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Article

Exploring the Path of Cultivating High-Quality Talents in Higher Vocational Education under the Threshold of Informatization

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Abstract: The emergence of new-generation technologies such as artificial intelligence, big data, and the Internet of Things is driving limitations on the great depth and breadth of talent for skilled and technological needs to new heights. The transformation and upgrading of industries are changing the employment market structure in fundamental ways, and require skilled compound talents with digitalized literacy, innovation capabilities and cross-boundary practice faculties. Higher vocational education, which is the main base for cultivating skilled talents, is faced with an epoch-long proposition, in the wave of informatization, to boost the quality of talent cultivation. Examining the current situation, Higher vocational education still continues to lean on traditional cultivation models that do not seem capable of meeting new demands or providing new solutions to new challenges. It is time to analyze informatization's capacity to enable higher vocational education, and investigate the transitional pathway for high-quality talent cultivation, the foundation for addressing national strategic requirements and contributing to socio-economic development.

Keywords: informatization; higher vocational education; high-quality; talent cultivation

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1. Introduction

Information technology represents not only a tool, but also serves as the primary driving force that has ushered in revolutionary changes to the foundational concepts, models, and ecosystems of education, creating a completely new pathway to cultivate talent. Higher vocational education has to take on the even heavier responsibility to cultivate technical and skilled talent that is adaptable to the cutting edge of industrial development and is able to promote implementation of industrial technology applications. The nature and essential characteristics of higher vocational education and practical orientation lead to the special urgency and internal logic of digital transformation. Understanding the nature of an informed education's characteristics of integration, omnipresence, and intelligence, as well as deeply thinking through the core abilities of high-quality technical and skilled talent, which are solid professional skills, good information literacy, the ability to learn continuously, and comprehensive thinking to solve problems, provides the theoretical basis for innovating the path to talent cultivation. Clearly understanding the current problems is the starting point to find effective pathways, and the inevitable prerequisite for an exploration of high-quality talent cultivation facilitated by informatization.

2. Theoretical Basis of Informatization and Talent Cultivation in Higher Vocational Education

2.1. Essential Characteristics and Development Trend of Informatization Education

Information technology drives the education model to shift from a static knowledge-transmission process to a dynamic one that emphasizes the cultivation of personalized experiences and contextualized learning abilities. The core of this shift is to break through the limitations of time and space and create a smart learning environment with ubiquitous connections and in-depth integration of resources. Information-based education essentially involves a systematic reshaping of the traditional teaching structure, which promotes the real-time update and cross-border integration of learning content to meet the rapidly changing industry demands. Meanwhile, it significantly changes the interaction mode between teachers and students, shifting from one-way knowledge transfer to collaborative knowledge creation based on equal participation. The development trend focuses on constructing a high-order cognitive training field based on real-world problem chains. Through immersive interactive design, it blurs the boundaries between virtual and real worlds to facilitate embodied cognition. Additionally, it relies on continuous data tracking to understand the learning mechanism and thus provide refined support for individual development differences [1]. In the future, the education ecosystem will seek a balance between intelligent technology and humanistic values, shaping a more open, inclusive, and resilient structure that supports diverse development paths.

2.2. Core Competency Composition of High-Quality Technical and Skilled Talents

In the digital age, the core abilities of technical and skilled talents are manifested in their precise control of intelligent devices and the in-depth extraction of value from complex data. The core of these abilities lies in their ability to flexibly respond to the challenges of knowledge structure gaps caused by technological iterations based on real-world production scenarios. High-quality talents possess the mental toughness to transform cross-field knowledge to solve practical engineering problems, and can integrate design thinking to continuously optimize solutions in dynamic workflows. At the same time, they develop cultural adaptability to new human-machine collaboration models, understand the logical boundaries of artificial intelligence-assisted decision-making systems, and maintain the subjectivity of professional judgment. The continuous driving force for the development of vocational abilities stems from the ability of knowledge transfer and the awareness of self-iteration. Individuals need to independently construct a learning network framework in the rapidly upgrading industrial environment, and develop a sensitivity to technological ethics and a habit of systematic risk prediction to cope with uncertainties. Essentially, the growth path of technical and skilled talents requires the dynamic integration characteristics of thinking models, which is the fundamental distinction from mechanical operators.

