty co-development, and shared practical platforms.

Keywords: New Liberal Arts; Digital-Intelligent Finance and Taxation; Professional Cluster; Digital-Intelligent Curriculum System; Construction Path

1. Introduction

Digital intelligent technologies promote the innovation of finance and taxation-related professional education in universities by integrating quantitative and qualitative research[1], constructing interdisciplinary knowledge systems, and expanding the application scenarios of intelligent finance and taxation. Against this backdrop, the construction of the Digital-intelligent finance and taxation Professional cluster has three-fold strategic value: First, it responds to the needs of regional industrial digital transformation, forcing universities to build an intelligent finance and taxation talent training system. Second, through the cultivation of intelligent finance and taxation talents, the Professional cluster empowers the development of small and medium-sized enterprises, helping enterprises reduce costs, increase efficiency, and achieve digital transformation. Third, relying on the concept of new liberal arts construction, it breaks down professional barriers, forms an ecological environment for collaborative development, realizes the sharing of resources such as courses, Faculty cohort, and practice, constructs a training matrix for compound Digital-intelligent finance and taxation talents, and ultimately forms an educational innovation paradigm that supports regional economic development[2-4].

2. Professional Cluster Group Logic

Driven by the Ministry of Education's policies to deepen the construction of Professional clusters, undergraduate institutions are actively exploring grouping paradigms that adapt to digital intelligent transformation. Based on the construction logic of the "industry chain → technology chain → talent chain → Professional cluster", the Digital-intelligent finance and taxation Professional cluster constructed by Ningbo University of Finance and Economics presents the following three innovative characteristics.

2.1 Consistency between Intra-Group Industry and Job Requirements

Centering around the intelligent finance and taxation service industry chain, the school, by the three-level job chain of "basic financial accounting, intelligent decision-making support, and risk control management", covers 12 emerging job types from intelligent accounting posts to audit assistants (see Table 1 for details). Through the reverse-deduction mechanism of industrial technology demands, Digital-intelligent technologies such as RPA(Robotic Process Automation) and Python are embedded into the new curriculum system.

Table 1. Job Groups and Core Skills in the Financial Industry

Industry	Group	Position Category	Core Competencies
Accounting, Auditing and Tax Services	Accounting Post	1.Intelligent Accounting Post	Automated bookkeeping; Financial data mining; RPA workflow design
		2.Shared Finance Post	Shared finance business processing ability
		3.Financial Robot Application Post	Accounting business processing ability of financial robots
		4.Business Finance Post	Intelligent financial management ability
		5.Data Operation Post	Data operation management ability
		6.Internal Control and Risk Control Post	Internal control design and risk control ability
	Tax Post	7.Tax Accounting Post	Tax calculation, declaration and payment ability
		8.Tax Services and Consultation	Tax-related verification serviceability
		9.Intelligent Tax Risk Early Warning	Tax risk assessment, early warning, and risk control model-building ability
		10.Tax Planning Post	Big data-based tax planning ability
	Internal Audit Post	11. Internal Audit Post	Internal audit and supervision ability
		12.Audit Assistant	Financial statement audit ability

2.2 Consistency of Professional Ethics and Culture within the Group

Relying on the spirit of "steadfast practice, versatility, integrity, and loyalty" in the Caiyong Business Culture, the school constructs a unified professional ethics training system for the accounting, auditing, and taxation Professional cluster. Through on-campus laboratories such as the Financial and Business Education Laboratory, the Labor Education Base, and the Cloud Financial Intelligence Experiment Center, as well as off-campus practice bases, a three-level training path for the curriculum modules of the Professional cluster is realized, namely "joint training of basic skills, separate training of core skills, and combined training of comprehensive skills".

