

Industry-Education Integration as a Driver for Digital and Intelligent Transformation in Practical Teaching of Human Resource Management Programs at Application-Oriented Universities

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Abstract: This study explores the pathways and measures for digital-intelligent reform in the practical teaching of human resource management programs at application-oriented universities, driven by industry-education integration. Combining literature review and field investigation, the research analyzes competency requirements for HR professionals in the digital-intelligent era, examines practical challenges in Beijing Union University's HR program, and proposes reform strategies anchored in industry-education collaboration. Key findings demonstrate that constructing a "Trinity-Four Stage-Five Dimension" practical teaching system, optimizing collaborative education networks, innovating digital-intelligent platforms, and enhancing faculty development can effectively improve students' digital intelligence skills, innovation capabilities, and employment competitiveness. The study concludes that integrating industry-education synergy with digital-intelligent empowerment enables precise alignment between talent cultivation and industrial demands, offering actionable reform approaches for applied higher education institutions.

1. Introduction

With the rapid evolution and application of modern technologies such as artificial intelligence and big data, the field of human resource management (HRM) is undergoing unprecedented transformation. The adoption of digital and intelligent technologies in HRM is becoming increasingly widespread, significantly driving up demand for professionals with digital and intelligent management skills. Consequently, new requirements have emerged for talent development in HRM programs. As a critical component of talent cultivation in applied universities, advancing the digital and intelligent transformation of practical teaching can effectively equip students with new technologies and methodologies. This optimization of talent supply ensures better alignment between workforce development and industry demands.

According to the 2022 Employment Quality Report issued by China's Ministry of Education, person-job fit rate for human resource management graduates was merely 63.7%, revealing a significant mismatch between traditional training models and talent requirements in the digital

economy era. As an institutional innovation paradigm within modern education systems, industry-education integration fundamentally achieves four-dimensional coupling among educational chain, talent chains, industrial chains, and innovation chains^[1]. This approach establishes a talent cultivation ecosystem that maintains a dynamic equilibrium between "industry demands and educational supply," while forming a tripartite industry-education integration community comprising "schools-enterprises-industries." Such integration facilitates precise alignment between talent development standards and corporate competency models^[2-3]. Given this context, promoting digital-intelligent transformation in HRM practical teaching through industry-education integration has become an imperative for applied universities. This study first systematically examines the competency requirements for digital-intelligent HRM professionals, subsequently analyzes the current challenges in implementing digital-intelligent reform of HRM practical education. Subsequently, it proposes solutions leveraging industry-education integration to address these challenges, ultimately aiming at enhance the quality of applied talent cultivation in digital-intelligent HRM programs.

2. New Requirements for the Cultivation of Digitally Intelligent Human Resource Management Talents

Digital intelligence represent both "intelligent digitalization" and "digitalized intelligence." Digitalization quantifies physical entities into data, which is then transformed into information and knowledge through human intelligence and digital technologies to drive social development. Intelligence emphasizes deep human-machine interaction and collaborative cooperation to achieve human-machine integration^[4-5].

Under the trend of digital-intelligent innovation and data-driven decision-making, "human data" has become the connecting point of all HRM functions, and human resource management professionals need to build comprehensive competency system of "technology application + management innovation + value creation", with the following capabilities strategic thinking and data literacy, the ability to apply digital tools, and innovative management and change leadership. Among them, data literacy and the ability to apply digital intelligence tools mainly involves four major aspects: first, strategic synergy and value transformation capabilities, including: 1) strategic decoding capabilities, transforming the enterprise digital transformation strategy into HRM execution pipeline, and enhancing organizational effectiveness based on data intelligence; 2) business coupling capabilities, the ability to deeply integrate the digital characteristics of business scenarios, and to achieve a dynamic match between business demand and talent supply; 3) capital quantification capabilities, the ability to use digital twin technology to simulate human capital inputs and outputs, and to establish a machine learning-based talent value measurement system. Second, technological integration and intelligent decision-making capabilities include: 1) Application of intelligent tools - proficiency in utilizing HR SaaS, AI recruitment systems, digital employee profiling tools, and understanding the application logic of machine learning in talent assessment to achieve management process automation; 2) Data-driven-decision-making - possessing skills in data cleaning and visual analysis, enabling big-data-based talent early warning management across various dimensions. Third, digital innovation and organizational enablement capabilities include: 1) Human-machine collaboration - the ability to work alongside intelligent systems to enhance the management efficiency while adhering to AI ethical principles; 2) Agile change management - leveraging big data analytics to dynamically adjust management strategies and improve organizational adaptability; 3) Digital culture cultivation - fostering a data-driven decision-making culture to establish new employment relationships. Fourth, cognitive evolution and knowledge iteration capabilities include: 1) Technological foresight - the ability to track cutting-edge technological developments and anticipate their impact on organizational structures; 2) Interdisciplinary integration - synthesizing knowledge

from behavioral economics, neuroscience and other fields to form a transdisciplinary knowledge structure; 3) Meta-learning - the capacity for skill transfer and adaptive learning.

Facing the change of talent demand triggered by digital intelligence technology, human resource management programs in application-oriented university and colleges urgently need to transform from the traditional teaching system and mode to the direction of digital intelligence management with multidisciplinary integration and data-driven decision-making^[6-7]. As a profession with strong practicality, promoting the reform of the practical teaching of digitalization is the key path to strengthen capacity-building as described above, improve the efficiency of talent cultivation, and narrow the gap between talent cultivation and the industry's demand for digitalization and transformation.