2.3. Inherent Logic of Digital Transformation of Vocational Education

The internal logic of the digital transformation of vocational education is deeply rooted in the fundamental restructuring of the industrial ecosystem by technological iterations. Technological penetration directly changes the way of knowledge reproduction and the matching degree of skill verification scenarios. The intelligent production mode accelerates the elimination of traditional experience-based skill frameworks, forcing vocational education to go beyond instrumental technical training and shift towards adaptive training of thinking models. The digital technology base can simulate the complexity and uncertainty of the real industrial environment, providing learners with a low-cost growth space for repeated trial-and-error, and giving rise to a data-driven education decision-making mechanism for dynamically adjusting teaching strategies. The new paradigm of human-machine collaboration requires the education system to break through the limitation of single-point skill teaching and construct a flexible ability-generation chain connected to real workflows. The reconstruction of the education ecosystem must respond to the fission speed of the industrial structure to maintain the value of education, which is an irreversible trend for the survival and development of vocational education rather than a simple superposition of technologies. The transformation of the roles of educational subjects makes educators become cognitive architects who support students in mastering intelligent technology clusters, guiding students to maintain the ability advantage of creatively solving problems in the human-machine co-existence environment.

3. The Main Problems Facing the Cultivation of Talents in Higher Vocational Education at Present

3.1. Disconnection between Traditional Teaching Mode and Informationization Demand

The traditional teaching model adheres to the paradigm of linear knowledge indoctrination and presets a unified progress standard, making it difficult to respond to the real learning needs of different cognitive styles. In the digital age, the rapid replacement of the industrial structure requires the immediate integration of cutting-edge technology cases into the teaching process. However, the traditional curriculum framework lacks a flexible adjustment mechanism, resulting in the teaching content lagging behind the technological changes in the industrial field. The teacher-centered one-way lecture restricts the development of students' in-depth information processing ability and problem-scenario construction ability, and severs the relationship between individual learning laws and the growth curve of vocational abilities. The closed classroom environment hinders the access of real-world work-process data streams to the classroom, making it difficult for learners to experience the complexity of human-machine collaborative decision-making. The rigid evaluation system focuses on the reproduction of static knowledge points and ignores the dynamic formation records of core abilities such as data-driven decision-making and cross-team collaboration [2]. The separation of theoretical teaching and practical application intensifies the sense of cognitive disconnection, restricting the efficiency of technology transfer and the cultivation of mental toughness in dealing with emergencies.

3.2. Fragmentation of Digital Teaching Resources Construction

The decentralized development of educational resources lacks systematic planning guidance, and there is a large amount of low-level repeated construction where isolated knowledge-point materials are piled up, resulting in information redundancy. Departmentalism leads to the independent development of similar teaching videos or virtual simulation software. The format barriers of resources on different platforms create interoperability obstacles, and the operation process of intelligent equipment is fragmented into non-connectable segments. The entities constructing the resource library pursue short-term visual results and neglect the internal logical connections, making it difficult for the teaching materials stored on the cloud computing platform to support the modular encapsulation of complete work scenarios. The digital resources obtained by learners often present a contradiction between cognitive overload and situational discontinuity, and cannot effectively connect the continuous knowledge map of tool-use specifications, fault-diagnosis logic, and process-innovation thinking. The resource update mechanism lags behind the iteration speed of intelligent devices. The outdated operation guides stored in the cloud only increase the risk of cognitive confusion, dissipate the funds invested, and reduce the activity of resource circulation.

3.3. Mismatch between Teachers' Information Literacy and Teaching Ability

There is a significant tension between the development trajectory of teachers' information literacy and the requirements of intelligent teaching. Although educators possess the ability to operate individual technical tools, they find it difficult to transform this ability into instructional design thinking that integrates subject logic. The lack of systematic digital teaching methods has caused some teaching practices to remain at the stage of using multimedia to replace blackboard writing. The real-time teaching feedback information generated by intelligent data-collection tools cannot be used to improve and iterate courses. The teaching staff lacks an educational technology cognitive framework for cross-boundary integration of devices and platforms, causing cutting-edge technological resources to be degraded into display materials and lose the value of reconstructing the learning process. The teachers' professional development system focuses on discrete technical training and neglects guidance on situational transfer, resulting in a disconnect between the application of intelligent system functions and the needs of solving real-world classroom problems. Students are faced with a sea of data manipulated by teachers, which intensifies the conflict of cognitive load. In the process of teaching reform, there is a misalignment between the potential of technology-enabled teaching and the pace of teaching method innovation. Some educators have not yet established norms for human-machine collaborative classroom management, and the fluctuating frequency of technology intervention disrupts the continuity of learners' in-depth thinking. The obstacles in the iterative cycle of teachers' capabilities fundamentally restrict the self-evolution potential of the intelligent education ecosystem.