2.3 Consistency of the Technology Chain and Discipline Chain within the Group

The school adopts a mixed model of "two-way mapping between the technology chain and the discipline chain". It not only maintains the advantages of traditional disciplines such as financial management and accounting, but also achieves rapid iteration by adding directions such as Digital-intelligent financial stewards, big data auditing, and intelligent accounting. Compared with the mature industry-oriented model of higher vocational colleges, the construction of undergraduate Professional clusters places more emphasis on the two-way mapping between the technology chain and the discipline chain. The practice of Ningbo University of Finance and Economics shows that by constructing a "technology demand analysis matrix" and a "disciplinary ability transformation model", the problem of technological lag in the integration of industry and education can be effectively solved, and a new paradigm for cultivating Digital-intelligent finance and taxation talents with undergraduate characteristics can be formed.

3. Analysis of the Current Situation of the Professional Cluster

3.1 The Existing Basic System of the Professional Cluster

After more than a decade of professional construction and accumulation, Ningbo University of Finance and Economics has constructed a Digital-intelligent finance and taxation Professional cluster system with the provincial-level advantageous major of financial management as the leader, the accounting major as the backbone, and the auditing and taxation majors as the support. Among them, the financial management major is a first-class major in Zhejiang Province and a brand major in Ningbo. It has formed a characteristic discipline focusing on the direction of family wealth management. The accounting major features the intelligent accounting direction. The auditing major is characterized by big data auditing and

strengthens the cultivation of internal audit characteristics. The taxation major highlights the shaping of big data tax analysis capabilities. The four majors form an ecological Professional cluster structure of "advantage - leading, a backbone - supporting, and characteristic - complementary", as shown in Table 2.

Table 2. Current Situation of the Digital-intelligent Finance and Taxation Professional Cluster at Ningbo University of Finance and Economics

Professional Name	Existing Foundation of the Major	Status in the Professional cluster
Financial Management	Provincial-level advantageous major in Zhejiang Province, brand major in Ningbo, first-class major in Zhejiang Province, school-level characteristic discipline in family wealth management	Advantageous major
Accounting	Key cultivation major for the master's degree program in accounting, school-level applied major, with a characteristic direction of "intelligent accounting"	Backbone major
Auditing	Key cultivation major for the master's degree program in auditing, school-level applied to major, highlighting big data auditing, with a direction of "internal audit"	Supporting major
Taxation	Highlighting big data tax analysis	Supporting major

3.2 Construction of the Digital-Intelligent Curriculum System

3.2.1 Modular curriculum structure

A dual-track curriculum system was developed, integrating foundational shared courses with discipline-specific modules. The basic shared courses include 8 general Digital-intelligent technology courses such as Python Programming and Accounting Information Systems. The characteristic-separated courses consist of 12 differential direction courses such as Financial Big Data Analysis and Frontier of Fiscal and Taxation Informatization. Among them, the intelligent accounting direction offers a characteristic curriculum group such as Financial Robots, and the auditing major develops a practical curriculum group such as Digital Simulation of Auditing Practice, as shown in Table 3.

3.2.2 Ladder-type training path

Since 2016, the "three-stage progressive cultivation mode of foundation, specialty, and integration" has been implemented. In the first and second years of college, tool-based courses such as Python and EXCEL Financial Application are offered to lay a solid digital foundation. In the second and third years, professional application courses such as Financial Shared Services and Big Data Financial Analysis are set up to strengthen the ability of technology integration. In the third and fourth years, through comprehensive training such as cross-professional enterprise operation simulation and financial decision-making simulation, the practical ability of digital intelligence is constructed. This system has formed a complete training loop of "tool mastery, technology application, and scenario practice".

3.3 Achievements in Professional Construction

3.3.1 Achievements in curriculum construction

The Professional cluster has cumulatively built 23 provincial-level first-class courses (accounting for 27% of the total in the university), 6 municipal-level MOOCs, and 25 school-level golden courses and industry-education integration courses. An intelligent monitoring system has been fully implemented for core courses, and the achievement rate of curriculum objectives exceeds 90%. Courses such as "Internal Control" have been selected as provincial-level ideological and political demonstration projects for courses, forming the characteristic of dual-element education of "technology + ideological and political education".