3. The Dilemma of the Reform of Numerical Intelligence in Human Resource Management Professional Practice Teaching

Currently, human resource management programs are progressively implementing digital-intelligence reforms in practical teaching, achieving certain outcomes such as establishing digital simulation platforms and optimizing hardware/software environments. However, significant challenges persist in reconstructing knowledge systems, developing digital-intelligence practice resources, updating applied technologies, and enhancing faculty capabilities. These limitations have hindered the synergistic integration of knowledge innovation, talent cultivation, and industrial digital-intelligent transformation, consequently impeding the development of students' digital-intelligent HRM competencies.

3.1 Insufficient reconstruction of the mathematical intellectualization knowledge system, lack of discipline integration curriculum system and higher-order integrated practice courses

The current data governance framework in human resource management theory exhibits structural deficiencies, lacking an integrated "technology-institution-culture" coordination mechanism adapted to digital-intelligent transformation. The digitization of theoretical instruction lags behind industry development. Teaching transformation demonstrates significant inefficacy, manifesting as a generational gap characterized by "theoretical obsolescence-practical disconnection," with only 35% digital penetration in pedagogical systems (Ministry of Education, 2022). Furthermore, there is an absence of interdisciplinary curriculum ecosystems facilitated by industry-education collaboration. The curriculum system lacks systematic planning, with disconnections between course modules. For instance, there is a clear absence of practical application linkages between data analysis courses and specialized courses such as job analysis and recruitment. This makes it difficult for students to apply data analysis skills in actual recruitment scenarios, hindering the construction of their knowledge system and practical abilities. Additionally, insufficient interdisciplinary integration with engineering disciplines like computer science leaves students ill-equipped to apply emerging technologies such as artificial intelligence to human resource management practices in the context of digital transformation. The lack of advanced comprehensive practical courses and real-scenario-driven project-based courses further restricts the development of students' innovative thinking and teamwork capabilities.

3.2 Lack of practical teaching resources for digital intelligence, limited opportunities for multi-scenario authentic digital intelligence management learning experience

The development of digital-intelligent practice resources faces multiple challenges. Firstly, the sensitivity of human resource management positions coupled with data security risks of digital-

intelligent technologies has reduced corporate willingness to accept student interns. Secondly, insufficient corporate investment in training for digital-intelligent tools and data analysis results in superficial guidance, making it difficult for students to gain effective practical experience, particularly hands-on training in core skills like machine learning and data visualization. Thirdly, limited intern intake capacity per enterprise and geographically dispersed placements increase teaching management difficulties. The lack of widespread adoption of remote digital-intelligent management systems hampers effective supervision and process monitoring of decentralized internships. Fourthly, constrained internship durations prevent students from participating in complete business processes, leading to low utilization of practical educational resources. Additionally, inadequate industry-education collaboration mechanisms fail to simulate authentic workplace scenarios effectively, hindering students' mastery of digital-intelligent HRM practices. Outdated practical curriculum systems lag behind industry advancements, lacking cutting-edge content such as big data and AI applications in HRM, consequently impeding the enhancement of students' professional competencies and employment competitiveness (see Table 1 for details).

Table 1: Current Situation of Practical Teaching in Some Professional Courses.

Course Name	Problems with Practical Teaching	Key Skills and Knowledge Missing From Students
Organization and Job Design	Simulation software is outdated and lacks realism	Skills to optimize organizational structures and processes using big data analytics
Recruitment and Talent Assessment	Failure to incorporate big data analytics to screen candidates	Screening skills to accurately match corporate culture and job requirements
Training and Human Resources Development	Training methods and techniques out of sync with business needs	Skills in developing individualized training plans and data application skills
Performance Management	Outdated simulation software and insufficient hands-on training	Employee assessment and incentive program development skills based on multidimensional data analysis
Remuneration Management	Outdated simulation software and insufficient hands-on training	In-depth understanding of the practicalities and challenges of payroll management

3.3 Practical application technology and tools are lagging behind, and a complete digital intelligence technology practice platform system has not yet been established

The construction of digital-intelligent laboratories faces dual constraints. Firstly, hardware iteration lags coexist with system silos, where industry-adapted technological infrastructure remains inadequate. Specialized equipment such as intelligent recruitment terminals suffers from slow updates, failing to meet modern pedagogical demands. Concurrently, the absence of data interfaces between disparate practice software systems results in fragmented operational modules—including talent assessment and performance simulation—thereby hindering the development of integrated digital practical teaching scenarios. Secondly, the scarcity of industry-education-integrated digital-intelligent teaching platforms, coupled with the deficiency of comprehensive projects unifying "theoretical modeling-data decision making-management simulation," undermines laboratories' capacity to effectively support innovative teaching methodologies. This limitation consequently curtails the outcomes of pedagogical reform. These deficiencies not only compromise the cultivation of core professional competencies (e.g., human efficiency analysis and organizational diagnosis skills) but also diminish laboratories' pivotal role in strengthening industry-academia-research collaboration and enhancing students' vocational competitiveness.