3.4. Incomplete School-Enterprise Collaborative Cultivation Mechanism

The update cycle of industrial technology is much faster than the adjustment frequency of college courses, and the real data streams of production lines and teaching systems have long been in a state of physical isolation. Enterprises are concerned about protecting their core competitiveness and thus refuse to open the interface permissions of intelligent devices. Practical training projects only stay at the level of safe operation demonstration, making it difficult for students to reach the growth points of core abilities such as fault diagnosis and process optimization. The practical training devices provided by equipment manufacturers to colleges are often obsolete models, and students' contact with outdated control panels deepens the knowledge gap. The gap between the advanced technologies of enterprises and the content of college textbooks continues to widen. Under the dual-track operation framework of schools and enterprises, the non-uniform standards lead to conflicts in ability certification, and the intelligent operation and maintenance certificates recognized by the industry are difficult to be incorporated into the credit system. Enterprise tutors and teacher teams belong to different evaluation systems, and the two-way flow lacks a substantial value-transformation cycle. The imbalance between the willingness to share technology and the return on resource investment weakens the collaborative stickiness. Data islands limit the depth of information sharing between industry and education, and the dynamic change information of job-ability maps cannot be timely transmitted to the nerve endings of curriculum reform. The transmission link of tacit knowledge continues to dissipate between organizational barriers, and interns fall into a cognitive disconnection between operation manuals and real decision-making fields.

4. Innovative Path of Talent Cultivation in Higher Vocational Education under the Threshold of Informatization

4.1. Construction and Application of Intelligent Teaching Platform

The smart teaching platform is built based on AI and big data operation engines as strong technical support capabilities from the outset of the design. The modular design can dynamically change according to the knowledge graphs of different professional fields, providing a flexible structure for follow-up teaching applications. The platform developers follow educational principles to incorporate complex algorithms, while providing an intuitive interface designed to significantly lower the operational threshold for teachers, ultimately eliminating the technological cognition gap. Teachers adjust their teaching approaches dynamically based on the continuous academic data analysis, produce personalized learning task chains, enhance the cognitive efficiency of students, and respond to the needs of different learning styles. Built in collaboration tools on the platform support students to do virtual training remotely, optimize decision making processes from their operational actions conducted in simulated industry scenarios, and subsequently reduce their skills acquisition cycle. The technology iteration model governing the teaching-learning platform enables the update rhythm of the teaching-learning platform to connect directly with industry changes, matching the teaching learning resources to the prevailing requirements on site, resulting in a closed-loop feedback. The function of the learning behavior data capture also helps teachers to identify resources for hidden ability deficits and provides opportunity for precision interventions, compensating for the blind spots of traditional evaluations and ensuring a continuity of ability development. During the in-depth application process, the platform strengthens the technological symbiotic relationship between teachers and students. Its operation specifications integrate the requirements of professional scenarios, naturally cultivate digital work habits, and accelerate the efficiency of practical transfer. The practical project library continuously injects real industry cases. Learners acquire the thinking mode for solving complex problems through contextualized tasks and build a ladder for ability growth [3].

4.2. Construction of Virtual Simulation Training Base

Leveraging the industry-standard 3D modelling engine, the virtual simulation training base construction team established the immersiveness of their operating environment and broke through the safety bottleneck of training in high-risk settings. Accurate control of the physical engine validated the limiting error between the simulation and reality of the equipment operating parameters into threshold limits, and established a high-fidelity simulation effect. The architecture design is modular allowing for a flexible combination of processes to supply demand for multi-disciplinary reuse and mitigating the wasting of resources by duplicating construction. The technology developer an incremental update mechanism that maintained the virtual equipment upgrades cadence within the reality of the production launders technology iteration cadence, thereby continues to close the generation gap between teaching and production. The training manager can deploy distributed server clusters to ensure concurrent activity loads impact can easily be managed, even creating abnormal failure modes within the virtual assembly process to assess the learners ability to respond to emergencies. Operators would be able to build muscle memory of high-risk equipment maintenance use in immersed environment significantly reducing the safety risk of real equipment operations, and promising to build their technical intuition gradually. Dynamic scene generation technology simulates the aging operation process of the equipment, allowing learners to experience the logical chain of faults triggered by the gradual change of working condition parameters, and enhancing the fault diagnosis capability.