Table 3. Curriculum of the Digital-intelligent Finance and Taxation Professional Cluster

Planned Professional cluster	Professional Name	Courses Related to Digital-intelligent Finance and Taxation
Digital-	Financial	Basic Python Programming (General Course), Accounting Information

intelligent Finance and Taxation Professional cluster	Management	System, Frontier of Financial Informatization Development, Financial Shared Services, Financial Big Data Analysis, Statistical Analysis and Software Application, Big Data Thinking and Decision - making (Interdisciplinary Elective Course), EXCEL Financial Application, Simulation Training for Multiple Accounting and Finance Posts, Cross - professional Enterprise Operation Simulation Training, Comprehensive Financial Decision - making Simulation
	Accounting	Basic Python Programming (General Course), Accounting Information System, Frontier of Financial Informatization Development, Courses for the Intelligent Accounting Direction (ERP Supply Chain Management, Financial Robots, Financial Big Data Analysis, Financial Shared Services, Implementation of Financial Informatization Projects), Financial Application of Database Technology, Statistical Analysis and Software Application, Big Data Thinking and Decision - making (Interdisciplinary Elective Course), EXCEL Financial Application, Simulation Training for Multiple Accounting and Finance Posts, Cross - professional Enterprise Operation Simulation Training, Comprehensive Financial Decision - making Simulation
	Auditing	Basic Python Programming (General Course), Accounting Information System, Frontier of Auditing Digitalization Development, Financial Shared Services, Statistical Analysis and Software Application, Big Data Thinking and Decision - making (Interdisciplinary Elective Course), Information Technology Auditing, Digital Simulation of Auditing Practice, Simulation Training for Multiple Accounting and Finance Posts, Comprehensive Financial Decision - making Simulation
	Taxation	Basic Python Programming (General Course), Accounting Information System, Big Data - related Tax Risk Analysis, Frontier of Fiscal and Taxation Informatization Development, Financial Application of Database Technology, Statistical Analysis and Software Application, Big Data Thinking and Decision - making (Interdisciplinary Elective Course), EXCEL Financial Application

3.3.2 Achievements in school-enterprise cooperation

A four-party collaborative education platform of "government, school, industry, and enterprise" has been established. On-campus, a provincial-level cloud financial intelligence experiment center has been built, with 5 special laboratories such as the financial sharing laboratory. Off-campus, 1 provincial-level demonstration base, and 7 school-level bases have been established. Excellent classes in intelligent finance have been jointly established with enterprises such as UFIDA and New Channel. The group has undertaken 6 industry-university cooperation projects of the Ministry of Education and 3 provincial-level projects. The collaborative mechanism of "industrial professors + dual-qualified teachers" has been innovated.

At present, the Professional cluster has formed the construction characteristics of "penetration of Digital-intelligent technology, deep integration of industry and education, and progressive improvement of ladder-type abilities". Currently, the Professional cluster has initially completed the transformation in the Digital-intelligent direction, cultivating compound finance and taxation talents for regional economic development.

4. Problem Analysis

4.1 Synergies in Specialized Clusters Have Not Yet Been Exploited

Currently, the digital transformation of the Professional cluster lacks the leadership of the Professional cluster as a whole, and no joint force has been formed, restricting the overall collaborative development. The digital transformation of each major shows a discrete characteristic. On the one hand, the curriculum system lacks top-level design. There is no course-mutual - selection mechanism among the four majors. For example, although there is some overlap in the content of the Financial

Big Data Analysis and Tax-related Big Data Analysis courses, the teaching teams develop them independently. On the other hand, the cultivation of the Faculty cohort is carried out separately, and the curriculum system lacks a unified Digital-intelligent curriculum standard framework. This discrete development has led to a slow digital transformation of the Professional cluster, and there is an urgent need to build a collaborative mechanism of "co-building standards, sharing resources, and jointly researching projects".

