Research on the Reconstruction of Talent Cultivation Function in the New Quality Productive Forces System in Vocational Colleges

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Abstract: *As the core driving force of the data-driven economy, the new quality productive forces are profoundly reshaping the training paradigm for technical and skilled talents. Vocational colleges, as the main base for cultivating high-skilled talents, are transforming their talent cultivation model from "single job adaptation" to "composite ability development." Based on the characteristics of new quality productive forces, this paper analyzes from three dimensions: evolution of capability structure, reconstruction of the cultivation system, and optimization of system mechanisms. The study indicates that vocational education urgently needs to break through the traditional linear curriculum system and one-way knowledge transmission path, and build a three-dimensional education model of "cognitive drive—structural coupling—dynamic feedback." Through the reorganization of teaching content, innovation of ability generation mechanisms, and optimization of evaluation systems, it promotes the deep alignment between vocational education systems and the development of new quality productive forces, meeting the demand for high-skilled talents in the new quality productive forces.*

Keywords: *new quality productive forces; vocational education; capability structure; system coupling; educational function reconstruction*

Introduction

The current production mode is accelerating its shift from resource-intensive to knowledge-integrated and structurally-coordinated types. New quality productive forces, driven by data intelligence, symbolic control, and knowledge capital, not only change the industrial operating mechanism but also deeply reshape the capability requirements and evaluation system for technical talents. Against this backdrop, the traditional "job skill training—standardized output" model in vocational education can no longer support the development of students' cognitive regulation and structural transfer abilities in complex scenarios. How vocational colleges can achieve a systematic reconstruction of their educational functions under the logic of new quality productive forces has become a key issue in educational theory research and talent cultivation mechanism reform. This paper, centered on the core issue of "functional adaptation of vocational education in the new quality productive forces system," analyzes the adaptive barriers in vocational education in terms of goal setting, knowledge organization, curriculum structure, and feedback systems, starting from the evolution of capability structures. It further proposes logical reconstruction pathways for educational functions and system optimization strategies. The core objective of the study is to build a vocational education model that supports composite ability generation, cognitive chain leaps, and multidimensional dynamic assessments, providing logical basis and methodological support for vocational colleges to cope with the structural transformation of productive forces.

1. The Evolution of Talent Capability Structure under the New Quality Productive Forces System

1.1 Analysis of the Connotation and Development Logic of New Quality Productive Forces

New quality productive forces, as the core variable in the transition of the production system in the new era, break the traditional "factor-driven—scale expansion" model and shift toward a "structural coupling—intelligent generation" development path, based on knowledge density, technology penetration, and system adaptability. Unlike the traditional production factors, such as material, capital, and labor, the new quality productive forces emphasize a value re-creation mechanism based on data, algorithms, cognition, and network collaboration, with operational logic characterized by high complexity and dynamic evolution. In this system, knowledge and technology elements no longer exist as static resources in isolation; instead, they achieve continuous value-added through cross-platform flow and multi-system embedding, driving the production process from a linear chain to a networked platform, and from centralized control to distributed collaboration.

The underlying logic of this system reflects three structural characteristics: First, the exponential enhancement of information processing capacity reshapes decision-making models, and knowledge representation and resource allocation trend toward structurally intelligent optimization. Second, the speed of technological iteration and system response capacity form a positive feedback mechanism, giving rise to a flexible production environment that balances rapid updates and precise adaptability. Third, the deepening embedding of individual capabilities in the system operation mechanism transforms human resources from external auxiliary elements to core value sources. Therefore, new quality productive forces represent not only an innovation in technology application but also a systemic transformation of nested cognition, structural reorganization, and potential stimulation. Its development logic drives the functional reconstruction and path reconfiguration of various structural units, including education, organizations, and industries [1].

1.2 The Capability Reconstruction Requirements for Technical Talents Driven by New Quality Productive Forces

The structural dependence of new quality productive forces on human resources has significantly increased, especially for technical talents, which now face composite capability requirements beyond the traditional skill framework. The former technical talent model, centered on job operation skills, shows clear adaptability bottlenecks in the face of high complexity, high flexibility, and high uncertainty in the production environment. Under the logic driven by new quality productive forces, technical talents are required to possess five key abilities: First, data literacy, the ability to process large volumes of heterogeneous data and identify decision-making clues from them; Second, systems thinking, the ability to place problems in the context of complex systems for holistic analysis and structured resolution; Third, cross-domain transferability, the ability to flexibly switch between multi-disciplinary and multi-technical scenarios and reconstruct knowledge; Fourth, problem-solving ability, the capacity to identify, model, and optimize structural task processes; Fifth, human-machine collaboration, the ability to achieve effective coordination and functional embedding in human-technology coupling systems.