3.4 Teachers' mathematical and intellectual literacy and practical experience are insufficient, and the construction of a faculty adapted to the application of modern technology needs to be strengthened

HRM faculty members generally possess solid theoretical knowledge but demonstrate deficiencies in practical experience, digital-intelligent literacy, and technological application, necessitating the urgent improvement in practical teaching capabilities. Three key limitations exist: First, outdated pedagogical concepts result in inadequate integration of digital-intelligent technologies into practical instruction, creating a disconnect between teaching content and actual corporate needs. Second, insufficient capacity to develop experimental projects for cutting-edge applications such as intelligent recruitment and big data analytics leads to a scarcity of comprehensive and design-oriented lab courses. Thirdly, the ability to build network shared practice teaching resources is limited, especially at the level of practice teaching design, there is still a lack of teaching content and programs that effectively integrate statistics, big data analysis, artificial intelligence and other digital technologies with the perspective of human resources management, which is not conducive to the enhancement of students' comprehensive literacy in the process of "learning to do, learning to create", and also restricts the cultivation of their innovative practice ability. It also restricts the cultivation of their innovative and practical abilities.

4. Paths and Initiatives for Reform of Digital Intelligence Enabled Practice Teaching in Human Resource Management Major

4.1 Driven by the integration of industry and education, practicing the concept of result-oriented education, and constructing a digital wisdom-enabled practice teaching system

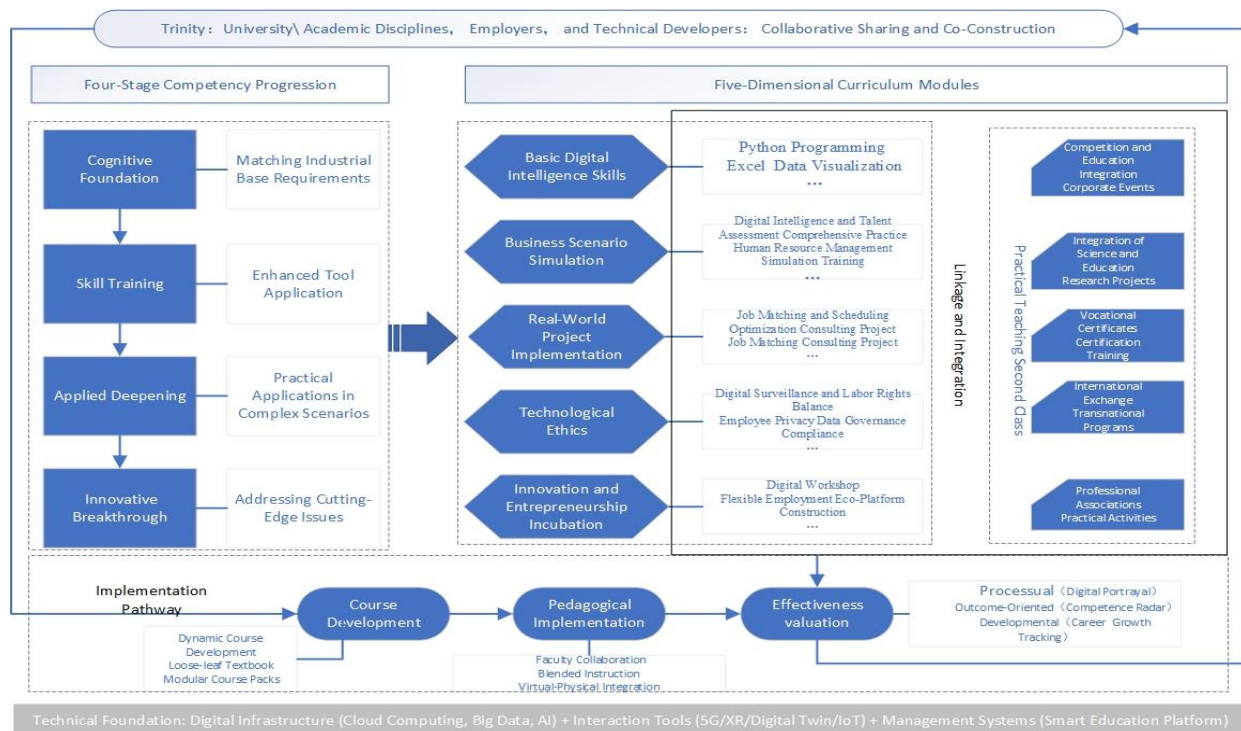


Figure 1: The "Trinity-Four Stage-Five Dimension" Practical Teaching System.

The Outcomes-Based Education (OBE) concept centers on learning outcomes, employing backward design to stimulate students' motivation and potential while emphasizing personalized

cultivation and formative assessment. This approach aligns seamlessly with the industry-education integration philosophy, as both advocate demand-driven talent development with attention to individual differences and process monitoring. Their coupling relationship manifests in three dimensions: goal alignment, process synchronization, and outcome equivalence ^[8]. The Human Resource Management program at Beijing Union University has developed a "Trinity-Four Stage-Five Dimension" practical teaching system (as shown in Figure 1), driven by industry-education integration and grounded in Outcome-Based Education (OBE) principles. This system deeply integrates the core logic of outcomes-oriented education with dynamic response mechanisms to industry needs.