4.3. Individualized Learning Support Based on Big Data

The personalized learning support system based on big data constructs a meticulous ability growth model by precisely capturing learners' multi-dimensional operation traces. Advanced data collection technology skillfully integrates the knowledge test process and practical operation behaviors, generating a dynamic ability topology map that presents learners' ability development trajectories in real-time. Algorithm engineers carefully develop an adaptive recommendation engine, conduct in-depth analysis of individual ability gradient differences, and accurately push targeted training content, effectively avoiding the common risks of knowledge redundancy or discontinuity in standardized courses and customizing learning paths for each learner. Educational implementers precisely focus on weak areas according to the cognitive efficacy heat distribution map, design special remedial task chains, reshape the learning logical structure, and help learners break through bottlenecks. The learning management system customizes the optimal training duration allocation for each learner by mining the inflection points of skill-mastering rates, strengthens the effect of technology internalization, and improves learning efficiency. The intelligent early-warning module continuously scans the operation data stream, accurately identifies potential areas of ability collapse. Based on this, teachers pre-allocate virtual coach resources and implement resilience training plans to help learners overcome difficulties and make continuous progress. The occupational characteristic analysis algorithm precisely matches the job ability requirement database, generating a precise skill supplementation plan, which promotes the continuous harmonious development of course content and enterprise requirements and seamlessly meets workplace needs. The educational support team optimizes the weights of course modules according to the group ability distribution law, realizes the precise adaptation of the resource supply side to the dimensions of ability development needs, provides the most suitable learning resources for learners, and helps each learner move forward steadily on the path of personalized learning [4].

4.4. Construction of Digital Platform for Industry-Teaching Integration

The school-enterprise collaborative working group uses conventional communication tools as the foundational carrier to build a routine communication channel, to allow problems generated from the production site to be immediately translated into teaching improvement themes. In the particular implementation process, enterprise supervisors instantiate an update of the typical process standard documents in quarters and the education team synchronizes its adjustment of the core parameters of the training manual to maintain the timeliness and matching degree of the skills teaching. Production line technical experts regularly select shareable segments of equipment log fragments, and the full-time teacher team converts such real materials into progressive fault-diagnosis training task chains that enable continuous metabolism and regeneration of the practice course content. The human resources section of the cooperative enterprise compiles the quarterly employment demand report, and the academic affairs office builds the micro-ability unit combination framework on top of it to guide the students in terms of enhancing the characteristic abilities of identified positions, in addition to their compulsory courses. Enterprise engineers receive batches of tutoring tasks for students by the platform allocation mechanism per semester. As they complete the work-order guidance in a standard way, they will automatically amass corporate social responsibility points which could be used to exchange for preferential policies in school-enterprise collaboration. The team responsible for the development of the course created a question bank for the visualization case competition in a way that is not pedagogically oriented. It seeks to motivate learners intrinsically to solve real-world problems. Within the framework of a draft of the platform's regular demand matching meetings, the question bank is generated by obtaining data on students' skills, noting deviations from companies' recruitment requirements, and calibrating the weights of the training programs to provide a dynamic balancing mechanism for self-adaptation between education supply and companies' needs [5].

5. Conclusion

Informatization has provided strong leverage to higher vocational education talent cultivation and drastically broadened the horizons for development. Constructing intelligent teaching environments, building immersive virtual training, precise learning support, and deepening the digitalization of the integration of industry with education all reflect a more open and future-based education model; yet again, technology is the means of accomplishing that end, and its core value is to enable the true essence of schooling. Future explorations must place more emphasis on the further meaningful and deep integration of technology with humanistic values, address deep-rooted structural contradictions, and continuously shape the process in dynamic evolution. The crux of the matter is to integrate information technology fundamentally throughout the entire process of talent cultivation, to stimulate renewal in educational concepts, reconstructed models, and ecosystems to achieve a shape in the intelligent era of vocational professionals with both sophisticated skills, digital wisdom, and a humanistic lineage to achieve the grand goal of higher vocational education's connotative development.

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