In terms of capability generation, traditional single-training models are no longer adequate to meet the structural growth demands of diverse abilities. The development of technical talents should no longer follow a linear "skills—job" path but instead should be based on a "cognitive—transfer—creation" cyclical mechanism. Through contextual adaptation, task practice, and data feedback, dynamic systems support the continuous construction and optimization of cognitive models in practice. The expression of ability is no longer confined to technical execution but manifests as a multi-dimensional integration of structural understanding and strategic application. This poses systemic challenges for vocational education in terms of teaching goals, curriculum organization, and evaluation methods [2].

1.3 The Structural Challenges to Vocational Education Functions Due to Capability Structure Evolution

Under the impact and pull of new quality productive forces, the traditional vocational education system's paradigms and organizational structures face deep tensions and structural mismatches. Currently, vocational colleges still rely on the basic logic of job matching and standardized skill training, with a lack of systematic coupling between teaching content, capability construction, and output evaluation. This makes it difficult to support the generation and transfer of composite and dynamic abilities. Significant structural barriers exist within the education system, manifested in the following three areas:

First, a disconnect between curriculum content and capability requirements. The teaching design overly relies on textbook knowledge and process flows, ignoring the expansion of capability dimensions under the context of technological evolution. This leads to outdated and fragmented knowledge modules that fail to support students' ability to transfer across scenarios and reorganize cognitive strategies.

Second, the teaching process still dominates with one-way input and lacks interaction structures that match cognitive evolution. The teaching process follows a "teacher imparts—student accepts" main line, with a single learning path and delayed feedback mechanisms. It lacks precise regulation and stage-based cognitive support driven by data, which hinders the construction of multi-path and multi-channel capability generation models.

Third, the evaluation system focuses solely on endpoint outcomes, neglecting the structural construction and strategy generation during the learning process. The current evaluation system places greater emphasis on technical outcomes and achieving indicators, while lacking tracking mechanisms for cognitive paths, ability transfer, and system adaptation processes. This ultimately hinders the timeliness of educational feedback and the dynamic evolution of the system [3].

2. Logical Reconstruction of Talent Cultivation Functions in Vocational Colleges

2.1 System Boundaries and Structural Logic of Talent Cultivation Functions in Vocational Colleges

Against the backdrop of the accelerated reconstruction of the new quality productive forces system, the talent cultivation function in vocational colleges is no longer applicable to the singular target model driven by job skills. The core of talent cultivation should shift from "job adaptation" to "ability generation," and the operational boundaries of the educational system should expand into a composite structural system integrating knowledge integration, cognitive construction, structural transfer, and situational adaptation. This system should achieve a transformation from one-way knowledge transmission to multi-directional ability coupling, with its core mechanism driven by cognitive processes to dynamically coordinate educational elements, achieving functional interlinkage within the "knowledge—ability—value" three-dimensional space.

The reconstruction of system boundaries requires the establishment of a nested relationship between educational content and capability structure. The curriculum design must not only cover the input of fundamental knowledge but also guide students in forming cognitive schemas within a complex knowledge network, activating transfer pathways through structural connections between knowledge. Structurally, the generation of talent capabilities should follow a closed-loop operational model of "perceptual input—cognitive integration—transfer application—structural output," with each stage requiring consistency and progression between teaching resources, cognitive tasks, and evaluation mechanisms. Knowledge is no longer static stored information but becomes a structural node carrying cognitive pathways and ability-shaping functions, facilitating the transition from operational cognition to systematic cognition for students. The ultimate goal of vocational education is to cultivate composite technical talents with cross-boundary regulation ability, system understanding capability, and adaptive ability, supporting their stable value output in uncertain, dynamic, and integrated production environments.

2.2 Path Analysis of the Transformation from Task-based Training to Generative Structures

The task-based training model has long been oriented toward matching job responsibilities, emphasizing the decomposition of skill elements and standardized output. Although this path is clear and actionable, its closed nature and result-oriented tendencies make it difficult to support students in generating high-level cognition in multi-knowledge scenarios. In the environment driven by new quality productive forces, the ambiguity, multiple interpretations, and cross-system nature of tasks continue to increase, forcing talent cultivation models to shift from static reproduction to dynamic generation.