This system deeply integrates the core logic of outcomes-based education with dynamic response mechanisms to industry needs, featuring the following key characteristics: 1) Trinity Collaboration Mechanism. Following the ADDIE instructional design model, systematic curriculum development comprises five phases: Analysis, Design, Development, Implementation, and Evaluation. The Human Resource Management program establishes a three-party collaboration among educational institutions, employers, and technical platform developers. This integration incorporates corporate HR case studies, government open data (e.g., employment monitoring reports, labor force surveys), and practical teaching platforms. Following the "curriculum development→teaching implementation→outcome evaluation" pathway, it achieves comprehensive co-construction of core courses including HR planning, recruitment & staffing, training & development, performance management, compensation management, and labor relations - forming an industry-education integration closed loop. The tripartite mechanism enables precise anchoring of industry competency requirements through deep collaboration, facilitates backward design of quantifiable learning objectives, and constructs resource loops for dynamic iteration of teaching cases and data. It systematically implements OBE's key principles of backward design, continuous improvement, and measurable outcomes, creating an innovative approach where educational quality and industrial value mutually validate each other. 2) Four-Stage Competency Progression. Grounded in Problem-Based Learning (PBL) theory and aligned with OBE's "higher-order competency development" objectives, this framework establishes a developmental pathway: "Cognitive Foundation → Skill Training → Application Deepening → Innovation Breakthrough," ensuring dynamic alignment between competency development and industrial upgrading demands. The cognitive foundation phase focuses on establishing fundamental HRM knowledge systems while cultivating students' strategic thinking through case studies of benchmark enterprises. The skill training phase emphasizes enhancing digital tool application capabilities in HRM, incorporating business simulation and virtual training exercises. The application deepening phase adopts authentic corporate HR projects to facilitate effective transformation of theoretical knowledge into practical operational skills. The innovation breakthrough phase concentrates on cutting-edge developments and challenges in enterprise HR reforms, aiming to develop students' change leadership competencies. This four-stage progressive competency development pathway not only refines core literacies—including professional skills, data thinking, innovative spirit, and continuous learning ability—into quantifiable instructional objectives, but also ensures full-cycle traceability of the competency development process under OBE principles. Furthermore, it embodies and implements OBE's core tenets of demand responsiveness and precision cultivation. 3) Five-Dimensional Curriculum Modules (as shown in Table 2). Built upon the student-centered OBE philosophy and grounded in constructivist and situated learning theories - which posit that knowledge is actively constructed by learners through autonomous learning and emphasize the "legitimate peripheral participation" nature of learning - the framework comprises five modules: "Fundamental Digital Intelligence Skills→Business Scenario Simulation→Real-World Project Practice→Technology Ethics→Innovation & Entrepreneurship Incubation". This comprehensive structure spans the complete educational continuum from theoretical understanding to innovative

practice, creating enriched virtual and physical learning environments that foster interactive and participatory student engagement. At the course-specific level, the teaching activities similarly adhere to the five-dimensional synergistic logic of "learning-practicing-applying-reflecting-creating." This framework guides students in mastering knowledge and skills while simultaneously cultivating their ethical reasoning capabilities and innovative awareness, thereby facilitating deep knowledge construction and comprehensive competency development. Furthermore, the five-dimensional course modules enable precise alignment between curricular content and professional competencies. Through innovative approaches such as explicitly assessing technological ethics as an independent module, offering dedicated courses, and establishing an ethical conflict case repository encompassing typical HR management scenarios and digital-intelligent application contexts, this model transcends the conventional competency dimensions of the OBE framework. It establishes a tripartite educational paradigm integrating "technical skill cultivation-advanced practical training-ethical value internalization," offering reform insights for the localized implementation of outcome-based education theory.

The implementation pathway of this pedagogical system comprises: 1) Dynamic Curriculum Development. The industry-education integration community is established through collaboratively developed dynamic knowledge graphs between academic institutions and enterprises, facilitating experience-oriented learning by combining business scenario simulations with authentic project practice. Core courses including "Organization and Job Design", "Recruitment and Talent Assessment", "Training and Human Resource Development", "Performance Management", and "Compensation Management" are co-constructed with enterprise partners to develop dynamic knowledge graphs. Authentic corporate cases are integrated into the teaching platform, accompanied by the development of loose-leaf teaching materials and modular course packages. This enables continuous iterative updates of teaching cases and relevant data, effectively assisting students in: gaining in-depth understanding of actual job requirements, systematically mastering relevant theoretical knowledge, and conducting rigorous specialized business skill training. 2) Hybrid Teaching Methodology. This pedagogical approach integrates the advantages of online digital resources and offline physical classrooms to establish a three-phase learning model encompassing "pre-class guided learning, in-class knowledge internalization, and post-class extension." Taking two theory-practice integrated courses—"Recruitment and Talent Assessment" and "Digital Intelligence and Talent Assessment Comprehensive Practice"—as examples: during online sessions, students conduct theoretical preparation using dynamic knowledge graph platforms and complete simulated case analyses (e.g., analyzing AI-generated recruitment and talent assessment data); during offline sessions, authentic business scenarios are introduced through industry-academia collaboration, where students engage in group discussions and hands-on data modeling exercises to enhance learning outcomes. 3) Multidimensional Evaluation System. An integrated assessment system has been developed by synthesizing learning behavior data (including platform access frequency and task completion rates) with hands-on performance outcomes, achieving balanced evaluation of both learning processes and results. This is further enhanced by longitudinal tracking of graduates' career progression to holistically assess educational effectiveness. Furthermore, through industry-education integration in extracurricular activities, it combines competition-based teaching, research-informed education, and innovation-entrepreneurship initiatives. The system provides professional certification training, international exchange programs, and specialized student organization practices, achieving synergistic integration between curricular and extracurricular activities to holistically enhance students' practical and innovative capabilities.