4.2 Shortage of Interdisciplinary and Compound Faculty Cohort

Among the existing Faculty cohort in the Professional cluster, those with a pure finance and economics background account for 82%, those with a pure information technology background only account for 7%, and those with a dual-discipline background are less than 11%. Faculty members over 50 years old showed significantly lower technology adoption rates, making it difficult to meet the current demand for the cultivation of accounting and finance talents in the context of Digital-intelligent technologies such as artificial intelligence.

4.3 Lagging Construction of the Digital-intelligent Practice Platform

The investment in the Digital-intelligent financial experimental and training platforms in on-campus laboratories needs to be increased. Off-campus practice bases mainly focus on cognitive internships and graduation internships, with a relatively low proportion of project-based practices. The courses jointly built by schools and enterprises account for 18% of the total practical courses. Current practical training resources demonstrate effectiveness in foundational skill development but show limitations in delivering advanced competencies required for complex financial scenarios. The satisfaction of industry-finance integration training in complex scenarios still needs to be improved.

5. Solutions

5.1 Constructing A Dual-Chain, Synergistic Education System Integrating Industry and Education

Based on Ningbo's “246” trillion industrial cluster development strategy and the manufacturing industry's demand for capital flow management, we have established a professional group structure with a five-dimensional link between “capital financing, accounting and supervision, capital management, risk control, and governance, and tax planning”. Through the four-way linkage of schools, the government, banks, and enterprises, we focus on cultivating new financial talent with digital thinking skills and financial management abilities (financial compliance, tax planning, internal control, auditing, and other composite skills). The “dual-unit, three-stage” training model focuses on financial sharing and intelligent accounting ability training in the middle and lower stages and on strengthening financial analysis, decision-making, and intelligent risk control training in the higher stages. This forms a “technology-based, industry-finance integration, strategic decision-making” ability progression chain.

5.2 Innovative Mechanism of Sharing and Synergistic Development of the Professional Cluster

The construction of the professional group realizes resource sharing through three major synergistic mechanisms: ① modular reconstruction of the curriculum system (grassroots sharing, mid-level streaming, and high-level mutual selection); ② matrix management of the faculty (professional affiliation + intra-group mobility).

5.2.1 Curriculum sharing within the cluster: Construct a three-tier modularized curriculum system of “grassroots+middle+higher level”.

Reorganize the main line of the professional group's curriculum, reorganize the main line of the Numerical Intelligence Taxation Professional Group's curriculum by the three layers of “grassroots, middle and upper levels”, do a good job of articulating the curriculum before and after, and mainly achieve the following goals: First, the basic curriculum (base sharing), ensure the basic specifications of the professional group and the common requirements for comprehensive development, and achieve the “bottom-sharing” of the basic curriculum. “The second is the core courses (mid-level streaming + sharing) reflecting the characteristics of each specialty talent

cultivation, and realizing the streaming cultivation of talents in different specialties (directions) and the knowledge and ability cultivation objectives of different specialties; the third is the expansion of the courses for mutual selection (high-level mutual selection), to meet the diversified choices of students' vocational positions and to achieve the mutual integration and communication of the four specialty job groups in the cluster, and to cultivate students with the best knowledge and ability in the field of education. Thirdly, to expand the mutual selection of courses (high-level mutual selection) to meet the diversified choices of students' vocational positions, to achieve the mutual integration and communication of the four professional positions within the cluster, and to cultivate high-quality composite application talents.

To guarantee the realization of the goal, the "curriculum group" of the professional group of mathematics, intelligence, finance, and taxation is established, and the original curriculum group of mathematics, intelligence, finance, and taxation is reconstructed by "grassroots+middle+higher level", to break the professional barriers and carry out the development of the professional group's "curriculum group" with the professional group's "curriculum group" as the starting point. The "curriculum group" of the professional group will be used as a handhold to carry out curriculum construction.