Generative structures emphasize the process-based construction of abilities and situational adaptability. The core logic lies in guiding students to achieve endogenous ability generation through the interactive integration of knowledge systems, hierarchical activation of cognitive mechanisms, and real-world reconstruction of problem scenarios. In this process, tasks are no longer simple skill operations but become dynamic tools that drive cognitive reorganization and ability transfer. The design of teaching activities should focus on situational construction, problem-driven approaches, and reflective mechanisms to ensure that students complete continuous transitions of knowledge integration, structural modeling, and strategic selection during execution [4].

The construction path of generative structures should reflect a deep response to individual learner differences and cognitive rhythms. The educational system must possess three capabilities: First, to create complex and authentic cognitive contexts, guiding students to engage in multi-directional construction in tasks; Second, to provide structured knowledge support resources, ensuring that the cognitive process possesses logical coherence and knowledge tension; Third, to embed a feedback—adjustment—reconstruction teaching loop, achieving the self-organizing evolution of cognitive pathways. Through this systemic reconstruction, the path from knowledge understanding to system application can be effectively opened, supporting technical talents in continuously updating and dynamically adapting their abilities within complex work systems.

2.3 Design of Knowledge Integration Mechanisms Under Ability Output Orientation

Ability output orientation requires the educational system to efficiently integrate knowledge content, cognitive structures, and ability performance from a structural output perspective, in order to achieve the effective transformation of talent value in the production system. The core of the knowledge integration mechanism lies in constructing a knowledge reorganization logic centered on problem-solving and aimed at ability construction. In this logic, knowledge content is no longer presented in a fragmented manner by course modules but is cross-organized and functionally coupled around core ability dimensions.

The integration mechanism should focus on three structural characteristics: First, the relevance design of content dimensions, emphasizing the transfer paths between conceptual networks; Second, the sequential distribution of cognitive dimensions, promoting the transition from basic understanding to higher-order construction; Third, the expressiveness of output dimensions, strengthening the visualization of abilities in real tasks. During the integration process, course design should incorporate cross-disciplinary ability modules, such as data modeling, system analysis, and structural innovation, to enhance students' comprehensive ability in complex information processing, structural logic organization, and result expression. The knowledge integration mechanism is not only a way of reconstructing teaching content but also a cognitive architecture support system within the ability generation process, providing an intrinsic support point for the functional reconstruction of vocational education.

3. Optimization Mechanism of Vocational Education System Facing New Quality Productive Forces

3.1 Reconstructing the Coupling and Coordination Mechanism within the Educational System

3.1.1 Dynamic Linkage Logic of Multidimensional Educational Elements

Within the new quality productive forces system, vocational education is no longer a linear system focused solely on transmitting knowledge or skills but should evolve into a multi-element collaborative system centered around ability generation. Efficient data interaction and structural adaptation must be established between teaching resources, teacher behavior, learning paths, and assessment mechanisms. The alignment between teaching content and capability objectives should be facilitated by an intelligent scheduling system, breaking the traditional static correspondence between "knowledge modules—skill output," and constructing a nonlinear linkage mechanism of "ability-driven—resource matching—path adjustment" [5].

3.1.2 High-Frequency Coupling of Teaching Structure and Ability Structure

The generation of abilities should not be an incidental outcome of teaching activities but should directly reflect the internal logic of the teaching system. The organizational form of teaching should be reconceived based on ability dimensions, structurally matching course content, teaching methods, and ability modules. For example, cultivating systems thinking ability should be embedded in cross-course projects, data analysis tasks, or structural modeling exercises to achieve high-frequency resonance between teaching units and ability outputs

3.1.3 Feedback-Adjustment Closed Loop in the Learning Process

The collaborative mechanism of the teaching system depends not only on static resource configuration but, more importantly, on the construction of feedback and adjustment mechanisms throughout the process. With the help of data collection tools and process tracking systems, real-time analysis of learning behaviors, task execution, and ability generation can be achieved. The feedback closed-loop system built on dynamic data allows the teaching plan to be structurally adjusted according to student status, introducing an adaptive evolutionary mechanism into the educational system and enhancing its precision in responding to complex cognitive behaviors.