Table 2: Five-Dimensional Curriculum Module Design for Practical Teaching in Human Resource Management Major.

Dimension	Categories	Course Name
Basic Skills	Basic Digital Intelligence Skills	Fundamentals of University Computer Science\Introduction to Artificial Intelligence\Python Programming Statistical Survey and Data Analysis\Introduction to Big Data\Excel and Data Visualization\HR Data Analysis and Applications\Special Topics in Digital Management"
	Basic Professional Skills	Interdisciplinary Specialized Courses Integrating Theory with Practice and In-Class Practical Training: Organization and Job Design, Managerial Economics, Marketing, Organizational Behavior, Corporate Strategic Management, ★Recruitment and Talent Assessment, ★Performance Management, ★Compensation Management, ★Training and Human Resource Development, Human Resource Planning, Work Quota Studies, Corporate Culture, Psychology in Human Resource Management, Social Security, Accounting, Management Communication, Leadership Science, Official Document Writing and Processing
Scene Simulation	Independent Courses	Human Resource Management Simulation Training, Team Spirit Development Exercises, ▲ Integrated Practice in Digital Intelligence and Talent Assessment, ▲ Personnel Information and Visualization Practice
	Modular Course Package (Case Repository)	Classic HR Work Scenarios including Recruitment Interviews, Salary Negotiations, Collective Contract Consultations, and Labor arbitration; Digital Solution Designs such as Performance Prediction Algorithm Models, and Intelligent HRM Scenarios including Labor Relations Coordination Plans Based on Big Data Analytics
Project Practices	Independent courses	Corporate Human Resource Diagnosis and Consulting Project Practice (School-Enterprise Collaborative Program), Cognitive Internship, Professional Internship, Graduation Internship, Graduation Thesis
	Modular Course Package (Case Repository)	Evidence-Based Project-Based Teaching Courses Transformed from Enterprise-Commissioned Projects, including: Position Staffing Analysis, Job Architecture Restructuring, Compensation System Redesign, Recruitment and Training System Development, Performance Program Optimization, and Labor Dispute Resolution
Technology Ethics	Independent courses	Labor Relations and Labor Law, Economic Law, Human Resource Management and Professional Ethics
	Modular Course Package (Case Repository)	Ethical Conflict Cases in Human Resource Management: Data Collection vs. Privacy Protection, Employee Monitoring, Algorithmic Bias, etc
Dual Innovation Incubation	Independent courses	Fundamentals of Innovation and Entrepreneurship, Practice of Specialized Innovation Integration Program
	HRM Innovation and Entrepreneurship Program	Digital Innovation Projects in Human Resource Management including Flexible Employment Ecosystem Platforms, Functional Recruitment Systems, and Employee Health Management Platforms; Entrepreneurship Initiatives such as Talent Service Companies and Management Consulting Firms

Note: Required courses are indicated in bold font, while others represent elective courses, course packages, or embedded case libraries; ★ marks core course titles; ▲ identifies courses featuring comprehensive and design-oriented experiments.

To effectively implement the "Trinity-Four Stage-Five Dimension" practical teaching system, this program has undertaken three reforms: First, reconstructing the educational objectives by shifting talent cultivation from traditional HR management to "data-driven + strategy-led" intelligent management. The competency framework has been optimized to incorporate requirements such as

data thinking, innovative management, and global perspective, while strengthening strategic decision-making and digital operation capabilities. Secondly, the curriculum system has been innovated through the construction of professional knowledge graphs, enabling intelligent correlation and collaborative management of core course resources to support students' personalized development. Targeting five types of gold-standard courses, the curriculum development focuses on innovative teaching models, including the establishment of a Smart Human Resource Management specialization class. This program cultivates professionals with AI capabilities, data thinking, and digital application skills, implementing pilot small-class teaching (≤ 30 students/class) to achieve multidimensional and differentiated talent cultivation. Thirdly, through enterprise-education integration, the institution has jointly applied with corporate partners for over 20 Ministry of Education Industry-Education Collaborative Education Projects and undertaken more than 30 enterprise-commissioned research projects. Building upon these collaborative platforms, three digital intelligence innovation practice courses have been co-developed, including "HR Data Analysis and Applications", "HR Management Simulation Training", and "Personnel Information and Visualization Practice". Additionally, three new teaching materials were compiled: "HR Management Practical Training in the Digital Intelligence Era", "Comprehensive Enterprise HR Management Training Manual", and "HR Information Processing and Visualization". Concurrently developed resources include: a new-scenario case library covering HR management business processes, and digital intelligence practice teaching platforms incorporating training, assessment, and compensation modules, along with an HR big data analytics platform.