5.2.2 Faculty sharing: cultivating "shared" mathematical and intelligent teachers for professional groups

The faculty team integrates the majors of financial management, accounting, auditing, and taxation, and establishes a teaching faculty team with strong professional technology, solid theoretical knowledge, and skilled operation, to jointly undertake the formulation of talent cultivation programs for the professional group in the context of the new liberal arts[5-7], the design of the professional group curriculum, the construction of the teaching resource base for the professional group, the reform of teaching materials and methods, the upgrading and reconstruction of practical teaching bases, the construction of the technical skills platform, etc. The faculty team will be responsible for the development of the training programs for the professional group in the context of the new liberal arts[8-10]. The main measures are: first, attracting and training students to the professional cluster.

The main measures include: firstly, attracting and training high-level professional group leaders; secondly, attracting and training shared backbone teachers; thirdly, building a structured teaching innovation team (age, title and academic qualification); fourthly, introducing a part-time teaching team composed of high-level industry experts.

5.3 Ecological Construction of Practice Platform Shared by the Professional Cluster

The integration of industry and education is driven by the construction of professional groups, and the cooperation between schools and enterprises in building on-campus laboratories and off-campus practice bases, constructing the "virtual and real double integration" practice system, and realizing the "four truths" (real data, real processes, real positions, real training, and real training). Real data, real process, real positions, real assessment) teaching scene full coverage. Schools and enterprises jointly build a dynamically updated teaching resource base, forming a three-level ability forging a system of "basic practical training, special training, and comprehensive combat". Developing a teaching resource base for professional groups, realizing reform of teaching materials and teaching methods, upgrading and constructing practical teaching bases, and building technical skill platforms.

The main measures include: first, sharing of on-campus experimental and practical training software; second, sharing of off-campus practice bases; and third, sharing of school-enterprise cooperation units. Joint development of teaching resource base for specialty groups within specialty groups, including teaching materials, catechism courses, teaching cases and so on.

6. Summary and Prospect

6.1 Summary

After five years of systematic construction, the Professional cluster has constructed a "three-layer, dual-sharing" talent cultivation paradigm and achieved three landmark results. First, it has innovated the curriculum system of "bottom-layer sharing, middle-layer divergence, and high-layer mutual selection",

developed 6 intelligent finance and taxation courses, and achieved an inter-professional course mutual - selection rate of 82%. Second, it has established a Faculty cohort cultivation system shared by schools and enterprises. The proportion of dual-qualified teachers has increased to 30%, and the number of teaching case databases jointly developed by schools and enterprises has reached 20. Third, it has created a "virtual - real dual - integration" shared practice platform, building on-campus and off-campus experimental and practice platforms, including 1 - a campus provincial-level practice base and an on-campus provincial-level experimental platform. Through collaborative mechanisms such as curriculum reconstruction, co-cultivation and sharing of Faculty cohort, and co-construction of practice platforms, more than 2,300 compounds of Digital-intelligent finance and taxation talents with core abilities such as financial robot application and financial big data analysis have been cultivated, supporting the financial digital transformation of small and medium-sized manufacturing enterprises in Ningbo.

6.2 Prospect

Looking to the future, the following strategies are planned to be implemented. First, horizontally cross - border, expand the disciplinary boundaries, integrate disciplines and majors such as data science and big data technology, and construct interdisciplinary curriculum modules of "financial intelligence + data governance + algorithm application". Second, vertically deepen, continue to strengthen the integration of industry and education with companies such as UFIDA and Shuiyou, jointly build an intelligent finance and taxation joint laboratory, and develop an experimental and training system for intelligent finance and taxation analysis and decision-making. Third, by constructing an interdisciplinary ecosystem of "finance and taxation + data + technology", create a new high-ground for cultivating intelligent finance and taxation talents in Ningbo.

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