3.2 Curriculum Structure Update Model Based on Cognitive Evolution

3.2.1 Cognitive Stage-Driven Curriculum Logic Reconstruction

Curriculum content design should be based on the stage theory from cognitive psychology and learning sciences, dividing the learning path into four interrelated stages: "concept formation—structure construction—skill transfer—innovative output." Each stage corresponds to different teaching objectives and cognitive load requirements, thereby constructing a progressive evolutionary system in the curriculum structure, transforming knowledge content into ability expression.

3.2.2 Cognitive Activation Mechanism Supported by Multimodal Interaction

The update of curriculum structure involves not only the reorganization of knowledge content but also requires a shift from a single-modal learning approach to multimodal integration. By utilizing multimodal resources such as virtual simulations, data visualization, and task rehearsals, the learner's multi-channel information processing ability is activated, enhancing the structural relationships between knowledge. Cognitive activation no longer depends solely on teacher instruction and memory reproduction but is promoted through cross-modal interactions, facilitating deep integration and structural transfer of knowledge [6].

3.2.3 Modularization of Curriculum Units and Cross-Domain Integration Design

At the curriculum level, a modular design should be used to build a three-level structure of "core knowledge—extended skills—transferable abilities," achieving functional collaboration between different courses. Each course module should be cross-integrated around the ability structure, breaking down disciplinary boundaries and professional barriers, and forming a course cluster system oriented toward real-world problems. The curriculum should no longer progress linearly based on content logic but should be arranged in a networked manner in accordance with cognitive laws, realizing the spatial restructuring and path diversification of the curriculum system.

3.3 Design of Ability Assessment Feedback System Driven by Digitization

3.3.1 Indicator System and Data Modeling Logic for Ability Recognition

Traditional assessment systems focus on knowledge recall and skill performance as the core evaluation criteria, making it difficult to accurately reflect the demand for "composite abilities—system adaptability—innovative transfer" under new quality productive forces. A multidimensional ability assessment indicator system can be constructed based on digital platforms, covering core dimensions such as cognitive complexity, problem-solving strategies, cross-context transfer, and structural reconstruction ability, while using data modeling methods to construct a constructive analysis of learning trajectories and ability growth paths.

3.3.2 Closed-Loop Design and Adjustment Logic of Intelligent Feedback Mechanisms

Ability assessment should not be limited to static presentations but should form real-time responses and dynamic adjustment mechanisms. Through artificial intelligence algorithms for clustering analysis and feature extraction of student task performance data and learning behavior characteristics, the system can generate personalized ability profiles and recommend learning paths. System feedback not only provides outcome data but also focuses on formative feedback and process-based guidance, enabling students to continuously optimize cognitive strategies and behavioral paths during task execution.

3.3.3 Data-Driven System Evolution and Visualization of Assessment Results

The construction of a digital system not only improves the precision of assessments but also provides structural support for the overall evolution of the vocational education system. By integrating and analyzing learning data, key variables such as educational resource allocation, course settings, and teaching methods can be modeled for correlation, driving the iterative update of the educational system based on self-feedback. Additionally, by utilizing visualization dashboards, ability heat maps, and other methods, the interpretability and operability of feedback data can be enhanced, creating multidirectional communication feedback channels for students, teachers, and administrators, realizing transparency, structuralization, and evolution of the educational system.

Conclusion

The core of vocational education reform facing the new quality productive forces system lies in achieving a systemic shift from a skills-teaching logic to an ability-generation logic. This paper delves into the intrinsic structure of new quality productive forces, clarifies its reconstruction path for talent capability structures, and reveals deep adaptation issues in vocational education in terms of goal setting, functional boundaries, and knowledge organization. Based on this, this study constructs a talent cultivation system reconstruction model characterized by "cognitive drive—structural coupling—dynamic feedback," covering modular reconstruction of course content, systematic embedding of capability structures, and data-driven evaluation and adjustment mechanisms. The study argues that in order to achieve deep collaborative development with the new quality productive forces system, vocational education must undergo a path of systemic mechanism reshaping, driving the synchronous evolution of teaching organization methods, knowledge integration logic, and ability assessment systems. Future research can further focus on enhancing data collection accuracy, modeling cognitive paths, and optimizing feedback strategies during the ability generation process, exploring the feasibility of integrating cutting-edge technologies such as artificial intelligence and adaptive learning systems into vocational education systems, and facilitating the structural leap and continuous evolution of vocational education systems.

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