4.2 Based on the integration of industry and education, build a practice network of collaborative education and innovate the path of cultivating digitalized talents

Based on the win-win principle, this program has established an industry-academia collaborative practice network. Through a three-phase integrated teaching model "classroom-laboratory-field practice", it optimizes an employment-oriented "one-stop" talent cultivation system. This system adopts diversified approaches combining intensive internships, group practice, and independent practice - expanding from single-position cognitive internships to multi-position rotation training and full-process job immersion. Implementation modalities include enterprise-based intensive internships, work-study alternation, and immersive job experiences. A parallel faculty mentoring mechanism has been implemented, featuring discipline-specific instructors who provide comprehensive oversight of students' practical learning progression. This framework systematically strengthens knowledge transfer, cultivates innovation capabilities, and enhances practical skills within the formal curriculum, ultimately establishing an integrated industry-academia-research collaborative education model.

By leveraging the collaborative education practice network, innovative approaches to cultivating digital-intelligent talents include: 1) From the perspective of value co-creation ecosystem construction, breaking through traditional organizational boundaries to establish a "discipline-major-industry" development community, jointly building vocational training bases and employment matching platforms to enhance professional adaptability. Currently, the program has established off-campus internship bases in collaboration with multiple enterprises, forming a stable "cognition-job rotation-post orientation" internship mechanism to provide students with practical HR management positions. Through industry-academia cooperation, a monitoring and response mechanism for evolving job requirements has been jointly developed to regularly track changes in position demands and job responsibilities, with particular attention to how AI and big data technologies are transforming HR-related roles in terms of work content, duty specifications, and skill requirements. This enables timely integration of emerging technical competencies (such as data modeling and human-machine collaboration) into practical training modules of courses like "HR Data Analysis and Application"

and "HR Management Simulation Training," achieving dynamic curriculum adaptation. Additionally, social practice bases have been established with government agencies to deepen students' understanding of social realities and help them establish proper value systems. 2) Establish an alumni resource support system to enhance the employment service chain. For instance, leverage student-led organizations such as the Human Resource Management Professional Association to build a digital platform for alumni resources and create a networked matrix for student internships and employment/entrepreneurship practices. 3) Leveraging smart laboratories and digital-intelligent practice platforms, the program incubates management consulting agencies and training service entities, organically integrating teaching practices with business operations. This approach deepens project-based learning by providing students with hands-on opportunities to participate in corporate strategy simulations and management system optimization. In recent years, the program has engaged an average of 30 students annually in external consulting services, covering areas such as job position analysis, organizational structure refinement, compensation system redesign, recruitment and training framework development, performance optimization, and labor dispute resolution. These efforts have provided technical support to over 20 organizations at various levels. Beyond expanding students' experiential learning boundaries, transforming enterprise-commissioned projects into empirical teaching environments, this initiative enhances faculty expertise and student employability through project-based pedagogy and university-industry collaboration. Additionally, it enriches practical teaching case resources and corporate human resource management digital training materials. 4) Collaborate with industry leaders to assess the feasibility of developing a digital twin practice platform, utilizing 5G and IoT technologies to enable real-time synchronization with critical HR metrics (e.g., organizational efficiency indicators, historical attrition trends). By integrating XR technology, it will create virtual simulation environments replicating typical HR scenarios—such as recruitment interviews, salary negotiations, and collective bargaining—to address internship resource shortages. Specifically, through blended virtual-physical pedagogical reforms with corporate partners, efforts are made to establish digital twin training bases. These platforms focus on end-to-end HR process simulation, dynamic mapping of business operations data, and immersive strategic decision-making exercises. The system constructs digital replicas of shared service center business units, enabling bidirectional enhancement between virtual simulations and real-world operations^[9-12].

4.3 Taking the integration of industry and education as a way, schools and enterprises jointly build a digitalized practice teaching platform to support the cultivation of high-quality talents

This program collaborates intensively with enterprises to integrate intelligent experimental equipment (high-performance computers/VR/AR technologies), data acquisition terminals (sensors/wearable devices), and cloud storage systems, establishing a Smart Human Resource Management Laboratory (including behavioral observation and simulation training zones) and a Human Resource Big Data Laboratory. Through resource sharing and technological synergy between academia and industry, the program develops an industry-education integrated database, creating a tripartite practical teaching platform that combines "professional knowledge + digital intelligence technologies + innovation and entrepreneurship." This approach effectively addresses the core challenge of disconnection between traditional liberal arts experimental education and industrial demands, while enabling data-driven precision teaching and a closed-loop quality improvement system.

The digital-intelligent practical teaching platform integrates specialized teaching software covering the entire human resource management process. It encompasses core modules including pre-employment expansion, HR planning, job analysis, talent recruitment, talent assessment, training development, compensation management, and performance management, along with big data

analytics practice systems and comprehensive skills training systems (as shown in Figure 2). The platform establishes a three-tier cultivation path of "in-class practice - specialized training - comprehensive innovation" to achieve progressive advancement from knowledge internalization to higher-order competencies. Based on authentic enterprise HR management cases and industry dynamic data (such as talent demand trends and compensation variation curves), it develops three core functional modules: 1) Data Thinking Cultivation Module: Through a comprehensive technological chain encompassing IT, AI, and end-to-end data processing (collection-cleaning-analysis-visualization), students develop capabilities to diagnose business issues and optimize management decisions using HR big data. 2) Professional Competency Advancement Module: A specialized training system covering all six HR functions incorporates professional certification standards like compensation management and digital HR services, enhancing core professional competencies and job alignment. 3) Interdisciplinary Innovation Module: Aligned with national competitions (e.g., National Business Elite Challenge, China Undergraduate HR Professional Skills Competition) and innovation projects like HR consulting firm incubation, this module designs comprehensive training scenarios including strategic HR planning and organizational digital transformation to cultivate complex problem-solving and innovation capabilities.



Figure 2: Partial Display of Numerical Intellectualization Practice Teaching Software.

Currently, based on the established professional knowledge graph and case database, the program has developed AI-powered practical teaching modules for core courses in alignment with real-world HR business scenarios. These modules incorporate three key instructional components: HR data analysis methodologies, core HR module data analysis protocols, and job-specific practical guidelines. This framework enables students to: comprehend actual job requirements, master data analysis methodologies, conduct specialized module data analysis training, and formulate personalized learning plans tailored to specific job competencies; the program is collaborating with relevant enterprises to develop a dual-dimensional data monitoring system for cloud-based intelligent teaching systems : 1) Individual growth dimension: Real-time tracking of learning duration, resource usage preferences, and other accompanying data to generate personalized learning profiles. 2) Group development dimension: Analysis of cohort data such as course completion rates and grade distributions to dynamically optimize teaching resource allocation. Through the teacher-side data cockpit, intelligent correlation analysis between "teaching behaviors - learning outcomes" is achieved, enabling the teaching team to implement three precise interventions: 1) Adjusting the relevance of practical training content based on job competency maps. 2) Pushing customized training programs according to identified competency gaps. 3) Updating experimental case libraries in line with industry technological iterations. This system can subsequently serve as the foundation for establishing and refining a new paradigm of intelligent education characterized by "data-driven decision making, precision teaching adaptation, and real-time industry-education interaction." The platform's primary

development components and application scenarios are detailed in Table 3.

Table 3: Curriculum Construction and Application Development of Platform Functions.

Course Name	Main Development and Implementation Status
Organization and Job Design	Establish a three-dimensional teaching resource system and panoramic smart learning model; Create 24/7 intelligent learning companions; Develop personalized learning pathways; Construct visualized student learning profiles for evaluation; Implement value-added assessment of knowledge acquisition; Conduct AI-powered classroom interaction analytics and learning insights; Build ideological-political curriculum knowledge graphs; Establish an academic knowledge graph platform
Recruitment and Talent Assessment	Establish three-dimensional teaching resources; Achieve real-time monitoring of students' knowledge point acquisition; Develop AI-powered classroom interaction statistics and learning analytics; Create an online mock interview application model; Implement visualized evaluation of student learning profiles
Training and Human Resources Development	Develop multidimensional teaching resources; Train AI for automated question generation; Develop knowledge graph-based resource linking; Construct an ideological-political knowledge graph for courses
Performance Management	Push personalized learning resources; develop knowledge graph-based correlated cases; establish simulation decision-making modules for performance practice
Compensation Management	Deliver personalized learning resources; develop knowledge graph-based correlated cases; construct simulation decision-making modules for compensation practices; establish external data links to expand data resources

4.4 Supported by the integration of industry and education, strengthen the construction of practical teaching faculty, and innovate the teaching mode and method of mathematics and intelligence

By leveraging the "complementary advantages and synergistic resonance" between universities and enterprises, this initiative facilitates the development of faculty members' professional competencies and digital transformation, while establishing a diversified team of practice-oriented instructors.1) Enhancing faculty's practical experience through multiple channels to cultivate dual-qualified instructors. The university-enterprise partnership establishes joint faculty training bases that require teachers to gain industry insights through corporate immersion. Faculty are encouraged to participate in various corporate services to develop practical innovation capabilities, while integrating digital intelligence case studies such as ByteDance's AI interview system and Sany Group's intelligent performance dashboard into curriculum delivery.2) Advancing teachers' digital-intelligent skills through multiple strategies. Faculty are encouraged to attend practical training programs and professional certification exams, with regular digital-intelligent technology workshops mandating the integration of these tools into practical teaching to drive pedagogical innovation.3) Optimizing faculty structure through tiered approaches to achieve diversity. The program improves flexible recruitment and part-time hiring mechanisms, prioritizing overseas and industry-experienced professionals. Enhancing enterprise collaboration by inviting industry experts to share practical experiences and cutting-edge industry developments on campus. Through school-enterprise partnerships, comprehensive practical courses such as "HR Data Analysis and Application" and "HR Management Simulation Training" are co-developed, with both parties jointly teaching and creating instructional

content and case libraries based on authentic enterprise work scenarios. Building upon this foundation, innovative approaches including professional knowledge graphs, blended learning, and project-based teaching are employed to establish a novel teaching model characterized by "multiple instructors for one course and collaborative instructional model.

The integration of industry and education provides robust support for the "teaching-learning-doing-creating" integrated practical teaching approach, guiding students to "learn through doing and innovate through practice," thereby effectively enhancing their ability to analyze and solve real-world problems. Building on this foundation, both academic institutions and enterprises, closely aligned with the demands of the digital-intelligent era and student interests, deeply integrate digital-intelligent technologies with practical teaching. Through collaborative design of practical teaching content and innovation in digital-intelligent teaching models and methods (see Table 4 for details), they achieve precise alignment between talent cultivation and industry needs.

Table 4: Comparison of Innovative Practical Teaching Methods and Modes of Mathematical Intellectualization with Traditional Practical Teaching Methods and Modes.

Dimension	School-Enterprise Collaboration	Innovative Practical Teaching Methods and Models	Traditional Practical Teaching Methods and Models	Comparative Analysis
Teaching Resource	Co-construction of practical teaching resources and direct interface with enterprise operation data	Enterprise real-time database, cloud shared knowledge map, support online and offline hybrid practice teaching	Case banks, sandbox simulations, manual files	Data-driven: shifting from static cases to dynamic data flow, upgrading enterprise participation from phase to continuity, and realizing synchronization between teaching and industry
Teaching Scene	Co-constructed virtual simulation scenarios, real enterprise scenarios digital intelligence reproduction	Virtual-reality fusion scenario: virtual simulation platform, XR technology to build an immersive work environment, digital twin mapping enterprise real business processes, through the API interface to docking enterprise HR system, support the combination of on-the-job practical exercises and remote practical training	Classroom simulation, single-job practical training	Spatial breakthrough: Physical space limitations are broken, and students can be exposed to multiple geographic regions and industries at the same time.
Technical Tools	Hands-on teaching using technology tools that are actually used in the business	Python/R data analytics, AI interview system, blockchain back-tuning platform, smart scheduling algorithms, etc.	Excel-based analysis, offline assessment tools	Tool upgrades: moving from manual processing to intelligent decision making, data processing
Capacity Building	Develop core competencies that are urgently needed for enterprise digital transformation	Data-driven decision-making, human-machine collaborative management, organizational digital change leadership	Six modules of basic operational skills	Competency reorganization: new digital literacy (data analysis, systems thinking) and change management competencies required
Educational Organization	Designing learning paths with reference to	Personalized learning path: based on the dynamic practice recommendation of learning	Fixed timetable, harmonized schedule	Precision teaching: instructional intervention response from weekly to

	corporate talent development models	behavior analysis, students can choose targeted human resources work tasks for hands-on training or play the corresponding role of group collaboration in order to exercise their own practical ability in certain aspects, professional teachers and business tutors work together to analyze the learning behavior of students' practice sessions and provide them with support programs conducive to stimulating the learning potential and practical results.		hourly
Rating Rystem	Introduction of enterprise evaluation dimension	Multi-dimensional digital portrait: integration of learning behavior data (clickstream, operation log), enterprise hands-on data (task completion), intelligent diagnostic report	Subjective teacher evaluation, internship report assessment	Evaluation innovation: moving from a single dimension to a multidimensional capacity assessment with refined assessment indicators
Teaching Case	Carry out project teaching, task teaching to directly solve the actual problems of enterprises, and co-edit the practical case base.	Task-based practical teaching: Integration of STEAM education concepts and PBL teaching methodology to design and transform teachers' government-enterprise service projects and transversal topics into practical teaching tasks, students can independently choose to join different project teams according to their personal interests and career planning, and carry out organizational effectiveness diagnosis and optimization based on real data from enterprises.	Mock job fairs, compensation plan design, etc.	Increased value: teaching results can be directly translated into business solutions
Teacher-Student Interaction	Professional teachers and business instructors guide through the teaching assistant system	Intelligent teaching assistant system: real-time Q&A (NLP technology), automatic generation of personalized learning reports, prediction of learning risks	Classroom quizzes, after-school homework corrections	Enhanced interaction: significant increase in the frequency of teacher-student interactions
Creative Capacity Development	School-enterprise joint innovation and practice	Digital innovation workshop: validating HR digital dolutions using design thinking + agile development	Case discussions, program writing	Methodology upgrade: from theoretical extrapolation to minimum viable product (MVP) development

5. Implementation Effectiveness and Outlook

In recent years, to address digital-intelligent transformation challenges, the program has leveraged deep industry-education integration to progressively advance practical teaching reform. With the strategic goal of establishing an "integrated quintuple" education platform encompassing

comprehensive curriculum development, internship training, external mentor sourcing, faculty corporate residencies, student entrepreneurship practice, and career placement, the reform aims at achieve effective articulation between education and industrial chains, as well as talent and innovation ecosystems.

Looking to the future, applied colleges and universities take the cultivation of industry-adapted talents as the core objective, and deepening the integration of industry and education is the key hand that promotes the teaching reform and improves the quality of talent cultivation. With the rapid development and application of artificial intelligence, big data and other modern technologies, human resource management-related industries, occupations and positions, as well as the total and structural demand for talents will change, the profession should be based on a forward-looking perspective, and make a reasonable prediction of the demand for professional talent training and its changes, and continue to optimize the school-enterprise linkage of the practical teaching system, including the development of an intelligent training platform to realize the digital upgrade of practical resources, relying on learning and data analysis to build an accurate evaluation system, and dynamically tracking the ability spectrum of students. This includes developing intelligent practical training platform to realize digital upgrading of practical resources, constructing accurate evaluation system based on learning data analysis, and dynamically tracking students' ability mapping, etc., so as to ultimately form an effective articulation mechanism between the supply of talents and the demand of emerging industries.

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